The Ohio State University
Course Catalog

1964-1965
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
U G = Advanced Undergraduate and Graduate
G = Graduate
P = Professional (for professional students enrolled in that particular school only)
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.

C Classroom and laboratory hours: 3-cl.; 2-hr.
labs. In the illustration above, the 5 hours of credit are earned through satisfactory completion of course 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.

D 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
Accounting

Office: 452 Hagerty Hall, 1775 South College Road.

PROFESSORS 2MalCOLLough (Chairman), SFERTIG, and
SIIONTING; ASSOCIATE PROFESSORS 1BRUSH, 1BURN-
HAMP, 1BURNS, ICRAT, 1GRIMSTAD, 1KOLLARITSCH,
1LYLE, and 1NORTHUP.

501 Introduction to Accounting U 5
Su, A, W, Sp. 5 cl.
Prereq.: Econ. 401 or 403 or 405 or 501 or 503 or 506 or 507.
Not open to students with credit for 401-403, 411-
413, 405, or 510.
The uses of accounting reports in management decisions and in
control of business enterprises. Staff.

502 Introduction to Accounting U 5
Su, A, W, Sp. 5 cl.
Prereq.: 501 or Econ. 501 or 503 or 506.
Not open to students with credit for 401-403, 411-
413, 405, or 510.
The accrual interpretation of transactions and fundamentals of
income determination, uses of financial statements by persons
outside the firm. Staff.

503 Accounting Methods U 5
Su, A, W, Sp. 3 cl., 2 2-hr. labs.
Prereq.: 403, 413, or 502.
Not open to students with credit for 403 or 413.
The application of accounting techniques to recording and reporting
financial information. Special emphasis is given to accounting
systems and the use of working papers. Staff.

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

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. Brush.

605 Financial Accounting U G 4
Su, A, W. 4 cl.
Prereq.: 403, 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. Burn-
ham, Grimstad.

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

623 Principles of Automatic Data U G 3
Processing
A, W. 2 cl., 1 2-hr. lab.
Prereq.: 412 or 415 or 502. Econ. 512, 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.
McCullough.

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. Kollaritsch.

641 Tax Accounting I U G 4
Su, A, W, Sp. 4 cl.
Prereq.: 403 or 405 or 412 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. Gray.

642 Tax Accounting II U G 3
Su, A, W, Sp. 3 cl.
Prereq.: 611 and 403 or 413 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. Gray.

643 Introduction to Management U G 3
Accounting
A. 3 cl. and conf.
A survey of accounting principles from the viewpoint of manage-
ment; income measurement; analysis and interpretation of accoun-
ting data, internal reports. Lyle.

644 Introduction to Management U G 0
Accounting
W. 3 cl. and conf.
Prereq.: 643.
Continuation of 643.

713 Accounting Practice U G 4
Su, A, W, Sp. 4 cl.
Prereq.: 602 and 616 or 603 and 605.
A study of the accounting concepts and standards underlying
accounting statements, including con-
consideration of typical accounting problems. Burnham.

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

724 Accounting Systems U G 3
Sp. 3 cl.
Prereq.: 603 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. Shonting.

A-2
AERONAUTICAL AND ASTRONAUTICAL ENGINEERING

8251 Accounting Problems of Financial Institutions and Fiduciaries
A. 3 cl.
Prereq.: 602 and 616 or 603 and 606.
Accounting principles and problems peculiar to banks, insurance companies, brokerage and investment houses, receivers, executors, and trustees.

830 Governmental Accounting
A. 3 cl.
Prereq.: 20 hrs. in Acc. or equiv.
The application of accounting principles to government. Problems relating to funds, appropriations, and allotments. Specialization.

856 Accounting Policies of Regulatory Agencies
W. 3 cl.
Prereq.: 30 hrs. in Acc. or equiv.
Not open to students with credit for 850 or 855.

860 Accounting Aspects of Business Policy Determination
Sp. 3 cl.
Prereq.: 30 hrs. in Acc. or equiv.
Case studies with particular attention to accounting analysis and application thereof to business problems. McGee.

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

Aeronautical and Astronautical Engineering
PROFESSORS: J. VON ESCHEN (Chairman), G. BOLINGER, and M. LEE; ASSOCIATE PROFESSOR M. MALLETT; ASSISTANT PROFESSORS BOLLINGER and FISHERBURNE; and INSTRUCTORS.

681 Elements of Aeronautics and Astronautics
A. 4 cl.
Prereq.: Physics 533, Math 544 or conc.
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
W. 4 cl.
Prereq.: 681.
Continuation of 681.
683 Elements of Aeronautics and Astronautics
   Sp. 4 cl.
   Prereq.: 682.
   Continuation of 682.

688 Aeromechanics
   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
   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 Aerokinetik
   A. 4 cl.
   Prereq.: 688.
   Derivation of fundamental equations governing internal and
   external aerodynamic flows.

705 Aerothermochemistry I
   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
   Sp. 4 cl.
   Prereq.: 705, 768.
   The fundamentals of the aerodynamics of compressible fluids.

708 Classical Aerodynamics
   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
   A. 2 cl., 2 3-hr. labs.
   Prereq.: Aero. Astro. E. 5th yr. standing.
   Laboratory demonstrations and experiments in aerodynamics, aero-
   elastcic, propulsion, and structures of flight vehicles.

714 Advanced Aeronautical Laboratory
   W. 4-6 lab. hrs.
   Prereq.: Permission of department, 713 or equiv.
   The solution of problems in aero-space engineering by experi-
   mental methods.

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

724 Stability and Control of Flight Vehicles
   Sp. 4 cl.
   Prereq.: 739.

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

729 Motion and Deformation of Flight Vehicles
   A. 4 cl.
   Derivation of the basic equations and methods of analysis govern-
   ing the motions, deformations, and resulting stresses encountered
   by flight vehicles.

730 Flight Vehicle Structures
   W. 4 cl.
   Prereq.: 729.
   Stress and deformation analysis of light weight structures for
   flight vehicles under static and dynamic loadings.

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

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

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

754 Aeroelasticity
   A. 4 cl.
   Prereq.: 708, 710.
   Dynamic loads analysis of elastic flight vehicles subjected to
   unsteady airloads.

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

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

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

772 Advanced Compressible Flow I
   W. 4 cl.
   Prereq.: 707.
   Characteristic methods, sonic flow phenomena, supersonic wing
   theory, and slender body theory.
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<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
<th>Notes</th>
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<td><em>Prereq.: 773 and 775. Wing-body interference, shock wave-boundary layer interaction, and control surfaces in supersonic flow.</em></td>
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<td>775</td>
<td>Aerodynamics of Viscous Fluids I</td>
<td>U G 4</td>
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<td><em>Prereq.: 707. The elements of laminar and turbulent boundary layers in incompressible flows.</em></td>
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<td>776</td>
<td>Aerodynamics of Viscous Fluids II</td>
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<td><em>Prereq.: 775. Advanced problems in boundary layer flows.</em></td>
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<td>777</td>
<td>Superaerodynamics</td>
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<td>Aerodynamic Heating</td>
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<td><em>Prereq.: 775. The analysis of laminar and turbulent boundary layer heat transfer in high speed flow.</em></td>
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<td>779</td>
<td>Hypersonic Flows</td>
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<td>*Prereq.: 772 and 775.</td>
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<td>787</td>
<td>Analytical Dynamics of Astronautics I</td>
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<td></td>
<td><em>Prereq.: 729 or equiv. The dynamical analysis of spacecraft trajectories and orbits including atmospheric re-entry.</em></td>
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<td>788</td>
<td>Analytical Dynamics of Astronautics II</td>
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<td><em>Prereq.: 787 or equiv. Drag estimation, transfer orbits, perturbations, and three-body problems.</em></td>
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<td><em>Prereq.: 779. Continuation of 779.</em></td>
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<td>790</td>
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<td><em>Prereq.: Aero-Astro. E. 5th yr. standing.</em></td>
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<td><em>Prereq.: Written permission of department. Repeatable to a maximum of 15 cr. hrs.</em></td>
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<td>Special advanced topics in aeronautical and astronautical engineering with the specific area under consideration announced.*</td>
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<td><em>Prereq.: Written permission of department. Repeatable to a maximum of 15 cr. hrs.</em></td>
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<td></td>
<td>Special studies in aeronautical and astronautical engineering under one or more topics, including aircraft structures, aerodynamics, propulsion, flutter and vibration, and stability and control.*</td>
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<td>821</td>
<td>Advanced Dynamics of Flight Vehicles</td>
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<td>Advanced Dynamics of Flight Vehicles</td>
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<td>831</td>
<td>Aerodynamics of Plasmas</td>
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<td><em>Prereq.: 707, 775, and Elec. E. 832 or equiv.</em></td>
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<td>832</td>
<td>Aerodynamics of Plasmas</td>
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<td>841</td>
<td>Advanced Structures for Flight Vehicles</td>
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<td>842</td>
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<td>861</td>
<td>Advanced Propulsion for Flight Vehicles</td>
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<td>862</td>
<td>Advanced Propulsion for Flight Vehicles</td>
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A-5
### AERONAUTICAL AND ASTRONAUTICAL ENGINEERING

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<th>Course Code</th>
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<th>Credits</th>
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<tr>
<td>571</td>
<td>Advanced Aerodynamics</td>
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<td>572</td>
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<td>573</td>
<td>Advanced Aerodynamics</td>
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<td>581</td>
<td>Seminar</td>
<td>G 1</td>
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<td>A, W, Sp. 1 2-hr. cl.</td>
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<td>Repeatability should be scheduled at least once by candidates for the M.S. degree and at least three times by candidates for Ph.D. degree.</td>
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<tr>
<td>950</td>
<td>Research in Aeronautical and Astronautical Engineering</td>
<td>G Arr.</td>
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<td>Research for thesis or dissertation purposes only.</td>
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### Agricultural Biochemistry

Office: 101 Vivian Hall, 2121 Fyffe Road.

PROFESSORS: D'EAHERAGE (Chairman), ALMY (Emeritus), BROWN, BURBELL (Emeritus), MOORE, MOXON, and SNELL; ASSOCIATE PROFESSORS: BULLEN and GANDER; ASSISTANT PROFESSORS: CLEMENTS, DOUGALL, HIVES, MENDICINO, and SERIF.

For related courses see Biology.

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<th>Course Code</th>
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<th>Credits</th>
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<td>610</td>
<td>Introduction to Biological Chemistry</td>
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<td>Su, A, W, Sp. 3 cl.</td>
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<td>Prereq.: Chem. 405 or 408 or 551 and 2 qtrs. of biological science.</td>
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<tr>
<td>611</td>
<td>Introduction to Biological Chemistry Laboratory</td>
<td>U G 3</td>
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<td>Su, A, W, Sp. 2 cl., 2 2-hr. labs.</td>
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<td>Prereq. or concurr.: 610</td>
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<td>Laboratory work to accompany 610. Assay techniques for chemical constituents and metabolic reactions of living cells.</td>
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<tr>
<td>613 *</td>
<td>Chemistry of Foods and Food Processing</td>
<td>U G 5</td>
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<td>W. 3 cl., 2 3-hr. labs.</td>
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<td></td>
<td>Prereq.: Chem. 521 and 551 or equiv.</td>
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<tr>
<td></td>
<td>The chemical, physical, and biological nature of foods in relation to handling, processing, packaging, quality, and consumer acceptance. D' Etherage.</td>
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</tbody>
</table>

### Biochemistry of Animal Function

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>620</td>
<td>Biochemistry of Animal Function</td>
<td>U G 3</td>
<td></td>
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<tr>
<td></td>
<td>A, Sp. 3 cl.</td>
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<tr>
<td></td>
<td>Prereq.: Chem. 531 or equiv.</td>
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<tr>
<td></td>
<td>Biochemical bases of animal function and nutrition.</td>
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</tbody>
</table>

### Biochemistry of Animal Function Laboratory

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>621</td>
<td>Biochemistry of Animal Function Laboratory</td>
<td>U G 3</td>
<td></td>
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<tr>
<td></td>
<td>A, Sp. 2 3-hr. labs.</td>
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<tr>
<td></td>
<td>Prereq. or concurr.: 620</td>
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<tr>
<td></td>
<td>Laboratory course to accompany 620. Assay techniques for chemical constituents and metabolic reaction in animals. Biochemistry of nutritional deficiency.</td>
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</table>

### Topics in Biological Sciences

(See Biology 690.)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Type</th>
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</thead>
<tbody>
<tr>
<td>701</td>
<td>Special Problems</td>
<td>U G 2.5</td>
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<tr>
<td></td>
<td>Prereq.: 6 qtrs. hrs. of biochemistry.</td>
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</table>

### General Biological Chemistry

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Type</th>
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</thead>
<tbody>
<tr>
<td>705</td>
<td>General Biological Chemistry</td>
<td>U G 3</td>
<td></td>
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<td></td>
<td>A. 3 cl.</td>
<td></td>
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<tr>
<td></td>
<td>Prereq.: Chem. 617, 648, 649, 650, or 655, 656, 657, 659 or equiv. and Math. 536 or equiv. Chem. 581 recommended. 705, 707, 709 should be taken in sequence.</td>
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<tr>
<td></td>
<td>An intensive treatment of modern biochemistry. Protein structure, thermodynamics of enzyme catalyzed reactions and oxidation-reduction reactions in living systems.</td>
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</table>

### General Biological Chemistry Laboratory

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Type</th>
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</thead>
<tbody>
<tr>
<td>706</td>
<td>General Biological Chemistry Laboratory</td>
<td>U G 3</td>
<td></td>
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<tr>
<td></td>
<td>A. 2 4-hr. labs.</td>
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<td></td>
<td>Prereq. or concurr.: 705, 706, 708, 710 must be taken in sequence.</td>
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<td></td>
<td>Laboratory to accompany 705.</td>
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</table>

### General Biological Chemistry

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Type</th>
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</thead>
<tbody>
<tr>
<td>707</td>
<td>General Biological Chemistry</td>
<td>U G 3</td>
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<tr>
<td></td>
<td>W. 3 cl.</td>
<td></td>
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<td></td>
<td>Prereq.: 705.</td>
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<tr>
<td></td>
<td>An intensive treatment of modern biochemistry. Chemistry and intermediary metabolism of lipids and carbohydrates.</td>
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</table>

### General Biological Chemistry Laboratory

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Type</th>
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<tbody>
<tr>
<td>708</td>
<td>General Biological Chemistry Laboratory</td>
<td>U G 3</td>
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<tr>
<td></td>
<td>W. 2 4-hr. labs.</td>
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<tr>
<td></td>
<td>Prereq.: 706.</td>
<td></td>
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<tr>
<td></td>
<td>Laboratory to accompany 707.</td>
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</table>

### General Biological Chemistry

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Type</th>
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</thead>
<tbody>
<tr>
<td>709</td>
<td>General Biological Chemistry</td>
<td>U G 3</td>
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<td></td>
<td>Sp. 3 cl.</td>
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<tr>
<td></td>
<td>Prereq.: 707.</td>
<td></td>
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<tr>
<td></td>
<td>An intensive treatment of modern biochemistry. Intermediary metabolism of proteins and nucleic acids; function of vitamins and hormones.</td>
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</tbody>
</table>

### General Biological Chemistry Laboratory

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Type</th>
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<tbody>
<tr>
<td>710</td>
<td>General Biological Chemistry Laboratory</td>
<td>U G 3</td>
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<tr>
<td></td>
<td>Sp. 2 4-hr. labs.</td>
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<tr>
<td></td>
<td>Prereq.: 708.</td>
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<tr>
<td></td>
<td>Laboratory to accompany 709.</td>
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### Seminar

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Type</th>
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</thead>
<tbody>
<tr>
<td>804</td>
<td>Seminar</td>
<td>G 1 or 2</td>
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<td></td>
<td>A, W, S. 1 or 2 cl.</td>
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<tr>
<td>804A</td>
<td>Topic to be announced.</td>
<td>G 1</td>
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<tr>
<td>804B</td>
<td>Journal Seminar</td>
<td>G 1</td>
<td></td>
</tr>
</tbody>
</table>
Agricultural Economics

Office: 103 Agricultural Administration Bldg., 2120 Faye's 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, pricing, and the economics underlying these trends. McCormick, Bailey.

502 Farm Management
U 5
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.
Organization and operation of farm business. Economic and management principles involved in decision making, farm planning, enterprise selection, financing, and tenure. Sitterley, Shadys.

510 Farm Records and Analysis
U 3
W, 2 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 manager viewpoint. Their use in income tax reporting. Baker, Shadys.

602 Advanced Farm Organization
U 5
A, 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. Sitterley, Shadys.

603 Cooperation in Agriculture
U 5
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. Hennings.

605 Agricultural Policy
U 3
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
U 3
W, 3 cl.
Prereq.: 613 or Bus. Org. 730.
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 Animal Science.) Hennings, Stout.

610 Agricultural Finance
U 3
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. Bailey.

612 Prices of Farm Products
U 3
Su, 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
U 5
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. Hennings, Baumler, Sharp, Fadberg, Crocens, and Stout.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
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</thead>
<tbody>
<tr>
<td>614</td>
<td>Business Management in Agricultural Marketing</td>
<td>U G 3</td>
<td>Sp. 2 cl. 1 lab. Prereq.: 420 and Econ. 401, 402 or 406 or 501, 502 or 506.</td>
</tr>
<tr>
<td>615</td>
<td>Land Economics</td>
<td>U G 3</td>
<td>Su, Sp. 3 cl. Prereq.: 420 and Econ. 401, 402 or 406, or 501, 502, or 506, or 3rd yr. standing and permission of instructor.</td>
</tr>
<tr>
<td>616</td>
<td>Food Economics</td>
<td>U G 3</td>
<td>Sp. 3 cl. Prereq.: Econ. 401, 402 or 404 or 406 or 501, 502 or 504 or 506.</td>
</tr>
<tr>
<td>618</td>
<td>Farm Appraisal</td>
<td>U G 3</td>
<td>Sp. 3 cl. 3 hr. field trips during qtr. Prereq.: 502.</td>
</tr>
<tr>
<td>626</td>
<td>Marketing Dairy Products</td>
<td>U G 3</td>
<td>W. 3 cl. Prereq.: 613 or permission of instructor.</td>
</tr>
<tr>
<td>628</td>
<td>Marketing Fruits and Vegetables</td>
<td>U G 3</td>
<td>Sp. 3 cl. One 3 day field trip. Prereq.: 613 or Bus. Org. 700.</td>
</tr>
<tr>
<td>633</td>
<td>Grain Marketing</td>
<td>U G 3</td>
<td>A. 3 cl. Prereq.: 420 and Econ. 401, 402 or 406 or 501, 502 or 506.</td>
</tr>
<tr>
<td>650</td>
<td>Foreign Agricultural Development</td>
<td>U G 3</td>
<td>A. 3 cl. Prereq.: 420 and Econ. 401, 402 or 406, or 501, 502 or 506, or permission of instructor.</td>
</tr>
<tr>
<td>697</td>
<td>Natural Resources Problems, Programs, and Policies</td>
<td>U G 4</td>
<td>W. 2 2 hr. cl. Prereq.: Conserv. 401 and 314, or equiv. with permission of instructor.</td>
</tr>
<tr>
<td>811</td>
<td>Research Methods in Agricultural Economics</td>
<td>G 3</td>
<td>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.</td>
</tr>
<tr>
<td>820</td>
<td>Economics of Agricultural Production</td>
<td>G 3</td>
<td>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.</td>
</tr>
<tr>
<td>821</td>
<td>Advanced Economics of Agricultural Production</td>
<td>G 3</td>
<td>A. 3 cl. Prereq.: 820, Econ. 604 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.</td>
</tr>
<tr>
<td>830</td>
<td>Advanced Farm Organization and Resource Management</td>
<td>G 3</td>
<td>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. Shady.</td>
</tr>
</tbody>
</table>
Agricultural Education

Office: 208 Agricultural Administration Bldg., 2129 Yaffe Road. FERNS: BENDER (Chairman), KIRBY, IMCORMICK, 
MNICHIE, ROBINSON, STEWART (Emeritus), WOLF, WOOD, and WOODIN; ASSOCIATE PROFESSORS BOLENDES 
(Emitates), GUILLER, I. E. JOHNSON, TAYLOR, and WILSON; ASSISTANT PROFESSORS FIDLER (Emeritus), 
RUBLE, and WORBALL.

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. Boucher

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. Wolf.

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. Concours 504 and 505.
Guided participation in the professional responsibilities of a teacher of vocational agriculture, including an intensive study of the problems encountered and the competencies developed. Boucher, Guiller, Wilson.

505 Student Teaching in Vocational Agriculture
A, W.
Prereq.: Concours 504 and 505. See 504 for description and requirements.

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

526 Principles in Extension Program Development
A, 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 10 or 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.
COURSES OF INSTRUCTION
AGRICULTURAL EDUCATION

611 Teaching Aids for Agricultural Education
Sp. 2 cl., 1 lab.
Theory and practice in the development and utilization of teaching materials in agricultural education. Woodin, Guiler.

624 Apprenticeship in Agricultural Education
W, Sp.
Prereq.: 504, 505, 506 and permission of instructor.
Concur. 625 and 626.
Experience in a selected county and school community with full time devoted to these courses.
Guided participation in vocational agriculture, agricultural extension, and other programs in agricultural education in order to develop further competency in teaching. Boucher, Cunningham, Guiler, Wilson.

625 Apprenticeship in Agricultural Education
W, Sp.
Concur: 624 and 626.
See 624 for description and requirements.

626 Apprenticeship in Agricultural Education
W, Sp.
Prereq.: Concur 624 and 625.
See 624 for description and requirements.

701 Special Problems
Su (either term or quarter), A, W, Sp.
Planning, conducting, and reporting a special problem in agricultural education appropriate to the needs of the student.

703 Methods in Teaching Agriculture
Su (1st term), W, 3 cl.
Prereq.: Teaching or extension experience in agriculture or permission of instructor.
Conditions and procedures that promote effective teaching in agricultural education at the secondary and college level. Bender.

705 Supervised Occupational Experiences
A, 3 cl.
Prereq.: Supervision of occupational experiences in agriculture.
Principles and procedures used in selecting, planning, conducting, and evaluating supervised occupational experiences in agriculture as related to teaching-learning situations. Woodin, Wolf.

707 Curriculum in Vocational Agriculture
Su (1st term), 3 2-hr. cl.
Prereq.: Teaching experience in vocational agriculture, or permission of instructor.
Principles and practices in the development of four-year programs of instruction adapted to local interests and needs for high school classes of vocational agriculture. Guiler.

708 Methods in Teaching Agricultural Mechanics
Su (1st term), 3 2-hr. cl., 1 2-hr. lab.
Prereq.: Teaching experience in vocational agriculture.
Emphasis upon teaching procedures and the development of resource units for use in vocational agriculture. Guiler.

709 Methods in Teaching Farm Business Planning
Su (1st term) A 3 2-hr. cl., 1 2-hr. lab.
Prereq.: Teaching experience in vocational agriculture.
Emphasis upon teaching procedures for vocational agriculture concerning farm business planning. Boucher.

712 Youth Organizations in Agriculture
Sp. 3 cl.
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.

715 Adult Education in Agriculture
A, 3 cl.
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.

716 Evaluation in Agricultural Education
Sp. 3 cl.
Prereq.: Experience in Agri. Ed. or permission of instructor.
Principles and procedures of evaluation used in projecting and developing programs of agricultural education. Woodin.

799 Workshop in Agricultural Education
Full time of student required for three weeks; no other courses concur.

799A Workshop—Program Planning in Agricultural Extension
W.
Open only to persons employed or about to be employed as extension workers.
Principles and methods involved in the formulation of policies and programs in various aspects of agricultural and home economics extension. McCormick.

799B Workshop—Program Planning in Vocational Agriculture
Su (2nd term).
Su.
Open only to persons employed or about to be employed as teachers of vocational agriculture. Repeatable to a maximum of 8 cr. hrs.
Objectives and methods of local program planning with special attention devoted to the appraisal of student needs and the use of community resources. Woodin, Wolf, Taylor.

799C Workshop—Communication in Agricultural Education
Su.
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.

799D Workshop—Student and Apprentice Teaching in Agricultural Education
Su.
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 Iowa Hall, 2079 Neil Ave.

PROFESSORS: STEWART (Chairman), BARDE (Emeritus), BARRE, SHAFTS, KENNEDY (Emeritus), McCUNE (Emeritus), McLEOD, MILLER (Emeritus), OVERHOLT (Emeritus), and ISCHWAB; ASSOCIATE PROFESSORS IBAZEE, CURRY, HUBER, I.C.E. JOHNSON, W.W. JOHNSON, and GROOLLER; INSTRUCTOR HALL.

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

508 Practical Experience in Agricultural Engineering
A.
Prereq.: Permission of advisor.
Ten weeks of agricultural engineering work prior to 6th year. The occupation, work completed, and a written report shall be subject to approval by advisor.

510 Food Products Engineering
A. 3 cl., 2 2-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 416 or 439.
Not open to students with credit for 502.

525 Machines for Agricultural Operations
A, S. 2 cl., 2 lab. hrs.
Prereq.: S13 or permission of instructor.
Not open to students with credit for 401.
Analysis 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, Sp. 2 cl., 3 lab. hrs.
Prereq.: Math. 416 or 439, Agron. 501.
Not open to students with credit for 401.
Use and application of surveying instruments, serial and topographic maps, rainfall and runoff, and engineering problems of soil and water management on farms. Schwab.
COURSES OF INSTRUCTION
AGRICULTURAL ENGINEERING

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 selec-
tion of economic power units. Harkness.

557 Engineering of Crop Growth and
Environment I
U 4
W. 4 cl.
Plant ecology, especially crop response to extremes of soil mois-
ture, precipitation, infiltration, evapotranspiration, runoff, and
probability of drought and excess moisture. Soil classification.
Scheuba.

567 Engineering of Crop Growth and
Environment II
U 4
Sp. 3 cl., 1 3-hr. lab.
Prereq.: 557, concur. Civil E. 611.
Soil erosion principles and control. Contouring, terracing, vegeta-
tion, tillage and hydraulic conveyance structures. Earth dams
and farm reservoirs. Headwater flood reduction and flood routing.
Scheuba.

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. Stewart.

605 Advanced Farm Power and
Field Machinery
U G 3
Su (1st term). A. 3 cl., 2 3-hr. labs.
Not open for graduate credit to Agr. E. students.
An advanced study of harvesting machines and power units from
the mechanical, operational, and economic standpoint. Emphasis
is given to the development of optimum harvest systems.

655 Sources and Utilization of Energy
in Agriculture
U G 5
W. 3 cl., 2 3-hr. labs.
Not open for graduate credit to Agr. E. students.
A study of sources of energy, principles of energy conversion, and
energy conversion systems importance to agriculture. Huber.

677 Engineering of Crop Growth and
Environment III
U G 5
A. 3 cl., 2 3-hr. labs.
Prereq.: 567, Bot. 606.
Not open for graduate credit to Agr. E. students.
Pumps and pumping. Design of drainage channels, subsurface
drains, and irrigation systems. Methods of irrigation. Special soil
problems and plant requirements. Legal aspects. Scheuba.

687 Engineering of Crop Growth
Environment IV
U G 4
Sp. 3 cl., 1 3-hr. lab.
Not open for graduate credit to Agr. E. students.
Factors influencing plant growth and engineering methods of con-
trolling growth factors through mechanical means. Approach to
functional design. Huber.

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

702 Special Problems U G 3-5
Prereq.: 15 hrs. of 600 level Agr. E. courses and per-
mission of instructor.
Not open for graduate credit to Agr. E. students.
Work on problems that are not included in regular courses. Practi-
tice in development, organization, solution, and report on prob-
lems of student's choosing.

703 Special Problems U G 3-5
Prereq.: 702.
Not open for graduate credit to Agr. E. students.

752 Engineering of Agricultural Processes U G 5
and Related Structures I
A. 5 cl.
Not open for graduate credit to Agr. E. students.
Functional requirements and principles involved in housing ani-
mal and biological materials. Analysis of physical-chemical fac-
tors and properties affecting energy exchanges with the environ-
ment. Barre.

762 Engineering of Agricultural Processes U G 5
and Related Structures II
W. 5 cl.
Prereq.: 752, Elec. E. 664.
Not open for graduate credit to Agr. E. students.
Analysis of processing and materials-handling subsystem functions
in agriculture designed to provide greater yield from raw products
and to reduce human labor. Harkness.

765 Functional Design of Harvesting U G 4
A. 3 cl., 1 3-hr. lab.
Not open for graduate credit to Agr. E. students.
Harvesting machine functional requirements imposed by crop
physical and biological characteristics, by desired condition of
harvested material, and by the production system. Approach to
functional design. McLeod.

772 Engineering of Agricultural Processes U G 4
and Related Structures III
Sp. 3 cl., 1 3-hr. lab.
Prereq.: 762, Mech. E. 783.
Not open for graduate credit to Agr. E. students.
Design of agricultural structures and interior environments to
meet load requirements and to optimize recovery of animal and
plant production. Barre.

775 Engineering of Agricultural Machines
U G 5
W. 3 cl., 2 3-hr. labs.
Not open for graduate credit to Agr. E. students.
Complete engineering development of machines for agricultural
operations. Introduction to experimental work, advanced work in
analysis, functional and mechanical design, economic consider-
ation. McLeod.
779 Engineering of Agricultural Systems
S p. 3 cl., 2 2-hr. labs.
Prereq.: Concwr. 772.
Not open to graduate credit to Agr. E. students.
Integration of engineering and biological principles in agriculture to optimize complete operational production systems. Application of relevant theory to present and future systems.

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

Advanced Studies in Agricultural Engineering
A. Sp. 3 cl.
Prereq.: 15 cr. hrs. of 600 level Agr. E. 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 Structure, Stewart; Sp.—Power and Machinery.

Workshop
Su (first term), first three weeks—full time.
Prereq.: 15 cr. Agr. E. Permission of instructor.
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.
Workshop—Farm Mechanics, Johnson.

Seminar
Repeatable to a maximum of 3 cr. hrs.

Measurement in Agricultural Engineering
Su. 3 cl.
Prereq.: Math. 626, 672, 727, Mech. E. 761, 762, or equiv.
Theory and principles involved in measurement and control of biophysical processes in agricultural engineering. Stewart.

Soil-Machine Dynamics in Plant Environment
Sp. 3 cl.
Mass and heat transfer in soil and dynamics of mechanical actions on soil in relation to plant environment and agricultural machine design and use. McLeod.

Aerosol Mechanics in Agricultural Engineering
A. 4 cl.

Advanced Agricultural Drainage
W. 3 cl.
Prereq.: 677 and Math. 660.
599 Undergraduate Seminar  U  2
W.  2 cl.
Prereq.: 15 cr. hrs. in Agron. and 3rd or 4th yr.
standing in Agron.
Research paper and evaluation; the function of
agronomic industries is studied.

600 Crop Production in Developing Countries  U G  4
W.  4 cl.
Prereq.: 403, 501, or equiv.
Fundamental studies of field and plantation crops in tropical and
subtropical countries with emphasis on means and techniques for
obtaining production increases. Volk, Albion, Hartman.

601 Crop Management Problems and Practices  U G  5
A, W.  5 cl.
Prereq.: 501, 520, or equiv.
Recognizing, correlating, and solving crop problems relating to the
efficient production and use of field crops.

603 Origin and Classification of Soils  U G  5
Sp.  4 cl., 1 2-hr. lab.
Prereq.: 501 and Geol. 416 or equiv.
Factors and processes in soil formation and the classification of
soils with specific reference to Ohio conditions. Holowaychuk.

604 Soil Erosion and Its Control  U G  5
A.  4 cl., 1 3-hr. lab.
Prereq.: 501 and Geol. 416 or equiv.
A study of the mechanics of soil erosion and its control. Field
trips to observe erosion and conservation practices are included. Hof.

605+ Soil Microbiology  U G  5
Sp.  3 cl., 2 2-hr. lab.
Prereq.: 501, Microbid. 607 or permission of instructor.
A study of the morphology and physiology of soil microorganisms
and their biochemical transformations of inorganic and organic
materials in relation to soil fertility. Miller.

608 Soil Physics  U G  5
A.  3 cl., 2 2-hr. lab.
Prereq.: 501, 1 yr. college Physics and Math. 440 or
536.
A study of the physical makeup and properties of soil, including
structure, thermal relationships, consistency, plasticity, water, and
their relationships. Taylor.

611 Soil Fertility  U G  3
A.  3 cl.
Prereq.: 501.
A study of the factors affecting soil productivity and the practices
needed in good soil management. Fertilizer practices and prac-
tices are included. Hof.

613 Soil Management  U G  3
A.  3 cl.
Prereq.: 501 or equiv.
An integrated study of fertility, tillage, erosion control, and water
management in maintaining soil productivity. Musgrave.

614+ Field Crop Breeding  U G  4
W.  3 cl., 1 2-hr. lab.
Prereq.: 403 and Zool. 604 or Biol. 604 or equiv.
Principles of genetics and methods of plant breeding applied to the
improvement of field crops and the ultimate development of
superior varieties. Smith.

620 Principles of Grassland Management  U G  4
Sp.  4 cl., 4 day field trip.
Prereq.: 501 and 530 or permission of instructor.
An advanced course primarily dealing with establishment, man-
agement, maintenance, and utilization of important forage species
such as pasture, hay, silage, sod crops, and ranges. Anderson.

630 Principles of Turfgrass Selection and Management  U G  4
Sp.  4 cl.
Prereq.: 501 and Bot. 401 or permission of instructor.
Adaptation, identification, growth characteristics, growth re-
responses, and fundamental principles essential to the production of
quality turf. Miller.

640 Field Crop Ecology  U G  3
Sp.  3 cl.
Prereq.: 501, 515, 520, and permission of instructor.
A study of the relationship of crop plants to climate, soils, and
other limiting factors of distribution, production, and quality.
Bendixen.

701 Special Problems  U G  2-5
Prereq.: Permission of instructor.
Students may select special agronomic problems, not included in
regular courses and involving library, laboratory, or field studies.

712 Chemistry of Soils and Fertilizers  U G  5
W.  3 cl., 2 2-hr. labs.
Prereq.: 611, Chem. 521 or equiv. and permission of
instructor.
A study of the chemical properties of soils and fertilizers affecting
plant growth and composition including modern laboratory analy-
sis of soil, fertilizer, and plant tissue. McLean.

801 Agronomy Seminar  G  1
Prereq.: Repeatable to a maximum of 6 cr. hrs.
Discussion of current problems in agronomy.

802 Advanced Studies in Agronomy  G  3
Prereq.: Permission of instructor.
A. Techniques with Field Plot Data. Ray.
C. W. Radioactive Tracers in Plant and Soil Research.
D. A. Theories and Application of Agronomic Re-
search. McLean.

805 Physical Chemistry of Soils  G  5
W.  3 cl., 2 2-hr. lab.
Prereq.: 608, Chem. 676 or 681, 682 and permission of
instructor.
A study of the physico-chemical properties of soils including
methods of characterizing clay minerals, soil acidity, ionic ab-
sorption and release, and plant nutrient uptake. McLean.

807 Techniques of Experimental Design  G  5
W.  5 cl.
Prereq.: Zool. 630 or Biol. 630 or equiv.
A study of experimental designs and their application to agricul-
tural research. Smith.
AIR SCIENCE

501 World Military Systems U 2
W. 2 cl., 1 lab. hr.
Prereq.: 401, 402, and 403 or permission of the Professor of Air Science.
A survey course comparing the characteristics and functions of Free World air forces (other than USAF) and their place in allied regional security organizations.

502 World Military Systems U 2
W. 2 cl., 1 lab. hr.
Prereq.: 401, 403, and 405 or permission of the Professor of Air Science.
A survey course comparing the mission, organization, functions, and characteristics of Free World land and naval forces.

503 World Military Systems U 2
Sp. 2 cl., 1 lab. hr.
Prereq.: 401, 402, and 405 or permission of the Professor of Air Science.
A study of the mission, organization, functions, and characteristics of Communist air, land, and naval forces and the characteristics and operations of Communist regional security organizations.

601 Growth and Development of Aerospace Power U 3
A. 4 cl., 1 lab. hr.
Prereq.: 501, 502, and 503 or permission of the Professor of Air Science.
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 U 3
W. 4 cl., 1 lab. hr.
Prereq.: 501, 502, and 503 or permission of the Professor of Air Science.
A survey course covering the mission and organization of the Defense Department; Air Force concepts, doctrine, employment; and introduction to astronautics and space operations.

603 Growth and Development of Aerospace Power U 3
Sp. 4 cl., 1 lab. hr.
Prereq.: 501, 502, and 503 or permission of the Professor of Air Science.
A survey course covering present and future astronautics and space operations, and the future development of aerospace power.

701 Weather and Navigation U 3
A, W. 4 cl., 1 lab. hr.
Prereq.: 601-602-603 or permission of the Professor of Air Science.
Basic principles of weather and air navigation. Prepares student for entry into Air Force flight training.

704 The Air Force Officer U 0
A, W, Sp. 1 cl., 1 lab. hr.
Prereq.: 601-602-603.
A study to help the student make a rapid and effective adjustment to active duty as an officer in the United States Air Force.

Air Science

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

401 Foundations of Aerospace Power U 2
A. 2 cl., 1 lab. hr.
An introductory examination of the factors of aerospace power, major ideological conflicts, requirements for military forces in being, responsibilities of citizenship, development and traditions of the military profession, role and attributes of the professional officer in American democracy, organization of the armed forces in the preservation of national security, and the United States Air Force as a major factor in the security of the free world.

402 Foundations of Aerospace Power U 2
W. 2 cl., 1 lab. hr.
Prereq.: 401.
Continuation of 401.

403 Foundations of Aerospace Power U 2
Sp. 2 cl., 1 lab. hr.
Prereq.: 402.
Continuation of 402.
Anatomy

Office: 414 Hamilton Hall, 1845 Neil Avenue.


For related courses see Biology.

504 Introductory Anatomy U 5
Su, A, W, Sp. 2 cl., 2 3-hr. labs.
Prereq.: Zool. 400 or Biol. 402 or equiv. Zool. 401 recommended.
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. 3 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., 2 3-hr. labs.
Prereq.: Zool. 400 or Biol. 402, Zool. 401, or equiv. Open only to optometry, pre-dental, pre-medical, and pre-veterinary students.
The basic plan of vertebrates with emphasis on the dogfish shark and on phylogeny leading to the mammals. Julyan.

604 Anatomical Methods U G 5
A. 2 cl., 9 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 Staff.

607 General Histology U G 5
W. 2 cl., 2 3-hr. labs.
Prereq.: 504 or 513.
A detailed study of the tissues, and a general survey of the microscopic structure of the various organs. Wismar.

608 The Eye U G 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.

611 Comparative Histology U G 5
A. 3 cl., 3 2-hr. labs.
Prereq.: 515 or 613 or Zool. 620.
A general consideration of cells, tissues and organs of animals with emphasis on the comparative and evolutionary aspects. Wismar.

613 Comparative Morphology of the Lower Vertebrates U G 5
A. 2 cl., 3 2-hr. labs.
Prereq.: Zool. 400 or Biol. 402, Zool. 401, or equiv.
Not open to optometry, pre-dental, pre-medical or pre-veterinary students.
Comparative morphology of representative lower vertebrates. Julyan.

615 Human Developmental Anatomy P G 4
A. 2 cl., 2 3-hr. lab.
Prereq.: Med. 1st yr. standing.
Emphasis is on human gametogenesis, fertilization, and the formation of germ layers, fetal membranes and organs. Weston, Russel.

616 Fundamentals of Embryology U G 5
Su, W. 2 cl., 2 3-hr. lab.
Prereq.: 513 or 613 or Zool. 630.
The fundamental principles of embryology with special emphasis on development of the lower vertebrates. Delphin.

618 Introductory Neurology U G 5
A. 3 cl., 2 3-hr. labs.
Prereq.: 513 or 613 or permission of instructor.
An elementary presentation of the structure and function of the human nervous system. A basic consideration of the neurological systems and nervous mechanisms. Humberten.

619 Comparative Morphology of Mammals U G 5
W. 2 cl., 2 3-hr. labs.
Prereq.: 513 or 613 or equiv.
Morphology of mammals, including man, from the point of view of their structural evolution. Julyan.

621 Human Anatomy P G 6
A. 3 cl., 9 lab. hrs.
Prereq.: Med. 1st yr. standing.

622 Human Anatomy P G 6
W. 3 cl., 9 lab. hrs.
Prereq.: Med. 1st yr. standing.
Gross anatomy of the head, neck, and limbs, using cadavers, roentgenograms, cross sections, models, and films. Physical diagnosis, television demonstrations, and individual practice in the clinic, Graces, Eddwards, Eglitis, Goughman, Gersten, Hines.

624 Histology P G 5
W. 3 cl., 3 2-hr. labs.
Prereq.: Med. 1st yr. standing.
General histology, cytology, epithelial, connective, bone, muscular, and nervous tissues, blood, hemoplastic tissue and vascular system. Eglitis, Ackerman, Caso, Vernall, Weston, Wismar.

625 Histology U G 5
Sp. 3 cl., 3 2-hr. labs.
Prereq.: Med. 1st yr. standing.
Special histology of the intermembranous, digestive, respiratory, urogenital, and endocrine systems. Eglitis, Ackerman, Caso, Vernall, Wismar.

626 Human Neurology U G 5
Sp. 3 cl., 3 2-hr. lab.
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, Kasibing.

627 Clinical Anatomy P G 2
Sp. 2 cl.
Prereq.: Med. 2nd yr. standing.
A study of selected anatomical regions correlated with clinical diagnostic methods. Graces and Staff.
637 Essentials of Embryonic Development P G 3
A. 2 cl., 1 3-hr. lab.
Dent. 1st yr. standing.
The essential features of embryonic development as represented by the chick and the pig. Delphi.

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. Verrall, Caso, Egilitis.

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.

650 Survey of Anatomy U G 4
Sp. 4 cl.
Prereq.: 15 cr. hrs. in Anat.
A survey of the historical development of anatomical knowledge, including leading investigators and their contributions in gross, comparative, developmental, microscopic and neuro-anatomy. Edwards and Staff.

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 U G 5
Sp.
Prereq.: Permission of instructor.
A study of the methods of preparing tissues for observation with the electron microscope. Training in the operation of the microscope, and basic interpretation are included. Weston.

727 Anatomy of the Newborn G P 3
Sp. 1 cl., 6 lab. hrs.
Prereq.: 621-622, or 638-639, or 821-822-823.
Gross anatomy of the newborn correlated with pre-natal and post-natal development. Gross Anatomy Staff.

728 Topographical Anatomy G P 2-4
Sp. 1 cl., 3-9 lab. hrs.
Prereq.: 621-622, or 638-639, or 821-822-823.
A study of body sections with emphasis on structural relations. Gaughan.

804 Histochemistry G 5
W. 1 cl., 8 lab. hrs.
Prereq.: 604, 611 or equiv.; 824-825 or equiv. Physiol. Chem. and permission of instructor.
Not open to students with credit for 704.
Designed for students desiring to do investigative work involving histochemistry. Classical histochemistry methods will be emphasized and evaluated. Ackerman, Weston.

807 Special Studies in Anatomy G 3 or 5
Prereq.: Permission of instructor.
Repeateable to a maximum of 15 cr. hrs.
The student will select or be assigned special topics in one of the following fields:
- Endocrinology
- Blood and connective tissues
- Embryology
- Advanced comparative morphology
- Microscopic anatomy
- Neurology
- Epithelial tissue, including glands
- Gross human anatomy
- Electronmicroscopy
- Tissue culture

Graduate Staff.

815 Human Morphogenesis G 4
A. 2 cl., 2 3-hr. lab.
Prereq.: Permission of instructor.
Embryology of the human with emphasis on the morphogenesis of the organ systems. Weston.

817 Comparative Neurology G 5
W. 3 cl., 3 2-hr. lab.
Prereq.: 618 or 626 or 626 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 Autonomic Nervous System G 4
W. 2 2-hr. cl.
Prereq.: 618 or 626 or 626 and permission of instructor.
A detailed presentation of the Involuntary Nervous System. Hall.

821 Human Morphology G 5
A. 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 5
W. 3 cl., 9 lab. hrs.
Prereq.: 821
Continuation of 821.

823 Human Morphology G 5
Sp. 3 cl., 9 lab hrs.
Prereq.: 822.
Continuation of 822.

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. Egilitis, Ackerman, Weston.
ANATOMY

825 Advanced Mammalian Histology
Sp.  3 cl., 6 lab. hrr.
Prereq.: Permission of instructor.
Special histology of mammalian organ systems except the vascular.
Ackerman, Egbert.

826 The Nervous System of Man
Sp.  3 cl., 6 lab. hrr.
Prereq.: Permission of instructor.
A detailed consideration of the gross and histological structure of the nervous system and sense organs of man. Hall, Humbertson, Kettlising.

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

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

Animal Science


401 Introductory Animal Science
A, W, Sp.  3 cl., 2 1/2-3 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, Judy.

407 Meat Selection and Identification
A, W, Sp.  3 cl., 2 1/2-3 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, Cahill, Atwood.

501 Horse Production and Management
W.  3 cl., 2 1/2-hr. lab.
Prereq.: 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-egg horses and equitation skills. Reed.

502 Beef Cattle Production and Management
A, Sp.  3 cl., 2 1/2-3 hr. lab.
Prereq.: 401, 402 or 520, 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
A, Sp.  3 cl., 2 1/2-hr. lab.
Prereq.: 401, 402, or 520, 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. E. Wilson.

505 Sheep Production and Management
W. Sp.  3 cl., 2 1/2-hr. lab.
Prereq.: 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
Sp.  2 1/2-hr. lab.
Prereq.: 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
A, W, Sp.  3 cl., 2 1/2-3 hr. lab.
Prereq.: 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. Cahill, Kunkle.

510 Meat Grading
Sp.  1 cl., 2 1/2-hr. lab.
Prereq.: 401, 402, or 520 or 530; 407 for Home Ec. students.
The factors that influence the value of meat animals, carcasses, and wholesale cuts in accordance with recognized grading standards. Laboratory practice. Atwood.

515 Livestock Management
Sp.  3 cl., 2 1/2-hr. lab.
Prereq.: 401 and 402 or 530.
Feeding, breeding, and managing of beef, sheep, and swine. Laboratory exercises are concerned with major management problems. Reed.

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

530 Principles of Animal Nutrition
A, W, Sp.  4 cl., 2 1/2-hr. lab.
Prereq.: Chemistry 408 or 412 and Math, 439 or equiv.
Not open to students with credit for Animal Sc. 402 or Poul. Sc. 509.
A study of the fundamental principles of nutrition in mammals and birds. (Offered in cooperation with the Departments of Dairy Sc. and Poul. Sc.) Close, Naber, Tymnck.

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

619 Advanced Meat Technology
W.  3 cl., 2 1/2-hr. lab.
Prereq.: 509 or 407 and 25 cr. hrs. in Biol. Sc.
Evaluation of scientific contribution to meat products and processing. Cahill, Kunkle, Oakman.
Anthropology

Office: 112 Hagerty Hall, 1775 South College Road.

PROFESSORS SLETTO (Chairman), IBERRY, and KRADER;
ASSOCIATE PROFESSORS BOUQUIGNON and ESTEL;
ASSISTANT PROFESSOR PETTAI.

501 Introduction to Anthropology U 5
Sw, A, W, Sp. 5 cl.
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 U 5
A, W, Sp. 5 cl.
Prereq.: 2nd yr. standing.
The organic development of man; human evolution; the modern groupings of man.

503 Introduction to Ethnology U 5
A, Sp. 5 cl.
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 cl.
Prereq.: 501 and Soc. 401 or 402, 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 U 4
A, 4 cl.
Prereq.: 5 hrs. of Anthropol. 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.

613z Religion in Folk Societies U 4
A, 4 cl.
Prereq.: 5 hrs. of Anthropol. 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 U 4
Sp. 4 cl.
Prereq.: 5 hrs. of Anthropol. or equiv. and permission of instructor.
American Indian cultures of the time of European conquest. Estel.

632 American Indian Prehistory U 4
A, 4 cl.
Prereq.: 5 hrs. of Anthropol. 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 \textit{UG 3}
Su, A. 3 cl.
Prereq.: 5 hrs. of Anthrop. or equiv. and permission of instructor.
A review of American customs, institutions, social systems, and ideas, with emphasis on recent cultural anthropological studies. Pettey.

634 Ethnology of Asia \textit{UG 4}
W. 4 cl.
Prereq.: 5 hrs. of Anthrop., or equiv., and 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. Estel.

635 Ethnology of Africa \textit{UG 4}
A. 4 cl.
Prereq.: 5 hrs. of Anthrop., or equiv., and 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 \textit{UG 4}
W. 4 cl.
Prereq.: 502 or 15 cr. hrs. of Biol. Sc. or Geol.

637 Physical Variability of Modern Man \textit{UG 4}
Sp. 4 cl.
Prereq.: 502 or 15 cr. hrs. of Biol. Sc., incl. genetics.

639 Theory and Problems of Cultural Anthropology \textit{UG 4}
W. 4 cl.
Prereq.: 30 cr. hrs. in allied subjects.

659 Peoples and Cultures of Latin America \textit{UG 3}
Sp. 3 cl.
Prereq.: 5 cr. hrs. of Anthrop. or equiv. and 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. Bourgignon.

660 Introduction to Anthropological Linguistics \textit{UG 4}
W. 4 cl.
Prereq.: 10 cr. hrs. of Anthrop. or Ling. 601.
Relations of language to social organization, world view, socialization, and cultural analysis. Bourgignon.

670 Principles of Research in Archaeology \textit{UG 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 \textit{UG 8–16}
Expedition
Su. 8 cr. hrs. for either term.
(Full time in expedition course.)
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 \textit{UG 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 \textit{UG 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, Petray.

730 Osteometry \textit{UG 2}
W. 1 hr. lec., 3-hr. lab.
Prereq. or concur.: 636.
Laboratory measurements of human skeletons. Estel, Petray.

731 Anthropometry \textit{UG 2}
Sp. 1 hr. lec., 3-hr. lab.
Prereq. or concur.: 637.
Laboratory measurement of living human beings. Estel, Petray.

820 Seminars in Anthropology \textit{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 \textit{Sp.}
(See under Interdepartmental Seminars)

899 Interdepartmental Seminar \textit{G 1–5}
(See under Interdepartmental Seminars)

950 Research in Anthropology \textit{G Arr}
Research for thesis or dissertation purposes only.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
<th>Prerequisites</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>411</td>
<td>Introductory Architectural Design U 4</td>
<td>An introduction to architectural design, through exercises in graphics, delineation, techniques, and space organization. Library research and individual criticism. Bousser and Staff.</td>
<td>Prereq.: 411</td>
<td>U 4</td>
</tr>
<tr>
<td>412</td>
<td>Introductory Architectural Design U 4</td>
<td>W. 12 lab. hrs.</td>
<td>Prereq.: 411</td>
<td>U 4</td>
</tr>
<tr>
<td>413</td>
<td>Introductory Architectural Design U 4</td>
<td>Sp. 12 lab. hrs.</td>
<td>Prereq.: 412</td>
<td>U 4</td>
</tr>
<tr>
<td>511</td>
<td>Elementary Architectural Design U 5</td>
<td>A. 15 lab. hrs.</td>
<td>Prereq.: 413</td>
<td>U 5</td>
</tr>
<tr>
<td>512</td>
<td>Elementary Architectural Design U 5</td>
<td>W. 15 lab. hrs.</td>
<td>Prereq.: 511</td>
<td>U 5</td>
</tr>
<tr>
<td>513</td>
<td>Elementary Architectural Design U 5</td>
<td>Sp. 15 lab. hrs.</td>
<td>Prereq.: 512</td>
<td>U 5</td>
</tr>
<tr>
<td>522</td>
<td>Elementary Architectural Construction U 3</td>
<td>W. 1 cl., 6 lab. hrs.</td>
<td>Prereq.: 521</td>
<td>U 3</td>
</tr>
<tr>
<td>523</td>
<td>Elementary Architectural Construction U 3</td>
<td>Sp. 1 cl., 6 lab. hrs.</td>
<td>Prereq.: 522</td>
<td>U 3</td>
</tr>
</tbody>
</table>

**Architecture**

Office: 106 Brown Hall, 190 West 17th Avenue.

PROFESSORS: WHITAKER (Director), BAUMER (Emeritus), BORCHERS, CLARK, PHILLIAN, RONAN (Emeritus), ISSTOLI-MAN, and WILSON; ASSOCIATE PROFESSORS CODDING-TON, IGEBRICKENS, TILLEY, and TOBEY; ASSISTANT PROFESSORS DIPNER and MILLS; INSTRUCTORS and LECTURERS.

**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 organization of space for human occupancy. Library research, individual criticism, and lectures. Tilley, Sadler, 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, 653 concur.

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
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
</table>
| 661        | Architectural Building Equipment           | U 4     | A. 3 cl., 2 lab. hrs.  
Prereq.: 711, 719, 713 and 621, 622, 623, concur.  
Fundamentals of building services; installation of approved equipment; application of building, fire prevention and safety codes; specifications and preparation of working drawings. Fass, Diemer. |
| 662        | Architectural Building Equipment           | U 4     | W. 3 cl., 3 lab. hrs.  
Prereq.: 661. |
| 663        | Architectural Building Equipment           | U 4     | Continuation of 661. |
| 671        | 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. |
| 672        | 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. |
| 673        | 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. |
| 707        | Allied Arts                                | U 3     | A. 3 cl.  
Prereq.: Arch. 5th yr. standing.  
Analysis of arts related to architecture and the expression of the nature of materials in architectural ornament, furniture and furnishings, and the garden. Borchers. |
| 708        | Community Patterns                        | U 3     | W. 3 cl.  
Prereq.: Arch. and Land. Arch. 5th yr. standing.  
Analysis of architecture and the urban landscape from ancient to modern times. Tobeys. |
| 709        | Urbanism and City Planning                 | U 3     | Sp. 3 cl.  
Prereq.: Arch. and Land. Arch. 5th yr. standing.  
Not open to graduate Planning students.  
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. Stollman. |
| 711        | Advanced Architectural Design              | U 5     | A. 15 lab. hrs.  
Prereq.: 613.  
Advanced problems in architectural design dealing with space organization in relation to group composition and community patterns. Library research and individual criticism. Phillips and Staff. |
| 712        | Advanced Architectural Design              | U 5     | W. 15 lab. hrs.  
Prereq.: 711.  
Continuation of 711. |
| 713        | Advanced Architectural Design              | U 5     |  
Sp. 15 lab. hrs.  
Prereq.: 712.  
Continuation of 711. |
Prereq.: 712, Arch. 5th yr. standing.  
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. Godding and Staff. |
Prereq.: 714.  
Continuation of 714. |
Prereq.: 715.  
Continuation of 715. |
| 754        | Professional Practice: Theory of Working Drawings and Specifications | U 2 | A. 2 cl.  
Prereq.: Arch. 5th yr. standing.  
| 755        | Professional Practice: Building Costs, Contracts, Supervision | U 2 | W. 2 cl.  
Prereq.: Arch. 5th yr. standing.  
Building costs, bidding procedures, forms of construction contracts and bonds, and supervision of building construction, including study of current construction projects. Wilson. |
| 756        | Professional Practice: Public, Professional Relations, and Office Management | U 2 | Sp. 2 cl.  
Prereq.: Arch. 5th yr. standing.  
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. Borchers. |
| 771        | Special Studies in Architecture            | U G 1-5 | A.  
Prereq.: Permission of the School.  
For students majoring in Architecture desiring to pursue special studies not offered in the fixed curriculum. |
| 772        | Special Studies in Architecture            | U G 1-5 | W.  
Prereq.: Permission of the School.  
For students majoring in Architecture desiring to pursue special studies not offered in the fixed curriculum. |
Prereq.: Permission of the School.  
For students majoring in Architecture desiring to pursue special studies not offered in the fixed curriculum. |
### Astronomy

**Astronomy**

*Offices: 106 Otton Hall, 155 South Oval Drive, Perkins Observatory, Delaware, Ohio.*

**PROFESSORS LEITZEBAK (Chairman), BOBOVNIKOFF, KEENAN, KO, and KRUS; ASSOCIATE PROFESSOR MITCHELL; ASSISTANT PROFESSORS BONSAACK AND COLLINS.*

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
</tr>
</thead>
</table>
| 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. |
| 402         | General Astronomy II                | U 5     | W. 4 cl., 1-2 hr. lab.  
Prereq.: Astron. 401.  
Not open to students with credit for 500. |
| 500         | Descriptive Astronomy               | U 5     | Su, A, Sp. 5 cl.  
Not open to students with credit for 401 and 402.  
An introductory course emphasizing the place of astronomy in man’s cultural and scientific development. Bonsack, Collins, Slettebak. |
| 601         | History of Astronomy               | U 3     | W. 3 cl.  
Prereq.: 401-402, or 500, or permission of instructor.  

**ASTRONOMY**

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
</tr>
</thead>
</table>
| 605†        | Introduction to Celestial Mechanics | U 3     | W. 3 cl.  
Prereq.: Math. 544 or 611 and Physics 413 or 538 and 533 or permission of instructor. |

Application of the laws of motion to planets, satellites, and stars. The two-, three-, and N-body problems. Introduction to orbit and perturbation theory. Collins.

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
</tr>
</thead>
</table>
| 611         | Spherical Astronomy                 | U 3     | W. 3 cl.  
Prereq.: 401 or 500 or equivo; Mathematics 441 or 543 or 538, and Physics 412 or 531. |

The application of spherical trigonometry to stellar positions and motions; stellar co-ordinate systems; time; fundamental measurements of star positions. Bonseck.

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
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</thead>
</table>
| 650         | Stellar Astronomy                   | U 6     | A. 3 cl.  
Prereq.: 402 or 500; Math. 441, 538, or 543; Physics 538 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. Bonseck.

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
</tr>
</thead>
</table>
| 651         | Introduction to Astrophysics        | U 3     | W. 3 cl.  
Prereq.: Physics 614 or equivo, 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. Keenan.

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
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</thead>
</table>
Prereq.: 10 crs. of Astron., Math. 538 or 543 and Physics 412-413 or 532-533.  
Repeatable. |

Independent library or laboratory work on a special problem in observational or theoretical astronomy at the Perkins or McMillin Observatory. Perkins Observatory Staff.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
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</thead>
</table>
| 751         | Observational Techniques            | U 3     | A.  
Prereq.: 651 and Physics 606 and 718. |


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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
</tr>
</thead>
</table>
| 752         | Observational Techniques            | U 3     | W.  
Prereq.: 751. |

Continuation of 751.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
</tr>
</thead>
</table>
| 753         | Observational Techniques            | U 3     | Sp.  
Prereq.: 752. |

Continuation of 753.

Radio Astronomy Instrumentation  
(See Electrical Engineering 784.)
### Courses of Instruction

**Astronomy**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>801</td>
<td>Seminar in Astronomy</td>
<td>G 1</td>
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<tr>
<td></td>
<td>A. 1 cl.</td>
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<tr>
<td></td>
<td>Prereq.: 10 cr. hours each in 600 courses or higher in Astron., Physics, and Math., or permission of instructor. Repeatable.</td>
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<tr>
<td></td>
<td>Seminar conducted on astronomical topics of current interest. Students will participate actively in the presentation and discussion of materials. Perkins Observatory Staff.</td>
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</tr>
<tr>
<td>802</td>
<td>Seminar in Astronomy</td>
<td>G 1</td>
</tr>
<tr>
<td></td>
<td>W. 1 cl.</td>
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<td></td>
<td>Prereq.: 801.</td>
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<tr>
<td></td>
<td>Continuation of 801.</td>
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<tr>
<td>803</td>
<td>Seminar in Astronomy</td>
<td>G 1</td>
</tr>
<tr>
<td></td>
<td>Sp. 1 cl.</td>
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<td></td>
<td>Prereq.: 802.</td>
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<tr>
<td></td>
<td>Continuation of 802.</td>
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<tr>
<td>821</td>
<td>Stellar Atmospheres and Diffuse Matter</td>
<td>G 3</td>
</tr>
<tr>
<td></td>
<td>A. 3 cl.</td>
<td></td>
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<tr>
<td></td>
<td>Prereq.: 651, Physics 702, 718, Math. 601, 611.</td>
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</tr>
<tr>
<td>822</td>
<td>Stellar Atmospheres and Diffuse Matter</td>
<td>G 3</td>
</tr>
<tr>
<td></td>
<td>W. 3 cl.</td>
<td></td>
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<tr>
<td></td>
<td>Prereq.: 821.</td>
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<tr>
<td></td>
<td>Continuation of 821.</td>
<td></td>
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<tr>
<td>823</td>
<td>Stellar Atmospheres and Diffuse Matter</td>
<td>G 3</td>
</tr>
<tr>
<td></td>
<td>in Space</td>
<td></td>
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<tr>
<td></td>
<td>Sp. 3 cl.</td>
<td></td>
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<tr>
<td></td>
<td>Prereq.: 822.</td>
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</tr>
<tr>
<td></td>
<td>Continuation of 822.</td>
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<tr>
<td>841</td>
<td>Dynamical Astronomy</td>
<td>G 3</td>
</tr>
<tr>
<td></td>
<td>A. 3 cl.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prereq.: 651, Math. 601, 611.</td>
<td></td>
</tr>
<tr>
<td>842</td>
<td>Dynamical Astronomy</td>
<td>G 3</td>
</tr>
<tr>
<td></td>
<td>W. 3 cl.</td>
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<td></td>
<td>Prereq.: 841.</td>
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<tr>
<td></td>
<td>Continuation of 841.</td>
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<tr>
<td>843</td>
<td>Dynamical Astronomy</td>
<td>G 3</td>
</tr>
<tr>
<td></td>
<td>Sp. 3 cl.</td>
<td></td>
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<tr>
<td></td>
<td>Prereq.: 842.</td>
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</tr>
<tr>
<td></td>
<td>Continuation of 842.</td>
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</tr>
<tr>
<td>850</td>
<td>Current Topics in Astronomy</td>
<td>G 3</td>
</tr>
<tr>
<td></td>
<td>A., W., Sp.</td>
<td></td>
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<tr>
<td></td>
<td>Prereq.: 651.</td>
<td></td>
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<tr>
<td></td>
<td>Repeatable with permission of staff.</td>
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<tr>
<td></td>
<td>Staff members and visiting lecturers will present material on their current research problems. Perkins Observatory Staff.</td>
<td></td>
</tr>
<tr>
<td>851</td>
<td>Stellar Interiors and Stellar Evolution</td>
<td>G 3</td>
</tr>
<tr>
<td></td>
<td>A. 3 cl.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prereq.: 651, Physics 614, 702, Math. 601, 611.</td>
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</tr>
</tbody>
</table>

**Aviation**

Office: Ohio State University Airport, 3130 Case Road.

Assistant Professor Eggspuehler (Chairman), Instructor 1 Billings, instructors and lecturers.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>505</td>
<td>Elements of Aviation</td>
<td>U 4</td>
</tr>
<tr>
<td></td>
<td>3 cl. 2 lab.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prereq.: Math. 416 or 459, Physics 411.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Problems in fundamentals of flight and aircraft operation. Objective studies of aviation laws and regulations.</td>
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<tr>
<td>506</td>
<td>Primary Flight</td>
<td>U 1</td>
</tr>
<tr>
<td></td>
<td>5 lab.</td>
<td></td>
</tr>
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<td></td>
<td>Prereq.: 503 or concur. and secure permission slip at University Airport prior to scheduling.</td>
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</tr>
<tr>
<td></td>
<td>A laboratory course provided for students to achieve greater understanding of 505.</td>
<td></td>
</tr>
</tbody>
</table>
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.: 506 and secure permission slip at University Airport prior to scheduling.
The student must register for specific studies in areas indicated below, and may register for more than one at a time.
Repeatable to a maximum of 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 U 3
W. 3 cl.
Prereq.: 505, Physics 420.
Meteorology
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.

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 environments, and the application of ecological principles to human affairs. Stanton.

509 Evolution U 5
A, Sp. 5 cl.
Prereq.: Zool. 404 or Bot. 401, 402, or equiv.
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, Sp. 5 cl.
Not open to students with credit for Zool. 604.
A consideration of the principles, concepts, and applications of classical and modern genetics. House, Flouse.

617 General Cytology U G 5
W. 3 cl., 1-3 hr. lab.
Prereq.: 3 qtrs. Chem. and 20 cr. hrs. of Biol. Sci.
Not open to students with credit for Zool. 617.
A study of the nature of the protoplasm, the inner organization of living cells and the fundamental phenomena of life. Moyer.

618 The Cytological Basic of Genetics U G 5
W. 2 cl., 3 2-hr. labs.
Prereq.: 603 or 604 or equiv.
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. Paddick.

630 The Interpretation of Biological U G 5
Data
Su, A. 4 cl. 1 2-hr. lab.
Prereq.: Math. 418 or 440 or equiv. and 15 cr. hrs. in Biol. Sci.
Not open to students with credit for Bot. 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.

690 Topics in Biology Sciences G 5
W. 5 cl.
Prereq.: Math. 418, Chem. 405 or equiv.
Not open to students with credit for Bot. 690.
Lectures and demonstrations intended for students of junior standing; cells, metabolism, photochemical phenomena, chemical genetics, physiology of reproduction, population genetics, speciation, and evolution. House, Moore, Moyer, Plaine, Platt, Swanson, Tidd.

699 Radiation Biology U G 5
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. Moyer.
COURSES OF INSTRUCTION

BIOLOGY

740 Cytogenetics U G 3 or 5
Sp., 3 cr., 2 hr. lab.
Prereq.: 401-402 or 606 or 672, Biol. 604 and Biol. 618 or Bot. 737.
Not open to students with credit for Zool. 740.
Origin, transmissibility, and effects of chromosomal aberrations; their usefulness in practical breeding and in attacks on fundamental cytogenetic problems. Paddock.

804 Ecological Investigations of Biotic G 8
Areas of North America
Su. (First term).
Prereq.: Bot. 601 or Zool. 636 or 640, 20 additional grad. hours Biol, Sci., and permission of instructor. Fee of $145 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.

816i Mathematical Genetics G 5
Sp.
Prereq.: 604, Math. 537 or 636 or equiv. and permission 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 genetics. Applications of human genetics. McIntosh.

817 Principles of Systematics G 3
A. 2 cr., 2 hr. lab.
Prereq.: 15 cr. hrs. of Zool. or Entom. at or above the 600 level.
Not open to students with credit for Zool. 817.
A study of the principles and techniques of Zoological identification, classification, and nomenclature. Harlow.

830i* Physiological Genetics G 5
Sp. 5 cr.
Prereq.: Zool. 603, 632, Agr. Biol. 601 or Physiol. Chem. 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 bio-chemical nature, replication, and mutation. Plambe.

831* The Nature of Gene Action G 5
Sp. 5 cr.
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: 241 Graduate School Bldg., 184 West 19th Avenue.
PROFESSORS RICHARD C. VELSON (Chairman), and IVAN
WINKLE; ASSOCIATE PROFESSORS J. COULTER, J. GANDER,
H. IPETZ, and J. MOULTON (e. officio).

645 Principles of Biophysics U G 3
Sp.
(See under Physiology 645.)

646 Radiation Biophysics U G 5
W.
(See under Physiology 646.)

648 Physical Instrumentation for Biologists U G 3
Sp.
(See under Physiology 648.)

700 Seminar in Biophysics G 1
Su, A, W, Sp. 1 cr.
Prereq.: Permission of instructor. Repeatable.

701 Minor Problems in Biophysics G 1-5
Prereq.: Permission of instructor. Repeatable to a maximum of 10 cr. hrs.

702 Advanced Experimental Methods in Biophysics G 1-3
Prereq.: Permission of instructor. Repeatable to a maximum of 9 cr. hrs.

800 Advanced Topics in Biophysics G 3
Prereq.: Permission of instructor. Repeatable to a maximum of 15 cr. hrs.

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

PROFESSORS 1MEYER (Chairman), 1ALEXANDER, 1ALLISON,
1BLAYDES, 1BOHNING, 1DILLER, 1GRAY, 1KRIEBL, 1LEBEN,
1MCANINNON, 1TAFT, 1IVERON, 1WALLER (Emeritus), and
1SWILSON, ASSOCIATE PROFESSORS 1DAY, 1ELLETT,
1FISHER, 1GILBERT, 1HACKSKAYLO, 1HERR, 1PADDOCK,
1POPHAM, 1SCHMITT, 1SCHMITTENNER, 1SWEISHAUPT,
1WILLIAMS, and 1ZABKA, ASSISTANT PROFESSORS BART,
1BURLEY, 1CIESY, 1JOHNSON, 1JONES, 1KOEB, 1LAMPE,
1PLATT, 1TUDELOF, 1SMITH, and 1THOPEL.

For related courses see Biology.

401 General Botany U 5
PreReq.: 1st or 2nd yr. standing or permission of in-
structor.
An observation and discussion course in basic processes and
structures of present, their relation to the environment, and their
importance to other organisms, especially man.

402 General Botany U 5
PreReq.: 401.
Continuation of 401. Reproduction, heredity, variation and evolu-
tion in plants; the plant groups; importance of non-green plants;
plant distribution; plants in relation to conservation.

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
processes of the seed plants.

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. Humphrey, Weishaupt, Fisher.

519 General Plant Pathology U 5
A, Sp. 3 cl., 2 2-hr. lab.
PreReq.: 401-402 or 403 or 672.
Not open to students with credit for Bot. 419.
An introduction to diseases of plants. Ellett, Trowel, Smith.

601 Basic Principles of Plant Ecology U G 5
A. 3 cl., 1 3-hr. lab., several Saturday field trips, 1
3-day field trip.
PreReq.: 401-402 or 403 or 672, 20 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.

602 Ecological Relations of World Vegetation U G 5
Sp. 3 cl., 1 3-hr. lab., 1 4-day field trip.
PreReq.: 601.
A consideration of present and past distribution of plants through-
out 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 or hr. Chem.
A fundamental course in plant physiology: solutions, colloidal
systems, diffusion, osmotic quantities, transpiration, absorption and
translocation of water, enzymes, photosynthesis. Swanson, Zabka,
Platt, Bary.

606 Plant Physiology U G 3 or 5
Su, W, Sp. 3 cl., 2 2-hr. lab.
PreReq.: 401-402 or 403 or 672, 10 cr. hr. 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, Bary.

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
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. Blydens.

615 Plant Microtechnic U G 5
A. 2 cl., 3 2-hr. lab.
PreReq.: 401-402 or 403 or 672, 10 additional cr. hrs.
Biol. Sc.
Principles and methods of preparing permanent plant tissue micro-
scopic preparations. Student has opportunity to prepare a personal
slide collection suitable for teaching or research. Blydens.

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, heterozygote, introgression, polyploidy,
self-incompatibility, and reticulism. Laboratory experience with
auto-carmine smears, colchicine, progeny tests, random number
tables, and herbarium specimens. Paddock.

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

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

650 Diseases of Fruit Crops U G 3
A. 2 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.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
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</thead>
<tbody>
<tr>
<td>651</td>
<td>Diseases of Cereal and Forage Crops</td>
<td>U G 3</td>
<td>Prereq.: 519 or 671.</td>
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<td></td>
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<td></td>
<td>A detailed study of important cereal and forage crop diseases; their cause, distribution, severity, importance, and specific control measures. Ellett.</td>
</tr>
<tr>
<td>652</td>
<td>Diseases of Vegetable Crops</td>
<td>U G 3</td>
<td>Prereq.: 519 or 671.</td>
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<td></td>
<td>A detailed study of important vegetable crop diseases; their cause, distribution, severity, importance, and specific control measures. Allen.</td>
</tr>
<tr>
<td>653</td>
<td>Mycology</td>
<td>U G 5</td>
<td>Prereq.: 401-402 or 493 or 672, 10 additional cr. hrs. Biol. Sc.</td>
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<td>A study of structures, life histories, and classification of the fungi. Gray, Schmitt.</td>
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<tr>
<td>655</td>
<td>Industrial Mycology</td>
<td>U G 3</td>
<td>Prereq.: 605-606, or Chem. 551 and 552 or equiv.</td>
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<tr>
<td></td>
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<td>The relation of fungi, especially saprophytic fungi, to human affairs, with emphasis upon their actual and potential applications in industry. Gray.</td>
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<td>The fungi pathogenic to man, their structure and distribution, and the importance of human mycotic diseases. Schmitt.</td>
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<tr>
<td>660</td>
<td>Bacterial Plant Pathogens</td>
<td>U G 3</td>
<td>Prereq.: 519 or 672 and Microbiol. 607.</td>
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<tr>
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<td></td>
<td>Representative types of bacterial plant diseases and factors affecting their control, severity, distribution, and economic importance. Methods used in studying plant pathogenic bacteria. Troxel.</td>
</tr>
<tr>
<td>664</td>
<td>Field Botany</td>
<td>U G 4</td>
<td>Prereq.: 20 cr. hrs. Biol. Sc. including 401-402 or 403 or 672.</td>
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<td>Not open to students with credit for Hydrobiol. 684.</td>
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<td>Given only at Franz Theodore Stone Laboratory.</td>
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<td>Collection, preservation, field and laboratory identification, and local distribution of plants of the major groups. Fisher.</td>
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<tr>
<td>665</td>
<td>Algae</td>
<td>U G 4 or 5</td>
<td>Prereq.: 401-402 or 403 or 672, 10 additional cr. hrs. Biol. Sc.</td>
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<td>In Summer Qtr. given only at Franz Theodore Stone Laboratory.</td>
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<td>A general course covering identification growth, reproduction, evolution, distribution and economic importance of the algae. Taft.</td>
</tr>
<tr>
<td>666</td>
<td>Plant Virus Diseases</td>
<td>U G 3</td>
<td>Prereq.: 519 or 671.</td>
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<tr>
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<td></td>
<td>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.</td>
</tr>
<tr>
<td>667</td>
<td>Physiology of Aquatic Plants</td>
<td>U G 4</td>
<td>Prereq.: 401-402 or 403 or 672 or equiv. and 20 cr. hrs. of Chem.</td>
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<td>Not open to students with credit for Hydrobiol. 667.</td>
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<td>Given only at Franz Theodore Stone Laboratory.</td>
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<tr>
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<td>Lectures, discussions, laboratory, and field work on basic topics in the physiology of aquatic plants.</td>
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<tr>
<td>669</td>
<td>Higher Aquatic Plants</td>
<td>U G 4</td>
<td>Prereq.: 401-402 or 403 or 672 or equiv. and 10 additional cr. hrs. of Biol. Sc.</td>
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<td>Not open to students with credit for Hydrobiol. 669.</td>
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<td>Given only at Franz Theodore Stone Laboratory.</td>
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<td>The aquatic plants of the Lake Erie region other than the algae. Field and laboratory work on their identification and ecological relation. Fisher.</td>
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<tr>
<td>670</td>
<td>Aquatic Mycology</td>
<td>U G 4</td>
<td>Prereq.: 401-402 or 403 or 672 or equiv. and 10 additional cr. hrs. Biol. Sc.</td>
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<td>Given only at Franz Theodore Stone Laboratory.</td>
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<td>A lecture, laboratory, and field course designed to acquaint the student with the fungi found in aquatic habitats including soil water.</td>
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<tr>
<td>671</td>
<td>Plant Pathology</td>
<td>U G 5</td>
<td>Prereq.: 401-402 or 403 or 672, 15 additional cr. hrs. Biol. Sc.</td>
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<td>Not open to students with credit for Bot. 710.</td>
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<td>Given only at Franz Theodore Stone Laboratory.</td>
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<td>Representative plant diseases are studied with emphasis on general principles of disease development and control. Troxel, Ellett.</td>
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<tr>
<td>672</td>
<td>Basic Concepts in Botany</td>
<td>U G 5</td>
<td>Prereq.: 10 hrs. Chem.</td>
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<td>Not open to students with credit for 401.</td>
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<td>Graduate credit only to participants in the Academic Year Institute.</td>
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<td>An advanced course in the basic concepts of botany for students with a fundamental knowledge of chemistry. Taft.</td>
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<tr>
<td>673</td>
<td>Taxonomy of Vascular Plants</td>
<td>U G 5</td>
<td>Prereq.: 406 or 684.</td>
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<td>A laboratory, field, and discussion course in the classification and identification of vascular plants. Fisher.</td>
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<tr>
<td>674</td>
<td>Field Plant Ecology</td>
<td>U G 4</td>
<td>Prereq.: 401-402 or 403 or 672 and 10 hrs. additional cr. Biol. Sc.</td>
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<td>Given only at Franz Theodore Stone Laboratory.</td>
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<td>Principles of plant ecology as exemplified by the study of aquatic terrestrial habitats. Emphasis on field work with supplementary lectures and laboratory work.</td>
</tr>
<tr>
<td>701</td>
<td>Special Problems</td>
<td>U G 1-5</td>
<td>Prereq.: 401-402 or 403 or 672 and 10 hrs. additional cr. Biol. Sc.</td>
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<td>Problems may be selected in the fields of taxonomy, morphology, anatomy, physiology, hydrology, ecology, genetics, cytology, plant pathology, mycology, or economic botany.</td>
</tr>
</tbody>
</table>
BOTANY AND PLANT PATHOLOGY

718 Physiology of Fungi
W. 3 cl., 2 hr. lab.
Prereq.: 605-606, 653.
The physiology of the nutrition, growth, and reproduction of fungi.
Gray.

725 Physiological Methods
A. 6 lab. hrs.
Prereq. or concur.: 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.

730 Physiological Methods
W. 6 lab. hrs.
Prereq. or concur.: 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.

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 654.
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 organs 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.
Biometrics 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 2-hr. lab., several Saturday field trips.
Prereq.: 406 or 644 and Zool. 604 or Biol. 694.
Biocenotic 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
Repeatable.

815 Seminar in Plant Pathology
Repeatable.
Allison, Ellett, Tranel, Smith.

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

825 Seminar in Plant Ecology
A, Sp.
Prereq.: 601.
Repeatable.
Gilbert.

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

835 Seminar in Plant Taxonomy
Repeatable.
Required of all graduate students majoring in Plant Taxonomy; elective for other qualified students. Fisher, Welkhaup.

850 Principles of Plant Pathology
W. 3 2-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.

860 * History of Botany
Su. 3 cl.
Prereq.: 401-402 or 403 or 672, 10 additional cr. hrs. Biol. 5 or 6.
A brief survey of the fundamental discoveries that have led to modern concepts in plant science.

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
G Arr.
Research for thesis and dissertation purposes only.
Business Organization

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

PROFESSORS: Miner (Chairman); Beckman, Craig, Stullman, R. Davis, H. Davis, Donaldson, Hicks, Huckle, Kindig, Illey, H. Kett, Frodell, Howell, Hoekel, Cowley, Riddle, Steele, Tuttle, Velman, and Wilkins; Assistant Professors: Dehling, Black, Cameron, Doody, Foster, Shouham, Leatherman, Leshan, Muir, Morgenroth, Smith, and Stern.

401 Introduction to Business U 5
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 U 1
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. Steele.

504 Business Communications U 3
Su, 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 U 5
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 U 3
Su, A, W, Sp. 3 cl.
Prereq.: Econ. 402 or 404 or 406 or 502 or 504 or 506 or 507.
Not open to students with credit for 655.
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, Flath, Goodell, Foster.

614 Business Statistics U G 4
Su, W. 3 cl., 1 2-hr. lab.
Prereq.: Econ. 522 or 542 or Soc. Work 511.

615 Industrial Statistics U G 4
A, Sp. 3 cl.
Prereq.: Econ. 522 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.

621 Business Law; Contractual Relationships U G 3
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 U G 3
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 U G 3
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 U G 3
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 U G 3
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 U G 3
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. Ley.

640 Corporate Organization and Control U G 3
W. 3 cl.
Prereq.: Econ. 402 or 404 or 406 or 502 or 504 or 506 or 507.
Not open to students with credit for 650.
Types of business enterprise; the corporation; rights, duties, obligations, and liabilities of stockholders, directors, and officers. Stone, Donaldson.

642 Real Estate and Urban Land Economics U G 3
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.: 642.
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 506 or 507.
The nature and functions of trade associations and their relation to business and to government.

646 Real Property Valuation U G 3
W. 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. Velman.

650 Corporation Finance U G 5
Su, A, W, Sp. 5 cl.
Prereq.: Econ. 402 or 404 or 406 or 502 or 504 or 506 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
A, Sp. 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. Pfahl, Stone.

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, Pfahl.

655 Principles of Investment U G 3
Su, 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 selection of common stocks. Pfahl, Stone.

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
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.

662 The Money Market U G 3
Sp. 3 cl.
Prereq.: Econ. 520.
The functioning of short-term money markets. Practical techniques through which Federal Reserve credit controls are brought to bear on the economy. Quantius, Goodell.

665 Foreign Exchange U G 3
W. 3 cl.
Prereq.: Econ. 520.
Theory and practices of foreign exchange from the standpoints of both bankers and foreign traders. Relationship of foreign exchange to international trade and financial problems. Quantius.

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, savings 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 or 510.
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. R. C. Davis, Jutius, 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. R. C. Davis, Jutius, 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, Schlender, Leatherman.

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. R. C. Davis, Hicks, Schlender, Leatherman.

686 Personnel Organization and Management U G 4
Su, A, W, Sp. 4 cl.
Prereq.: 676.
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, R. C. Davis, Schlender.

687 Production Organization and Management U G 4
A, W, Sp. 4 cl.
Prereq.: 676.
Examines the problem of coordinating sales, finance, and various technical staff services with the line function of production and its requirements. R. C. Davis, Abramowitz, Black.

691 Office Organization and Management U G 3
A, W, Sp. 3 cl.
Prereq.: 676.
The planning, organizing, and controlling of office work; office standards, business forms, selection of business machines, analysis of office methods. Hicks, R. C. Davis.

692 Problems in Personnel Organization and Management U G 3
W, Sp. 3 cl.
Prereq.: 680 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, Schlender.

693 Wage and Salary Administration U G 3
Su, W, 3 cl.
Prereq.: 958.
Examination of problems of equitable compensation plans, alternative methods of compensation, wage and salary differentials, staff relationships, and administrative methods of compensation. Jucius, R. C. Davis, Schlender.

695 Industrial Relations Management U G 3
W, Sp. 3 cl.
Prereq.: 696.
Examination of managerial and organizational aspects of employee relations arising out of relations with union, negotiation of contracts, living with contracts, and pertinent legislative matters. Jucius, Schlender.

698 Problems in Industrial Organization and Management U G 3
Sp. 3 cl.
Prereq. or concurs.: 653, 687.
Case study approach to problem-solving thought in the area of industrial organization and management. R. C. Davis, Leatherman, Black.

700 Marketing U G 5
Su, A, W, Sp. 5 cl.
Prereq.: Econ. 402 or 404 or 406 or 502 or 504 or 505 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. Beckman and Staff.

702 Managerial Marketing U G 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.

704 Marketing Research U G 4
Su, A, W, 4 cl.
Prereq.: 700 and Econ. 523 or 543.
The role of research in the solution of marketing problems. Emphasis is on available data analysis and methods of field investigation. Miner, Morgenroth.

705 Retailing U G 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, Doody.

706 Wholesaling U G 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 state, internal operations, and operating expense control. Beckman, Davidson, J. H. Davis, Doody.

707 Retail Merchandising and Control U G 3
Sp. 3 cl.
Prereq.: 705, and Econ. 532 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.

708 Problems in Marketing Research U G 3
Sp. 2 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 U G 4
A, W, Sp. 4 cl.
Prereq.: 700 and Acc. 403 or 405 or 412 or 502 or 510.
BUSINESS ORGANIZATION

712 Sales Management U G 4
A, W, Sp.  4 cl.
Prereq.: 676, 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 U G 4
Su, A, W, Sp.  4 cl.
Prereq.: 700.

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.

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 enterprise:
a. Finance. Donaldson and Staff.
b. Real Estate. Smith and Staff.
c. Insurance. Ley, Bickelhaupt.
d. Marketing. Beckman and Staff.
e. Banking. Goodell.
f. Industrial Management. R. C. Davis and Staff.
h. Transportation. Haskett.
i. Advertising. Cullman and Staff.
j. Retailing. Davidson, Doody, and Staff.

729 Marketing G 3
Su, A, 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 marketing institutions and functions primarily from a social point of view. J. H. Davis, 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, human relations, and advertising in a service enterprise. Haskett.

752 Industrial and Commercial Traffic Management U G 3
W.  3 cl.
Prereq.: 677, or Econ. 618 or 648 or 672 or 676.
Organization of traffic management by shippers and carriers. Current problems of rates and services in the transportation of goods by various types of carriers. Haskett.

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, Hammond.

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, Hammond.

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 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. Hammond.

799 Special Problems in Business Organization U G 1-3
Organization
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. Beckman and Staff.
e. Banking. Goodell.
f. Industrial Management. R. C. Davis and Staff.
g. Personnel Management. Jucius and Staff.
h. Transportation. Haskett.
i. Advertising. Cullman and Staff.
j. Retailing. Davidson, Doody, and Staff.
k. Analysis of Theories. Stogill and Staff.
l. Quantitative methods. Black and Staff.
COURSES OF INSTRUCTION

BUSINESS ORGANIZATION

800 Principles and Techniques of Research G 3
A, Sp.
Prereq.: 650, 676, 700, Econ. 523 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, Morgenroth.

802 Applications of Quantitative Methods in Business G 3
Sp. 3 cr.
Prereq.: 600 and permission of instructor.
Applications of quantitative tools to the solution of recurring business management problems such as breakeven points, forecasting, capital budgeting, inventory control, and product mix. Abramowitz, Black, Morgenroth.

803 Advanced Finance G 3
Su, W.
Prereq.: 650.
A critical study of internal financial management of business enterprises, based primarily on comprehensive case analyses. Pfahl, Stone, Goodell, Foster.

804 Seminar in Finance G 3
Sp.
Prereq.: 650.
Repeatable by permission of instructor.
A critical study of current practices, trends and problems in the field of finance. Donaldson, Stone, Pfahl.

812 Physical Distribution Management G 3
A.
Prereq.: 677, 700, Econ. 523 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 G 3
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, Doody.

815 Seminar in General Marketing G 3
A.
Prereq.: 700.
A critical study of fundamental principles of marketing. Special emphasis on the historical, macro, social, and theoretical aspects of the subject. Beckman.

816 Seminar in General Marketing G 3
W.
Prereq.: 815.
Continuation of 815.

817 Seminar in Contemporary Marketing Problems G 3
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. Beckman, Bartels, J. H. Davis, Davidson.

818 Seminar in Specialized Areas of Marketing G 1-3
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, Collman.
818B Credits and Collections. Beckman, Bartels.
818C Marketing Research, Miner.
818D Retailing, Davidson.
818E Sales Management, J. H. Davis.
818F Wholesaling, Beckman.
818G Marketing Theory, Bartels.

819 History of Marketing Thought G 3
A.
Prereq.: 700 and permission of instructor.

825 Industrial Consolidations and Mergers G 3
W.
Prereq.: 640 or 650.
Historical and analytical study of industrial consolidation and mergers. Stone.

827 The Security Market G 3
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 G 3
W.
Critical consideration of current topics of significance in the field of life and health insurance through class discussions and individual research reports. Bickelhaus.

830 Seminar in Property and Liability Insurance G 3
Sp.
Investigation through class discussion and reports of the current literature on significant topics in property and liability insurance. Bickelhaus.

833 General Administrative Management G 3
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. R. C. Davis, Jucius.

834 General Administrative Management G 3
W.
Prereq.: 676, 677.
Deals with then top management problems as organization, structure, staff organization, decentralization, morale, and others. R. C. Davis, Jucius.

835 Advanced Industrial Management G 3
Su, W.
Prereq.: 677.
A critical survey and examination of the current trends and advanced problems in the organization and management of industrial enterprises. R. C. Davis, Jucius, Abramowitz.
CERAMIC ENGINEERING

Ceramic Engineering

Office: 288 Lord Hall, 294 West 17th Avenue.
PROFESSORS: EVERHART (Chairman), BLEU, CABRUTHERS (Emeritus), KING (Emeritus), RUSSELL, and WATTS (Emeritus). ASSISTANT PROFESSORS: ALEXANDER, RUSSELL, and SHOOK; INSTRUCTORS: AND LECTURERS.

430 Industrial Experience U 5 A.
Ten weeks practical experience or its equiv., including written report in approved factory manufacturing ceramic wares.

521 Fundamentals of Ceramic Engineering U 5 A. 4 cl., 1 3-hr. lab.

630 Junior Inspection Trip U 2 Sp. One week between W. and Sp. Qtr.
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 U 3 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 U 5 W. 5 cl.
Drying processes including vaporization, moisture transport, pyrometry, and fluid flow. Firing, sintering, melting, cooling, tempering, and annealing processes. Harrell.

715 Ceramic Materials Science I U G 4 A. 4 cl.
Prereq.: Chem. 683, Mineral. 665.
Crystalline bonds, atomic structure, coordination, defect and silicate structures, Glass energy relations. Glass structure and composition related to photoelastic, optical, elastic, and mechanical properties. Blau.

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

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

726 The Chemistry and Chemical Processes of Glass Technology U G 3 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 of Glass Technology
Sp. 4 cl.
Prereq.: 715, 731.
The development of machine processes for forming containers, tubing, flat glass, etc. Theory and processes of annealing, heat treatment, and decoration. Emphasis on the relation of processes to properties. Bluau.

731 Ceramic Technology
Sp. 2 cl., 2 3-hr. lab.
The technology of glass. Bluau.

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

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

734 Ceramic Technology
A. 2 cl., 2 3-hr. lab.
The technology of fine textured ceramics in the area of white-ware, electrical, technical and nuclear materials, and glaze coatings. Russell.

740 Ceramic Plant Design
Sp. 4 cl., 1 2-hr. lab.

750 Special Problems
Prereq.: Permission of department.
Repeatable to a maximum of 15 cr. hrs.

765 Ceramic Research Methods
A. 1 cl., 2 2-hr. lab.
Prereq.: 726.
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. Eserhart, Russell, Bluau.

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

775 Ceramic Case Histories
Sp. 3 cl.
The study of selected case histories in ceramic technological and industrial problems. Designed to give experience in individual and group thinking in problem solution. Eserhart, Bluau.

776 Ceramic Case Histories
Sp. 3 cl.
The study of selected case histories in ceramic technological and industrial problems. Designed to give experience in individual and group thinking in problem solution. Russell, Bluau.

781 Advanced Ceramic Materials
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
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. Eserhart, Russell, Bluau, Koenig, King, Alexander.

821 Advanced Ceramic Physics and Chemistry
W. 4 cl.
Prereq.: Permission of instructor.
Reactions between solid phases, including sintering; the application of phase equilibria to ceramic problems. Oxide ceramics and thermodynamics. Alexander.

822 Advanced Ceramic Physics and Chemistry
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
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. Bluau.

832 Physical Vitreology
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. Bluau.

841 Advanced Ceramic Science
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
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.
COURSES OF INSTRUCTION

CERAMIC ENGINEERING

727 The Physics and Physical Processes of Glass Technology
of U G 4
Sp. 4 cl.
Prereq.: 715, 731.
The development of machine processes for forming containers,
tubes, fiberglass, etc. Theory and processes of annealing, heat
treatment, and decoration. Emphasis on the relation of processes
to properties. Bluw.

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

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 white-
wares, electrical, technical and nuclear materials, and glaze
coatings. Russell.

740 Ceramic Plant Design U G 5
Sp. 4 cl., 2 2-hr. lab.
The basic concepts of ceramic plant layout and process equipment
selection. Klin, 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.
765 to give experience in individual and group research. Everhart,
Russell, Bluw.

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. Everhart, Russell, Bluw.

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. Everhart, Bluw.

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, Bluw.

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.
Materials science in the area of electrical, magnetic, and semi-
conductive ceramics. Behavior of special ceramics in nuclear
environment. Solid state systems. Alexander.

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. Everhart, Russell, Bluw, Koenig, King,
Alexander.

821 Advanced Ceramic Physics and U G 4
Chemistry
W. 4 cl.
Prereq.: Permission of instructor.
Reactions between solid phases, including sintering; the application
of phase equilibria to ceramic problems. Oxide ceramics and
thermodynamics. Alexander.

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

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. Bluw.

832 ° Physical Vitrology 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
equilbria; and X-ray diffraction studies. Bluw.

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.

A-36
Chemical Engineering

Offices: 121 Chemical Engineering Bldg., 140 West 19th Avenue.
PROFESSORS: KOFFOLT (Chairman), IDRYDEN, IGEANKOPLIS, IKAY, 1KUMIN, O’ROURKE (Emeritus), and SSYVER-SON, ASSOCIATE PROFESSORS: BRODKEY, ICORRIGAN, ISHEETS, ISLIEDE, and ISMITH; ASSISTANT PROFESSOR SWEENEY; INSTRUCTORS and LECTURERS.

501 Chemical Engineering Practice Work  U 5
A. 10 weeks approved work experience.
Prereq.: Chem. E. 3rd yr. standing.
The equivalent of ten weeks spent in a factory, or the engineering department of an industrial plant or organized industrial work between 3rd and 4th yr. in Chem. E. Koffolt.

593 Chemical Engineering and Process Calculations  U 3
A, W.  2 cl., 2 comp. lab. hrs.
Prereq.: Physics 539, Math. 542, and Chem. 522 or permission of instructor.
The application of the 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 Calculations  U 3
W, Sp.  2 cl., 2 comp. lab. hrs.
Prereq.: 593.
Continuation of 593.

691 Elements of Chemical Engineering—Transport Phenomena I  U 3
A, W.  2 cl., 2 comp. lab. hrs.
Prereq.: 584, concurr. Math. 544, Physics 552 or permission of instructor.
Introduction to momentum, mass, and heat transfer with emphasis on the analogies between the transports. Numerous computational problems illustrate applications to chemical engineering practice. Brodkey, Smith, Sweeney.

692 Elements of Chemical Engineering—Transport Phenomena II  U 3
W, Sp.  2 cl., 2 comp. lab. hrs.
Prereq.: 601, 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-S
Operations
Su, A, W, Sp.  1 cl., 5-23 lab. hrs.
Prereq.: 692.
Repeatably. 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.
Repeatably.
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—Transport Phenomena III  U  G 3
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 stagewise operations with applied computational problems. Geankoplis, Brodkey, Smith, Sweeney.

720 Chemical Engineering Operations  U  G 4
W, Sp.  3 cl., 2 comp. lab. hrs.
Prereq. or concurr.: 719, Chem. 682 or permission of instructor.
The application of the transport phenomena as fluids, 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.: 730 or equiv. 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—Laboratory  U  G 4-S
Su.  5 conf., 7-19 lab. hrs.
Prereq.: 730-740 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 Thermodynamics  U  G 3
A, Sp.  2 cl., 2 comp. lab. hrs.
Prereq.: Chem. 690 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 Thermodynamics  U  G 3
Su., W.  2 cl., 2 comp. lab. hrs.
Prereq.: 753.
Continuation of 753.

755 Chemical Engineering Kinetics  U  G 3
Sp.  2 cl., 2 comp. lab. hrs.
Prereq.: 720, 754, and Chem. 683.
Chemical and engineering principles for the design and operation of chemical reactors. Kinetics of simple homogeneous systems and introduction to heterogeneous catalysis. Corrigon.

A-37
760 Chemical Engineering Economy U G 3
A. 2 cl., 2 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., 2 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, Brodkey, Corrigan, Sweeney.

763 Applied Electrochemistry U G 3
A. 2 cl., 4 lab. hrs.
Prereq.: Chem. 689 or permission of instructor.
The relationship between electrical and chemical energy as applied to chemical industry will be discussed and illustrated by laboratory work. Spierzon.

765 Introduction to Nuclear Chemical Engineering U G 3
W. 3 cl.
Prereq.: Phys. 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.
Continuation of 765 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 Development U G 4
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, Spierzon, Sweeney.

772 Chemical Engineering Process Design U G 3
Sp. 1 cl., 3 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. 755. Spierzon, Wilcox.

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 Project Problem Investigations U 2
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. Spierzon, Hoering.

791 Special Project Problem U G 5 or 6
Investigations
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 Chemical Engineering G Arr.
Prereq.: Satisfactory courses 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, Spierzon, Gankoplis, Dryden, Brodkey, Corrigan, Sweeney.
815A Advanced mass transfer—I.
815B Advanced mass transfer—II.
815C Advanced binary and multicomponent distillation.
815D Extraction, aseptropic and extractive distillation.
815E Advanced heat transfer—I, conduction, radiation and convection.
815F Advanced heat transfer—II, condensation, 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.
Chemistry

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

PROFESSORS 1VERHOEK (Chairman), BOORD (Emeritus)
1BUSCH, 1CALVEY, 1CALVERT, 1CAYA, 1CARRATT, 1HARRIS,
1ASKINS (Emeritus), 1KENNE, 1LIEPPINCOTT, 1NEWMAN,
1SHECHTER, 1TAYLOR, 1VANWINKLE, 1WHITE, and 1WOLFRON (Research); ASSOCIATE PROFESSORS 1COLLAT,
2FIREFSTONE, KURBATOV (Emeritus), 1MACWOOD, IRUBIN,
1SHORE, and 1SWEET; ASSISTANT PROFESSORS 1FRAENKEL,
1GASSMAN, 1GERVIN, 1HORTON, 1LEUSSING, 1MEEK,
1OUELLETTE, 1FADWA, 1FAQUETTE, and 1WOJCICKI.

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. Shore, General Chem. Staff and Assistants.

405 General Chemistry
W, Sp. 3 cl., 3 lab. hrs.
Prereq.: 404.
Not open to students with credit for 406 or 412.
Continuation of 404.

406 General Chemistry
A, Sp. 2 cl., 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. 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
A, W. 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.
411 General Chemistry
Su, A, W, Sp. 3 cl., 4 lab. hrs.
Prereq.: One unit of high school Chem., and Math. 400 or 401 or its equi.
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 (410). Colecar, Lippincott, General Chem. Staff and Assistants.

412 General Chemistry
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
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. 3 cl., 4 lab. hrs.
Prereq.: Superior performance on placement examination, Math. 401 or equi.
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. 3 cl., 4 lab. hrs.
Prereq.: 511.
Continuation of 511.

513 General Chemistry
Sp. 3 cl., 4 lab. hrs.
Prereq.: 512.
Continuation of 512.

521 Quantitative Analysis
Su (1st term), A, W, Sp. 2 cl., 5 to 8 lab. hrs.
Prereq.: 406, 409 or 413, or equi.
Not open to students with credit for 421.
A general course in quantitative analysis, gravimetric and volumetric analysis. Calev, Waters, Sweet, Collot, Leauring, and Assistants.

522 Quantitative Analysis
Su (2nd term), 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
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
Sp. 2 cl.
Prereq.: 522 or 532, or equi.
Calculations in quantitative analysis and the interpretation of analytical data. Watters.

531 Quantitative Analysis
A. 3 cl., 5 lab. hrs.
Prereq.: 406, 409, or 413 or equi.
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. 3 cl., 5 lab. hrs.
Prereq.: 531.
Not open to students with credit for 432.
Continuation of 531.

533 Quantitative Analysis
Sp. 3 cl., 8 lab. hrs.
Prereq.: 532.
Not open to students with credit for 433.
Continuation of 532.

551 Organic Chemistry
A. 3 cl., 8 lab. hrs.
Prereq.: 400, 409, or 413, or equi.
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
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.
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 photo-synthesis. Lippincott.

631 Radiochemistry
U G 3
Sp. Summer Institute only. 4 cl. each week.
Prereq.: Academic Year Science Institute students only. 1 year college Math., 1 year college Chem., 1 year college Physics.
Not for credit to students majoring in Chem.
The properties of nuclear, selection and preparation of isotopes for tracer work, the application of radioactive isotopes to chemical problems. Sweet.

647 Organic Chemistry
U G 3
A, Sp. 3 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. Cooper.

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.
CHEMISTRY

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 647-648, their purification and a study of their
properties. Cava and Assistants.

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 431, 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, Sheeter 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 431, 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.: 655 or concur.: 657.
Not open to students with credit for Chem. 451-452.
Not for graduate credit to students majoring in Chem.
Continuation of 656.

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.: 658 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. VenWinkle.

681 Physical Chemistry  U G 3
A. 3 cl.
Prereq.: 523 or 533 or equiv., Physics 411-412-413 or
531, 533, and Math. 558 or 543. 691 concur recommended.
Not for graduate credit to students majoring in Chem.
The fundamental course in physical chem. Galcer, Harris, Van-
Winkle, 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. Engr. 3rd yr. standing. 670 or 638.
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.: 692.
Continuation of 691.

693 Physical Chemistry Laboratory  U G 2
A, W, Sp. 6 lab. hrs.
Prereq.: 692 or concur.: 693.
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 Chem-
istry.

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.

A-41
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>722</td>
<td>Advanced Instrumental Analysis</td>
<td>U G 4</td>
<td>353, 683, or equiv.</td>
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<tr>
<td>723</td>
<td>Advanced Instrumental Analysis</td>
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<td>722</td>
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<tr>
<td>726</td>
<td>Inorganic Micro Analysis</td>
<td>U G 4</td>
<td>533 or 683, or equiv.</td>
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<tr>
<td>728</td>
<td>Spectroscopic Analysis</td>
<td>U G 4</td>
<td>412 or equiv.</td>
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<tr>
<td>729</td>
<td>Chemical Spectrophotometry</td>
<td>U G 4</td>
<td>523 or 453, 648-650, or 657-658, or equiv.</td>
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<td>742</td>
<td>Organic Micro Quantitative Analysis</td>
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<td>1 cl., 9 lab. hrs.</td>
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<td>751</td>
<td>Nuclear, Radio, and Radiation Chemistry</td>
<td>U G 3</td>
<td>683 or equiv.</td>
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<td>752</td>
<td>Nuclear, Radio, and Radiation Chemistry</td>
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<td>753</td>
<td>Nuclear Chemistry Laboratory</td>
<td>U G 2 or 3</td>
<td>751 and/or concurs.: 752.</td>
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<td>754</td>
<td>X-rays and Crystal Structure</td>
<td>U G 4</td>
<td>Math 538 or 543, 413 or 533, or equiv.</td>
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<td>760</td>
<td>Chemistry of Organic Catalysis</td>
<td>U G 3</td>
<td>659 and 683.</td>
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<td>Not open to students with credit for 860.</td>
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<tr>
<td>761</td>
<td>Advanced Inorganic Chemistry</td>
<td>U G 3</td>
<td>683 or permission of instructor.</td>
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<td>762</td>
<td>Advanced Inorganic Chemistry</td>
<td>U G 3</td>
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<td>763</td>
<td>Advanced Inorganic Chemistry</td>
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<td>769</td>
<td>Solutions of Electrolytes</td>
<td>U G 3</td>
<td>683</td>
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<td>771</td>
<td>Inorganic Chemistry Laboratory</td>
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<td>683 or equiv.</td>
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<tr>
<td>772</td>
<td>The Phase Rule</td>
<td>U G 3</td>
<td>683, or equiv.</td>
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<tr>
<td>7771</td>
<td>Photochemistry</td>
<td>U G 3</td>
<td>683, or equiv.</td>
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<td>782</td>
<td>Chemical Bibliography</td>
<td>U G 1</td>
<td>533 or 533, 459, 648 or 688, or equiv.</td>
</tr>
</tbody>
</table>

A-42
794 History of Chemistry \[ U \ G \ 2 \]
W. 2 cl.
Prereqs.: 523 or 533, 453, 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. Caley.

794\[.\] Chemistry of the Carbohydrates \[ U \ G \ 3 \]
A. 3 cl.
Prereqs.: 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.: 683 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. Yerchook, VanWinkle.

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

844 Advanced Organic Chemistry Laboratory \[ G \ 3 \]
Su, W. 9 lab. hrs.
Prereq. or concur.: 841 and 842.
An advanced course in fundamental reactions and procedures with emphasis on recent advances in technique. Neuman, Gassman.

845 Advanced Organic Chemistry Laboratory \[ G \ 3 \]
Su, Sp. 9 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.)
553† Seminar in Organic Chemistry
Su.
Prereq.: 552.
Continuation of 552. (Topics to be announced.)

G 3

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

G 3

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

G 3

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

G 3

864† X-ray and Electron Diffraction
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.

G 3

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

G 2 or 3

867* Seminar in Inorganic Chemistry
W. 2 cl.
Prereq.: 761 and 762 or equiv.
Busch.

G 2 or 3

868 Advanced Inorganic Chemistry
A. 3 cl.
Prereq.: 553, 763, or permission of instructor.
A survey of modern theories of valence and their application to the problems of structural inorganic chemistry. Shore.

G 3

869 Advanced Inorganic Chemistry
W. 3 cl.
Prereq.: 858.
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.

G 3

881 Chemical Kinetics
A. 3 cl.
Prereq.: 881-882-883.
A study of the velocity of chemical reactions, with emphasis on reactions taking place in solution. Verhock.

G 3

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

G 3

884† Atomic Structure and Spectra
A. 3 cl.
Prereq.: 683 and Physics 726 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.

G 3

885† Molecular Spectra and Structure
W. 3 cl.
Prereq.: 647-648 or 655-656, 683 and Physics 726 and 727.
Molecular structure is taken up from the quantum standpoint with particular emphasis on band spectra. MacWood.

G 3

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

G 3

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

G 3

889 Advanced Thermodynamics
A. 3 cl.
Prereq.: 861 or equiv.

G 3

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

G 3

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

G 3

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

G 3

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

G 3

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

G 0

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

G 1

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

G 1

950 Research in Chemistry
Research for thesis or dissertation purposes only.

G A
Chinese

Office: 415 University Hall, 216 North Oval Drive
PROFESSOR LAWRENCE KRAIDER (Chairman, Asian Division); ASSISTANT PROFESSOR CHING.

401 Elementary Chinese
A. 5 cl.

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

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

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

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

506 Chinese Composition
A. Sp. 3 cl.
Prereq.: 404 or permission of instructor.
Practice in composing simple writings. Review of vocabulary and grammar.

551 Chinese Literature in English Translation
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
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
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
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 instructor.
Continuation of 610. Ching.

624 Chinese Phonetics
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
W. 3 cl.
Prereq.: 404.
A survey of Chinese literature of the past half-century. Reading of influential authors such as Lu Syun, Ba Chin, and others.

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

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

695 Private Reading
Prereq.: Permission of department.
Repeatable to a maximum of 10 cr. hrs.

City and Regional Planning

Office: 107 Brown Hall, 190 West 17th Avenue.
PROFESSOR ISTOLLMAN; ASSOCIATE PROFESSOR IGGERCKENS; ASSISTANT PROFESSOR MILLS; and LECTURERS.

721 City Planning Seminar
A. 3 cl.
Prereq.: Admission to graduate Planning curriculum or permission of instructor.
COURSES OF INSTRUCTION

CITY AND REGIONAL PLANNING

722 City Planning Seminar
W. 3 cr.
Prereq.: 721.
Continuation of 721.

723 City Planning Seminar
Sp. 3 cr.
Prereq.: 722.
Continuation of 722.

731 City and Regional Planning Laboratory I
W. 1 cr., 12 lab. hrs.
Prereq.: Admission to graduate Planning curriculum.
City and regional planning problems; individual and team projects. Regional development, new town design, planning in existing communities. Research, analysis, and design with individual criticism.

732 City and Regional Planning Laboratory I
Sp. 1 cr., 12 lab. hrs.
Prereq.: 731.
Continuation of 731.

741 Special Studies in City and Regional Planning
Prereq.: Permission of instructor.
Individual study of special problems in city and regional planning. Conferences and written reports.

831 City and Regional Planning Laboratory II
A. 12 lab. hrs.
Prereq.: 731-732.
Continuation of 731-732 with problems of greater complexity.

832 City and Regional Planning Laboratory II
W. 12 lab. hrs.
Prereq.: 831.
Continuation of 831.

899 Interdepartmental Seminar
(See under Interdepartmental Seminars.)

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

Civil Engineering

Office: 228 Civil and Aeronautical Engineering Bldg.,
2030 Neil Avenue.

PROFESSORS IGORAY (Chairman), HBAKER, HKEBER,
H. LARGE, MORRIS (Emeritus), PRIOR (Emeritus), SHANK
(Emeritus), SMITH, and VANDERGRIFT (Emeritus); ASSOCIATE PROFESSORS ICHEE, IHOFFMAN, IHOENS, D汉NA,
H. MINTZ, ST. MONTZ (Emeritus), H. MOULTON, IOALVO, and
FURTZ; ASSISTANT PROFESSORS IBLETZACKER, LLINDLEY,
H. MOAVENZADEH, NAIR, PAGEN, IPEROUFF, H. SCHWAR,
H. SHUMATE, and H. TIEETRERER, and INSTRUCTORS.

412 Elementary Surveying
Sp. 3 cr. 2 3-hr. lab.
Prereq.: Math. 439.
Use and adjustment of instruments, land surveying, leveling, profiles, use of plane tables, mapping, and computations. Parts.

502 Surveying I
A, W. 3 cr. 2 3-hr. lab.
Prereq.: Physics 531.

504 Photogrammetry
W. 3 cr., 1 3-hr. lab.
Prereq.: 502.
Fundamental geometry and photogrammetric applications to engineering. Parts.

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

604 Structural Analysis I
W. 4 cr.
Stresses in statically determine frames and trusses. Influence lines, moving loads, space frames. Smith, O'Keefe, and Chen.

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

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

616 Principles of Hydraulics
W. 3 cr.
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
W. 3 cr.
Prereq.: Chem. 406 or equiv., concor 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 that are controllable by engineering developments. Cosene.
622 Soil Mechanics I U 4
Sp. 3 cl., 3 3-hr. lab.
Prereq. or concur.: Engr. Mech. 602.
Basic and engineering soil properties; fluid flow through soils; compaction; effective stresses and compression. Mr. Perluff.

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. Meessen-Szaleh.

624 Transportation I U 4
A. 3 cl., 1 3-hr. lab.
Prereq.: 606.
A study of the development, location, geometric design, economics, finances, and operation of transportation systems. Karrer, Treitereir.

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 2-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. Cozens.

705 Reinforced Concrete Structures U G 4
A, Sp. 4 cl.
Prereq.: 623, 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, Chem.

710 Transportation Planning U G 5
A. 4 cl., 2-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 2-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 G 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. Cozens.

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. Treitereir, Schoen.

723 Construction Methods and Equipment U G 3
Sp. 2 cl., 1 3-hr. lab.
Prereq.: 724.
Selection and management of construction equipment in building of highways, dams, airports, bridges, and structures. Karrer.

724 Transportation II U 3
W. 3 cl.
Prereq.: 623, 624.
Design, construction and maintenance of embankments, drainage structures, and pavements for highways and airports. Karrer, Treitereir.

725 Soil Mechanics II U G 4
W. 3 cl., 1 3-hr. lab.
Prereq.: 632.
Not for graduate credit to students majoring in Civil E.
Stress distribution, shear phenomena, lateral earth pressure, settlement, soil stability. Perluff.

726 Principles of Foundation Analysis U G 4
A. 4 cl.
Prereq.: 725.
Subsurface exploration; shallow foundations; piles and caissons; embankments and excavations. Perluff.

728 Applied Hydraulics U G 3
A. 3 cl.
Prereq.: 611 or Engr. Mech. 610.
Not for graduate credit to students majoring in Civil E.
Civil engineering applications of fundamental fluid mechanics principles including pipe and open channel flow, manometry and earth dams, and pumps, with laboratory studies to support the above topics. Cozens, Moulton, Hanna.

731 Soil Stabilization U G 4
W. 3 cl., 2 3-hr. lab.
Prereq.: 725.

733 Rigid Frame Structures U G 3
A. 3 cl.
Analysis and design of rigid frame concrete structures. Wind stress analysis. Large, Chem.

A-47
COURSES OF INSTRUCTION

CIVIL ENGINEERING

734 Advanced Bridge Design U G 3
Sp. 9 cl.
Prereq.: 714, 701, 741.
Stresses in and design of arch bridges. Smith, Ojalvo.

738 Highway Location and Design U G 3
W. 2 cl., 1 3-hr. lab.
Prereq.: 624.
Geometric design of roads and streets. Determination of alignment, grade, intersections, and traffic capacity of roads. Karren, Treater.

739 Bituminous Materials and Mixtures U G 4
Sp. 3 cl., 1 3-hr. lab.
Prereq.: 724.
Types and chemical composition of asphaltic materials, physical and chemical properties of asphaltic materials and mixtures.

741 Structural Analysis II U G 4
A, Sp. 4 cl.
Prereq.: 604 or 711, Engr. Mech. 602.
Not for graduate credit to students majoring in Civil E.
Deflection in trusses, beams and frames. Solution of indeterminate structures by methods of consistent deformations, and moment distribution. Ojalvo, Chen.

742 Applied Hydrology U G 3
W. 3 cl.
Prereq.: 728 or equivo.
Basic principles of the hydrologic cycle; precipitation, hydrographs, unit graphs, drainage basin characteristics, infiltration, ground water hydrology, run-off, flood and drought magnitude and probability, flood routing. Cosmos, Hanna, Shumate.

743 Advanced Civil Engineering I U 3
A. 3 2-hr. cl. and lab.
Prereq.: 701, 716, 724, 725.
An integrated study of the principles and methods used in the solution of problems associated with the design and construction of large engineering projects.

744 Advanced Civil Engineering II U 4
W. 3 cl., 9 1-hr. lab.
Prereq.: 743.
Continuation of 743.

745 Advanced Civil Engineering III U 4
Sp. 3 cl., 9 1-hr. lab.
Prereq.: 744.
Continuation of 744.

746 Civil Engineering Applications of U G 4
Photo-Interpretation
A. 2 cl., 2 2-hr. lab.
Prereq.: 504, 724, I course in Geol.

748 Sanitary Engineering Laboratory U G 3
A. 2 2-hr. cl. and lab.
Prereq.: 710, Chem. 406 or equivo., Microbiol. 607 or equivo.
A laboratory study of the sanitary engineering indices pertinent to the control of water, sewage, streams, and industrial waste quality. Hanna, Shumate.

749 Sanitary Engineering Design U G 3
Sp. 3 cl.
Prereq.: 716.
The design of unit operations and processes employed in the field of water supply and waste water including data collection and control instrumentation. Cosmos, Hanna.

750 Mechanical Properties of Engineering U G 4
Materials
W. 4 cl.
Prereq.: 623, Engr. Mech. 605, Met. E. 611 or permission of instructor.
Structure of liquids and solids, elasticity, plasticity and flow, viscosity, viscoelasticity and surface phenomena. Mowshowicz.

799 Advanced Civil Engineering U G 3-5
Prereq.: Senior or graduate standing with point average of 2.5 or better, 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 following subdivisions.
The advanced student is given opportunity to pursue advanced study. Work undertaken may be elected in the following fields of civil engineering:
  a. Structural Engineering.
  c. Sanitary Engineering.
  d. Highway and Transportation Engineering.

808 Geodesy G 3-5
A, Sp.
Prereq.: 609 and Math. 608. Civil Engr.: Master's candidates.
Triangulation or surveying, 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.: 632.
Analysis of seepage volume and stresses in connection with excavation, dams, wells, slopes and subsurface drainage. Electromosism, Gray.

815 Advanced Soil Properties G 5
W. 3 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 G 5
Sp. 5 cl.
Prereq.: 815.

817 Slope Stability Theory G 3
W. 3 cl.
Prereq.: 725, 810.

818 Soil-Structure Interaction II G 5
Sp. 5 cl.
Prereq.: 815.
CIVIL ENGINEERING

820 Traffic Engineering II
W. 4 cl., 1 3-hr. lab.
Prereq.: 821 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. Kerr.

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 sections, 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. Ojaico.

829 Concrete Shell Structures
Sp. 5 cl.
Prereq.: 705, 741, Math. 609.
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.: 620, 716, 748.
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. Cozen, Hanna.

832 Principles of Advanced Sanitary Engineering
W. 3 cl., 2 3-hr. lab.
Prereq.: 831.
Continuation of 831.

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 Engr. 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
G 3-5
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 students opportunity to pursue advanced study. Work undertaken may be elected in the following fields of civil engineering.
   a. Structural Engineering.
   c. Sanitary Engineering.
   d. Highway and Transportation Engineering.

949 Research Seminar
G 1
A. 1 cl.
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.

PROFESSOR STITCHENER (Chairman), IABBOTT, and
FORBES, ASSOCIATE PROFESSOR, R. JONES; ASSISTANT PROFESSORS HOLZINGER AND LEONARDON.

See also Greek and Latin.

510 Classical Background of Scientific Terminology
A, W, Sp. 3 cl.
Study of technical and scientific terms from Greek and Latin sources; roots, word elements, word formation, analysis. Helpful in medical, biological, and kindred studies. Brunner.

520 The Greek Foundation of European Literature
A. 5 cl.
 Homer, tragedy, Aristophanes, with brief study of lyric and elegiac poetry, the development of prose and typical literature of the Alexandrian period. Forbes, Lenardon, Leinicks.

A-49
Courses of Instruction
Classical Languages and Literature

521 The Latin Contribution to European Literature
W. 5 cl.
The major poets and dramatists, with brief study of prose, historical, rhetorical, and philosophical. Emphasis will be placed on classicism in Classical Literature. Forhet, Leinikis.

522 Classical Mythology
Su, A, W, Sp. 5 cl.
A study of the principal Greek and Roman myths, with particular reference to the use of mythology in English literature. Abbott, Jones, Lenardon, Leinikis.

524 Classical Civilization: Greece
W. 3 cl.
An introduction to ancient Greek civilization, concentrating upon important facets of literature, history, art, and archaeology. Lenardon.

607† Roman Private Life
W. 3 cl.
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.

Conservation
Office: 101 Townsend Hall, 1885 Nell Avenue.
C. A. DAMBACH (Chairman of Committee).

401 Introduction to Conservation of Natural Resources
A, Sp. 3 cl. 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, Dembick.

514 Conservation Agencies
W. 3 cl.
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
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 697.)

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
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
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
Sp.
1st or 2nd yr. standing only.
Chaucer, Milton, Moliere, Shakespeare, Goethe. A course in great books of the the western world and the part they play in the development of modern European and American culture.

Dairy Science
Office: 116 Plumb Hall, 735 Stadium Drive.
PROFESSORS VANDERMARK (Chairman), ELY (Emeritus), ILGILMORE, HUBBS, SKAUSS, SLUDDWICK, and SUTTTON; ASSOCIATE PROFESSORS I. BRAKEL, I. CONRAD, I. FECHHEIMER, J. PORTER, J. PRATT, and STAUDUS; ASSISTANT PROFESSORS KAESER and WESELI.

401 Fundamentals of Dairy Science
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, Ranuch.

501 Dairy Cattle Production
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 workmen, such as selection, feeding, breeding, management, herd health, quality milk production, fitting, and showing. Brahek.
504 Dairy Herd Management U 5
W. 3 cl., 2 2-hr. lab.
Prereq.: Animal Sc. 402 or 530.
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.

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 400 or Biol. 462.
Not open to students with credit for 520, 620.
(Offered 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, Joap, Farkas.

Principles of Animal Nutrition
(See Animal Sc. 530.)
(Offered in cooperation with the Departments of Dairy Sc. and Poul. Sc.)

610 Physiology of Growth and Milk U G 3
Secretion
A. 2 cl., 1 2-hr. lab.
Prereq.: Vet. Physiol. 418 and 417 or equiv., or permission of instructor.

612 Physiology of Reproduction and Artificial Insemination U G 3
A, Sp. 2 3-hr. lab.
Prereq.: Vet. Physiol. 416 and 417 or equiv. or permission of instructor.

Marketing of Dairy Products
(See Agr. Sc. 630)
(Offered in cooperation with the Department of Dairy Sc.)

Nutrition and Feeding of Ruminal Animals
(See Animal Sc. 631)
(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 elect work in desired subjects after conference 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 bibliographies, and presentation of reports. Gilmore.

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 composition of animal populations. Fechheimer, Joap.

801 Seminar in Dairy Science G 1-3
Ely.

820 Current Topics in Animal Breeding G 3
W, Sp. 3 cl.
Prereq.: 720 or equiv. and permission of instructor.
Repeatable to a maximum of 9 cr. hrs.
(Offered in cooperation with the Departments of Animal Sc. and Poul. Sc.)
Fechheimer, Harvey, Joap.

Advanced Studies in Nutrition
(See Animal Sc. 880.)
(Offered in cooperation with the Departments of Dairy Sc. and Poul. Sc.)

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

950 Research in Dairy Science G Arr.
Research for thesis or dissertation purposes only.

Dairy Technology

Office: 122 Vision Hall, 2121 Fuffy Road.
PROFESSORS: GOULD (Chairman), BURGWALD (Emeriti), HARRIS, KRISTOFFERSEN, and ISLATTER, ASSISTANT PROFESSORS ARMSTRONG (Emeriti), HARTLEY, MARTIN, MIKOLAJOIKI, and IMORI.

401 Survey of Industrial Dairying U 3
A, Sp. 2 cl, 1 2-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. Slater.
415 Dairy Industry Apprenticeship U 3
Graduation credit limited to students completing the Dairy Tech. curriculum. Ten weeks practical experience on dairy, 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.

515 Dairy Industry Apprenticeship U 3
Graduation credit limited to those students completing the Dairy Tech. curriculum. Ten weeks practical experience or equal 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; Stoller.

601 Dairy Products Standards and Analysis U G 3
A. 3 cl.
Prereq.: 401 and/or concur. Chem. 521.
Not open for graduate credit to majors in Dairy Tech.
Function of the laboratory in a modern dairy organization; product composition, character, and legal standards; principles and evaluation of analytical methods. Kristoffersen.

602 Dairy Products Standards and Analysis: Laboratory U G 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 G 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 G 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 G 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, Stoller.

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. Heideman.

609 Concentrated Milk Products U G 3
Sp. 3 cl., 1 3-hr. lab.
Prereq.: 603, 604.
Condensed, evaporated, and powdered milk and milk products are considered from a business and scientific standpoint; chemical and physical properties, manufacturing and distribution methods; utilization of concentrated milk products. Stoller.

610 Ice Cream Industry U G 5
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 U G 3
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 U G 3
Sp. 1 rec., 1 6-hr. lab.
Prereq. or concur.: 626.
Project studies and experiences with commercial methods of manufacturing, with product control practice, and with butter and cheese plant operation. Kristoffersen.

651 Junior Seminar U G 1
A. 1 cl.
Prereq.: Dairy Tech. 4th yr. standing and 603, 604
Not open for graduate credit to majors in Dairy Tech.
Research literature review and interpretation; preparation and oral presentation of technical abstracts and papers. Harper.

652 Junior Seminar U G 1
W. 1 cl.
Prereq.: 651.
Not open for graduate credit to majors in Dairy Tech.
Leading research workers in Dairy Technology and their contributions. Importance of scientific research will be stressed. Gould.

701 Special Problems U G 2-5
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 U G 3
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.
### DENTAL HYGIENE

**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.

**505 Dental Materials**

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. Woelfel.

**506 Oral Histology and Embryology**

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. Permar.

**507 Oral Pathology**

A. 1 cl.

Prereq.: Dent. Hyg. 2nd yr. standing.

A study of the clinical manifestations of the common diseases affecting the teeth and their supporting structures. Bruce.

**508 Clinical Dental Prophylaxis**

A. 2 clinic hrs.

Prereq.: Dent. Hyg. 2nd yr. standing.

Clinical application of principles taught in 403. Wise and Staff.

**509 Clinical Dental Prophylaxis**

W. 15 clinic hrs.

Prereq.: Dent. Hyg. 2nd yr. standing.

A continuation of 508. Wise and Staff.
COURSES OF INSTRUCTION

DENTAL HYGIENE

510 Clinical Dental Prophylaxis
Sp. 15 clinic hrs.
Prereq.: Dent. Hyg., 2nd yr. standing.
A continuation of 509. Wise and Staff.

511 Nursing Techniques for Dental Hygienists
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
A. 2 cl., or 6 lab. hrs.
Prereq.: Dent. Hyg. 2nd yr. standing.
The theory and technical procedures of oral radiography. Fappas.

513 Oral Hygiene in the Schools
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
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
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
Sp. 2 cl.
Prereq.: Dent. Hyg. 2nd yr. standing.
The role of the Dental Hygienist in dental practice and the economics involved. Weissmann.

Dentistry

Office: 120 Dentistry Bldg., 305 West 12th Avenue.
PROFESSORS W. D. POSTLE (Dean), T. ALLISON, T. BOUCHER, DEW, KAISER, T. BRINDLE, T. MACDONALD, T. PETTITT, STEFFEL, T. WILSON, WISE, and WOELFLE; ASSOCIATE PROFESSORS BRUCE, DIETZ, HINTZ, JAMPFER, ISAKOS, KREIDER, LONG, MARSHALL, IPERMAR, H. POSTLE, RUSELL, SPANGENBERG, TAYLOR, T. WADE, W. WALTON, and WILLIAMS; ASSISTANT PROFESSORS ALDRICH, APP. WILLIAMS; ASSISTANT PROFESSORS ALDRICH, APP.

501 Dental Anatomy
A. 1 cl., 3 lab. hrs.
Prereq.: Dent. 1st yr. standing.
The morphology of human teeth and surrounding structures. Trippay and Staff.

502 Dental Anatomy
W. 1 cl., 11 lab. hrs.
Prereq.: Dent. 1st yr. standing.
The physiology of human teeth and surrounding structures. Trippay and Staff.

505 Dental Materials
W. 1 cl.
Prereq.: Dent. 1st yr. standing.

320 Orientation and History of Dentistry
A. 1 cl.
Prereq.: Dent. 1st yr. standing.
The evaluation of dentistry from the ancient period through the medieval, colonial, early American and modern periods. W. Postle, Harper.

381 Complete Prosthodontics
A. 1 cl., 6 lab. hrs.
Prereq.: Dent. 1st yr. standing.
The elemental principles of impressions and jaw relations and procedures used in the construction of complete dentures. Boucher and Staff.

382 Complete Prosthodontics
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. Johannes and Staff.

386 Fixed Partial Prosthodontics
Sp. 1 cl.
Prereq.: Dent. 1st yr. standing.

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. Haft.
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 pulpless 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. Poole 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 composite and complex cavities and the use of amalgams and silicate as restorative materials. H. Poole 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. Poole and Staff.

434 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. Wilson.

463 Periodontics
   Sp. 1 cl.
   Prereq.: Dent. 2nd yr. standing.

482 Complete Prosthodontics
   W. 1 cl., 3 lab hrs.
   Prereq.: Dent. 2nd yr. standing.
   The principles and practices of the construction of immediate dentures, and of making esthetic denture restorations. Larrimer 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. Boncher 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-movable 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 restoration with basic retainers and connectors and glazed porcelain pontics. 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. Heine 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. Steffel 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. Haist, 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.

512 Clinical Endodontics
   W. 2 clinic hrs.
   Prereq.: Dent. 3rd yr. standing.
   Kaiser and Staff.

513 Clinical Endodontics
   Sp. 2 clinic hrs.
   Prereq.: Dent. 3rd yr. standing.
   Continuation of 512. Kaiser and Staff.
COURSES OF INSTRUCTION

DENTISTRY

531 Operative Dentistry P 4
A. 1 cl., 8 clinic hrs.
Prereq.: Dent. 3rd yr. standing.
Clinical diagnosis of pulp disease; protection and conservative treatment of the vital pulp; factors influencing the success or failure of restorative materials in clinical practice. Beckwith and Staff.

532 Operative Dentistry P 4
W. 1 cl., 6 clinic hrs.
Prereq.: Dent. 3rd yr. standing.
Detailed study of restorative materials, indications and contra-indications for each, their manipulation and individual requirements in cavity preparation. Beckwith and Staff.

533 Operative Dentistry P 4
Sp. 1 cl., 6 clinic hrs.
Prereq.: Dent. 3rd yr. standing.
Clinical application of the theories and techniques of restoring carious and defective teeth. Beckwith and Staff.

540 Oral Histology and Embryology P G 4
A. 2 cl., 6 lab. hrs.
Prereq.: Anat. 640. Dent. 2nd yr. standing.
Embryology and histology of teeth and surrounding structures and their correlation to the practice of dentistry. Max and Staff.

541 Oral Pathology P G 4
A. 3 cl., 3 lab. hrs.
Prereq.: Dent. 3rd yr. standing. 540 and Path. 635.
The histopathologic and clinical study of oral disease processes that are chiefly of local origin. Kolas and Staff.

542 Oral Pathology P G 1
W. 1 cl.
Prereq.: Dent. 3rd yr. standing.
The histopathologic and clinical study of oral disease processes that are associated with systemic disease or diseases of specific organ systems. Kolas and Staff.

545 Oral Diagnosis and Treatment Planning P 1
W. 1 cl.
Prereq.: Dent. 3rd yr. standing.
The principles and methods of oral diagnosis, with emphasis on the medical and dental history of the patient. Bruce.

546 Oral Diagnosis and Treatment Planning P 1
Sp. 1 cl.
Prereq.: Dent. 3rd yr. standing.
The interpretation of signs and symptoms, medical laboratory tests, and treatment planning for the patient. Bruce and Staff.

547 Oral Radiography P 1
A. 1 cl.
Prereq.: Dent. 3rd yr. standing.

548 Oral Radiography P 1
W. 1 cl.
Prereq.: Dent. 3rd yr. standing.
Bisection of the angle and long cone technics used in intraoral radiography. Extraradicular radiographic technics. O'Brien.

549 Oral Radiography P 1
Sp. 1 cl.
Prereq.: Dent. 3rd yr. standing.

551 Pedodontics P 1
A. 1 cl.
Prereq.: Dent. 3rd yr. standing.

552 Clinical Pedodontics P 1
W. 2 clinic hrs.
Prereq.: Dent. 3rd yr. standing.
Pettit and Staff.

553 Clinical Pedodontics P 1
Sp. 2 clinic hrs.
Prereq.: Dent. 3rd yr. standing.
Continuation of 552. Pettit and Staff.

555 Orthodontics P 1
W. 1 cl.
Prereq.: Dent. 3rd yr. standing.
The etiology and classification of malocclusion, physiology of tooth movement, character of tissues involved. Williams.

556 Orthodontics P 2
Sp. 2 cl.
Prereq.: Dent. 3rd yr. standing.
Methods and appliances for the correction of malposed teeth. Williams.

560 Periodontics P 1
A. 1 cl.
Prereq.: Dent. 3rd yr. standing.

561 Clinical Periodontics P 1
A. 3 clinic hrs.
Prereq.: Dent. 3rd yr. standing.
Wilson and Staff.

562 Clinical Periodontics P 1
W. 3 clinic hrs.
Prereq.: Dent. 3rd yr. standing.
Continuation of 561. Wilson and Staff.

563 Clinical Periodontics P 1
Sp. 3 clinic hrs.
Prereq.: Dent.: 3rd yr. standing.
Continuation of 561. Wilson and Staff.

572 Pharmacology P 1
W. 1 cl.
Prereq.: Dent. 3rd yr. standing.
General pharmacology including the origin and methods of development of drugs. Basic pharmacy involving prescription writing, the metric and apothecary systems, drug standards and federal drug legislation and regulation. Hsitt.

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. Hsitt.

581 Complete Prosthodontics P 2
A. 1 cl., 2 clinic hrs.
Prereq.: Dent. 3rd yr. standing.
The principles and practices of maxillo-mandibular relation records, articulating instruments and occlusion. Boucher and Staff.
DENTISTRY

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 aesthetics and facial expression by artificial 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 techniques 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. Steffel.

593 Individual Studies in Dentistry P 1-3
Prereq.: Dent. 2nd, 3rd or 4th yr. standing.

600 Histologic Laboratory Technique G 1-3
Prereq.: Permission of instructor.
The preparation of oral and dental tissues for microscopic study. Permar.

601 Anesthesia P 2
A. 1 cl., 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
History taking; physical examination 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. 4 yr. standing.
Laryngoscopy, endotracheal intubation, maintenance of anesthesia and management during recovery; management of emergencies; use of fluids, drugs, open and closed carboxy massage techniques, and analeptics. 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.

622 Dental Practice Administration P 1
W. 1 cl.
Prereq.: Dent. 4th yr. standing.

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.

632 Operative Dentistry P 5
W. 1 cl., 8 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Introduction of special technical procedures in Operative Dentistry and their clinical applications. Taylor and Staff.

633 Operative Dentistry P 5
Sp. 1 cl., 8 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Continuation of 632. Advanced theories, technical procedures, and materials in Operative Dentistry; their value, limitations, and clinical application. Taylor and Staff.
COURSES OF INSTRUCTION
DENTISTRY

645 Clinical Oral Diagnosis and Treatment Planning
W. 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Bruce and Staff.

646 Clinical Oral Diagnosis and Treatment Planning
Sp. 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Continuation of 645. Bruce and Staff.

647 Clinical Oral Radiography
A. 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
O’Brien and Staff.

648 Clinical Oral Radiography
W. 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Continuation of 647. O’Brien and Staff.

649 Clinical Oral Radiography
Sp. 3 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Continuation of 648. O’Brien and Staff.

651 Pedodontics
A. 1 cl., 3 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Diagnosis of pulp conditions of primary and young permanent teeth. Techniques for treatment. Growth and development pertaining to pedodontics. Care of handicapped patients. Pettit and Staff.

652 Clinical Pedodontics
W. 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Pettit and Staff.

653 Clinical Pedodontics
Sp. 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Continuation of 652. Pettit and Staff.

661 Clinical Periodontics
A. 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Wilson and Staff.

662 Clinical Periodontics
W. 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Continuation of 661. Wilson and Staff.

663 Clinical Periodontics
Sp. 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Continuation of 662. Wilson and Staff.

672 Pharmacology
W. 1 cl., 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
The chemistry, indications, actions, and effects of antibiotics and analgesics. O’Brien.

673 Pharmacology
Sp. 1 cl., 2 clinic hrs.
Prereq.: Dent. 4th yr. standing.
The chemistry of tranquilizers; indications for their use and their actions. A review of prescription writing. O’Brien.

681 Complete Prosthodontics
A. 1 cl., 4 clinic hrs.
Prereq.: Dent. 4th yr. standing.
The clinical practice of special occlusal problems, temporomandibular joint disturbances, cleft palate and surgical prosthesis. Boucher and Staff.

682 Clinical Removable Prosthodontics
W. 4 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Boucher, Heints and Staff.

683 Clinical Removable Prosthodontics
Sp. 4 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Continuation of 682. Boucher, Heints and Staff.

684 Clinical Fixed Partial Prosthodontics
A. 4 clinic hrs.
Prereq.: Dent. 4th yr. standing.
McBride and Staff.

685 Clinical Fixed Partial Prosthodontics
W. 4 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Continuation of 684. McBride and Staff.

686 Clinical Fixed Partial Prosthodontics
Sp. 4 clinic hrs.
Prereq.: Dent. 4th yr. standing.
Continuation of 685. McBride and Staff.

693 Individual Studies in Dentistry
G 1-5
Prereq.: Permission of instructor.
Special assignments in advanced phases of dentistry. Students will elect to work in desired subjects after a conference with the instructor in charge.

800 Special Problems in Dentistry

800A Advanced Oral Surgery and Anesthesia
Prereq.: Oral Surg. grad. standing.
Diagnosis and treatment of surgical conditions of the teeth and contiguous structures. Advanced techniques in surgery and local and general anesthesia. Allison.

800B Advanced Orthodontics
G 1-5
Prereq.: Orthodontics grad. standing.
Applied orthodonty and myology in cephalometric roentgenographic interpretations; review of cephahoric growth and development factors in normal occlusion; correction of malocclusions 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.
ECONOMICS

Economics

Office: 239 Hagerty Hall, 1775 South College Road.

PROFESSORS: CRAIG (Chairman), BOWENHORN, BOWERS, CONDORE, COONS, HARRISON, HAMES, KINNIG, LOVENSTEIN, LYNES, MILLER, MUNIER, PARKES, PATTON, QUANDTUS, SHERMAN, and STYBOUT; ASSOCIATE PROFESSORS: BICKELHAUPT, FLETCHER, KELLEY, MURRAY, and WARNER; ASSISTANT PROFESSORS: BRESHEED, CAMERON, HAMMOND, LEONARD, ANDERSON, LEVINE, CALMONT, MICHAEL, STEVENS, WICKS, WOODWARD, ZELLER.

The department of Economics offers opportunities for special study in the following subfields:
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.

400 Development of Modern Economic Thought U 5
Society
Su, A, W, Sp. 5 cr.
Prereq.: 1st or 2nd yr. standing.
No open to students with credit for Hist. 491-492-493.
Study of dominant historic forms of economic organization to provide an understanding of role of capitalism in evolutionary development of society. Waive.

501 Principles of Economics U 5
Su, A, W, Sp. 5 cr.
Not open to freshmen, nor to students with credit for 401, 403, 406, 501, 506, or 507.
A study of the organization and functioning of modern economic society, with emphasis on income determination, employment, fiscal and monetary problems and policies. Woodard, Lovenstein, Coons.

502 Principles of Economics U 5
Su, A, W, Sp. 5 cr.
Prereq.: 401 or 501. Not open to freshmen, nor to students with credit for 402, 404, 406, 504, 506 or 507.
A continued study of the organization and functioning of modern economic society, with emphasis on price determination, income distribution, and special economic problems. Woodard, Lovenstein, Coons.

503 Principles of Economics U 3
for Engineers
A, W, Sp. 3 cr.
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, Hamilton.

504 Principles of Economics U 3
for Engineers
A, W, Sp. 3 cr.
403 or 503. Not open to freshmen, nor to students with credit for 402, 404, 406, 504, 506 or 507.
Micro economic principles: A study of the economics of the firm, allocation of productive factors and factor income distribution; international economics. Fletcher, Hamilton.
506 Outlines of Economics U 5
Su, A, W, Sp. 5 cl.
Not open to freshmen, nor to students with credit for 401, 402, 403, 404, 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, Batte, McCalmont.

507 Fundamentals of Economics U 5
Su, A, W, Sp. 5 cl.
Prereq.: Hist. 432.
Not open to students with credit for 401, 402, 403, 404, 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. Loesnstein, Parnes, Bodenhorn, McCalmont, Batchelder and Staff.

520 Money and Banking U 5
Su, A, W, Sp. 5 cl.
Prereq.: 402 or 404 or 406 or 502 or 504 or 506 or 507.
Organization, operation, and economic significance of our monetary and banking system are discussed with special reference to current conditions and problems. Craig, Quantius, Stevens, Michael, and Staff.

530 Government Finance in the U 5
American Economy
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 509 or 631 and 632.
Analysis of fiscal institutions and decision-making in the public sector of the American economy; budget planning and execution; taxation, debt, fiscal policy. Wicks, Cameron, Woodard, 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.
Ratio, 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, Bodenhorn, L’Experience, Cameron 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.
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.

580 Labor Economics and Industrial Relations U 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 641 or 686.
Survey of the field of labor economics; trade unionism, collective bargaining, wage determination, employment, unemployment, labor legislation. Miller, Parnes, Levine, Leonard 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.
Critical analysis of ideas of great economists, factors which influenced those ideas; their impact upon social and economic development of the modern world. Batchelder, Leonard 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.
Examination of current problems; optimum levels of employment; conditions underlying consumer expenditures; savings, investments, inflation, deflation, agriculture, public works, housing, regional development. Coons, Miller, Batchelder.

610 Economic Development 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 638.
Empirical and theoretical consideration of long term economic changes, including changes in industrial structure, technology and level of national product.

611 American Capitalism Since the Civil War U G 3
W. 3 cl.
Prereq.: 408 or 406 or 502 or 504 or 506 or 507.
Not open to students with credit for 639.
Emphasis given to rise of big business and organized labor, significance of increasing price rigidities, and growing importance of government intervention. Harrison.

612 Economics 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.
Analysis of outstanding American corporations; their relations to basic national economic trends and general price movements, specific price-profit policies, and innovation practices. Harrison.

621 Problems of Monetary-Fiscal Policy U G 3
W, Sp. 3 cl.
Prereq.: 530 or equiv.
Not open to students with credit for 613.
Monetary-fiscal policies for stabilization at high levels of production, employment, and income. Emphasis on contemporary problems of policy. Craig, Quantius.

624 Risk and Insurance U G 3
Su, A, W, Sp. 3 cl.
Prereq.: 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. Bower, Bickelhaupt, Hammond.

631 Public Sector Expenditure U G 3
Decision-making
A. 3 cl.
Prereq.: 402 or 404 or 406 or 502 or 504 or 506 or 507.
Historical, analytical, and operational aspects of government expenditure and the decision-making process in the public sector of the American economy. Woodard, Wicks.
632 Public Sector Revenues  
W. 3 cl.  
Prereq.: 402 or 404 or 406 or 502 or 504 or 506 or 507.  
The economics of taxation; analysis of revenue instruments and their effects upon the public and private sectors of the American economy.  
Woodard, Wicks.

633 Fiscal Policy and Administration  
Sp. 3 cl.  
Prereq.: 509 or 530 or 631 or 632.  
Economic aspects of fiscal policy and practice; analysis of revenue, expenditure, and debt policies in relation to growth and stability in a federal system.  
Woodard, Wicks.

644 Mathematical Economics Theory  
A. 3 cl.  
Prereq.: 402 or 404 or 406 or 502 or 504 or 506 or 507.  
Application of essentials of calculus in deriving principal theorems of economic marginal analysis.  
Problems and examples.  
Tuttle.

651 Consumption Economics  
W. 3 cl.  
Prereq.: 402 or 404 or 406 or 502 or 504 or 506 or 507.  
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  
A. 3 cl.  
Prereq.: 402 or 404 or 406 or 502 or 504 or 506 or 507.  
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  
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.

656 National Income and Flow of Funds Analysis  
A. 3 cl.  
Prereq.: 522 or 542 and Acc. 402 or 405 or 412 or 500 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  
Sp. 3 cl.  
Prereq.: 520.  
Not open to students with credit for 627.  
Study of changes in levels of income and output.  
Current and past theories of the business cycle.  
Public policy proposals for controlling economic fluctuations.  
Coons, Craig.

663 Economic Problems of Western Europe  
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 679.  
Impact of World War II and problems of reconstruction; economic unification of Europe; role of Europe in the world economy.  
Conдоide.

664 International Trade  
A. 3 cl.  
Prereq.: 520.  
Specialized production and international trade; comparative cost advantages and the gains from trade; international payments, exchange rates, and trade equilibrium.  
Janes.

665 International Finance  
W. 3 cl.  
Prereq.: 520.  
Balance-of-payments adjustments under different monetary systems; U. S. foreign aid, investments, and gold losses; economic development; International Monetary Fund and proposed reforms.  
Janes.

666 International Commercial Policy  
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.  
Janes.

670 Competition and Public Policy  
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  
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 Utility Economics  
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  
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.

A-61
COURSES OF INSTRUCTION

ECONOMICS

677 Air and Water Transportation U G 3
Sp., 3 cl.
Prereq.: 618 or 676.
Not open to students with credit for 619.
Economic aspects of air and water transportation including costs, demand, pricing, government promotion and regulation, and international problems. Glydon, Fletcher.

678 Highway Transportation U G 3
W., 3 cl.
Prereq.: 618 or 676 or permission of instructor.
Not open to students with credit for 630.
Analysis of economic aspects of highway transportation, including costs, taxes, rates, and vehicular weight and size. Development of public policy toward highways and motor carriers. Glydon, Fletcher.

680 Social Insurance U G 3
Su., A, Sp., 3 cl.
Prereq.: 580 or permission of instructor.
Not open to students with credit for 630.
Social insurance systems to provide economic and social security against the hazards of unemployment, sickness and injury, dependent old age, premature death and liability claims. Bowser, Hammond.

681 Collective Bargaining U G 3
A, Sp., 3 cl.
Prereq.: 637 or 682.
Collective bargaining procedures and issues; the handling and settlement of industrial disputes. Miller, Farnes.

682 The American Labor Movement U G 3
A, 3 cl.
Prereq.: 402 or 404 or 406 or 502 or 504 or 506 or 507.
Not open to students with credit for 637 or 694-695 or 780-781.
History and theory of American labor movement. Trade union organization, administration, programs and policies. Miller, Farnes.

684 Labor and the Government U G 3
W., 3 cl.
Prereq.: 580.
Not open to students with credit for 638.
Public policy with respect to labor problems and industrial relations. Role of legislative, judicial, and executive branches of state and federal governments. Miller, Farnes.

685 Foreign Labor Movements U G 3
W., 3 cl.
Prereq.: 580.
Not open to students with credit for 640.
Comparative labor movements and industrial relations systems in selected countries. The international labor movement. Farnes.

688 The Labor Market U G 3
Sp., 3 cl.
Prereq.: 580.
Not open to students with credit for 650.

690 Contemporary Economic Systems U G 3
Sp., 3 cl.
Prereq.: 402 or 404 or 406 or 502 or 504 or 506 or 507.
Comparative study of development and operation of economic institutions and principles in capitalism, socialism, communist, and fascist economic systems. Loewenstein.

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 652 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. Loewenstein.

698 Soviet Economic System U G 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 525 or 654.
Survey of Soviet economics with major emphasis on planning; allocation of resources; spending, saving and investing; agriculture; public finances; and international trade. Condovis.

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 8 or better in all Econ. courses and a cumulative point hour of 3.0 or better. 1-5 cr. hrs., eac. hr., 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.
Only open to students enrolled in the Honors Program of the College of Arts and Sciences or the College of Commerce and Administration. Repeatable to a maximum of 15 cr. 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 Econ. Patton, Craig.

National Security Policy Studies
(See National Security Policy Studies 702-703-801.)

707 Intermediate Economic Analysis U G 3
Su., A, 3 cl.
Prereq.: 530.
Not open to students with credit for 601-602-603.
Nature of economic analysis; theory of demand; variable production, costs, and supply; competitive, oligopolistic, and monopolistic price and output determination for consumers' goods. James, Bodenhorn.

708 Intermediate Economic Analysis U G 3
W., 3 cl.
Prereq.: 707.
Theory of factor price determination and functional income distribution; competition, monopoly, and monopsony; labor and wages; land and rents; capital and interest; entrepreneurship and profit. James, Bodenhorn.
709 Intermediate Economic Analysis   U G 3
Sp.  3 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.

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 applica-
tions. Statistical inference and testing using binomial, Poisson,
normal and t probability distributions. Tuttle, L'Esperance.

741 Statistical Analysis   U G 2
W.  1 2-hr. cl.
Prereq.: 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   U G 2
Sp.  1 2-hr. cl.
Prereq.: 741.
Simple, partial and multiple correlation and regression; multi-
variate probability distributions. Tuttle, L'Esperance.

745 Linear Programming and Economic Analysis   U G 3
A.  3 cl.
Prereq.: 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. Tybout.

760 Soviet International Economic Policies   U G 3
Sp.  3 cl.
Prereq.: 550 or 666 or permission of instructor.
Survey of the scope and nature of Soviet international economic
policies; relations with satellites; economic aid and expansion of
influence. Condoriz.

770 Economics of National Security   U G 3
A.  3 cl.
Prereq.: 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. Levenstein, Sherman.

772 Economics of Research and Development   U G 3
W.  3 cl.
15 cr.-hrs. in Econ. or permission of instructor.
Economic analysis of invention, innovation and diffusion of tech-
nology at the level of the business firm or other micro-unit.
Tybout.

798 Special Studies in Economics   U G 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 nor a total of
more than 15 hrs. in the course. Senior Staff.
a. Economic Theory, History of Economic Thought
b. Economic History, American and European
c. Money and Banking

A-63
<table>
<thead>
<tr>
<th>COURSES OF INSTRUCTION</th>
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<td>ECONOMICS</td>
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<tr>
<th>Course Code</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>814*</td>
<td>The Economic History of Western Europe</td>
<td>G 3</td>
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<td>Prereq.: 813</td>
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<td></td>
<td>The agricultural, commercial, and industrial revolutions; changing patterns in finance, business organization, and investments; economic growth and economic depressions; economic consequences of two world wars. Harrison.</td>
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<td>816 *</td>
<td>Economic History of the United States</td>
<td>G 3</td>
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<td>Not open to students with credit for 824-805-806 taken prior to 1955-1959.</td>
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<td>Colonial agriculture, commerce, and industry; American industrial revolution; development of transport, capital markets, and the banking system; economic problems of the Civil War era. Harrison.</td>
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<td>817 *</td>
<td>Economic History of the United States</td>
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<td>Prereq.: 816</td>
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<td>The westward movement; organization and regulation of big business; labor and its problems; economic fluctuations; First World War and its economic consequences. Harrison.</td>
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<td>818 *</td>
<td>Economic History of the United States</td>
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<td>Prereq.: 817</td>
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<td>The expanding dimensions of the economy; international economic relations; government, business, and labor; agriculture in transition; Second World War and its aftermath. Harrison.</td>
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<td>820</td>
<td>Monetary Theory</td>
<td>G 3</td>
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<td>Prereq.: 520 or equiv.</td>
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<td>Not open to students with credit for 863.</td>
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<td></td>
<td>Role of money in theoretical analysis of forces determining and influencing level of income, employment, and prices. Craig.</td>
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<td>821</td>
<td>Central Banking and Monetary Policy</td>
<td>G 3</td>
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<td>Sp.  3 cl.</td>
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<td>Prereq.: 820 or permission of instructor.</td>
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<td>The Federal Reserve System; its objectives, techniques, and probable effectiveness. Problems of coordinating monetary policy, fiscal policy, and debt management. Quantz.</td>
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<td>830</td>
<td>Seminar in Fiscal Economics</td>
<td>G 2</td>
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<td>W., S. 1 cl.</td>
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<td>Repeatable to a maximum of 6 atr. hrs.</td>
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<td></td>
<td>Analysis of theoretical and applied aspects of fiscal economics in the American and foreign economies. Selected topics of current and permanent importance. Lynn.</td>
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<td>831*</td>
<td>Legal and Economic Problems in State and Local Taxation</td>
<td>G 3</td>
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<td>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.) Lynn, Glander.</td>
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<td>848</td>
<td>Seminar in Econometrics</td>
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<td>Prereq.: Differential and integral calculus, and permission of instructor.</td>
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<td>Repeatable to maximum of six hours.</td>
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<td>Examination of economic problems whose solutions may advantageously be sought by use of the methods of mathematics and mathematical statistics. L'Esperance.</td>
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<td>851</td>
<td>Seminar in Business Fluctuations and National Income Accounting</td>
<td>G 2</td>
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<td>Not open to students with credit for 844.</td>
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<td>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.</td>
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<td>852</td>
<td>General Business Conditions Analysis</td>
<td>G 3</td>
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<td>Prereq.: 20 or hrs. in Econ. and/or Bus. Org. and permission of instructor.</td>
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<td>Not for graduate credit to majors in Economics.</td>
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<td>Theoretical and applied analysis of general economic conditions and their relation to decisions of the firm. Craig.</td>
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<td>860</td>
<td>Seminar in International Economic Problems</td>
<td>G 2</td>
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<td>Prereq.: 664-665-666.</td>
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<td>Not open to students with credit for 838.</td>
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<td>Seminar in analytical problems, theoretical and applied, of international economic adjustments; development of techniques for implementation of policies. James.</td>
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<td>870 *</td>
<td>Seminar in Public Control</td>
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<td>Prereq.: 670 or 672 or 676 or 773.</td>
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<td>Not open to students with credit for 834.</td>
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<td>An analysis of the leading problems involved in government promotion and regulation of economic enterprise. Appraisal of existing and alternative public economic policies. Tybout.</td>
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<td>871</td>
<td>Problems in National Security Economics</td>
<td>G 3</td>
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<td>W., Sp. 1 2-hr. cl.</td>
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<td>Prereq.: 770 or permission of instructor.</td>
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<td>Repeatable to a maximum of 6 cr. hrs.</td>
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<td>Seminar designed to analyze in depth selected economic problems of national defense and defense-related activities. Sherman, Lovenstein.</td>
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<td>872</td>
<td>Seminar in Economics of Research and Development</td>
<td>G 3</td>
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<td>S. 3 cl.</td>
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<td>Prereq.: 772</td>
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<td>An analysis of special problems in the economics of research and development. Tybout.</td>
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<td>879</td>
<td>Anti-Trust Law and Economics</td>
<td>G 3</td>
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<td>An evaluation of anti-trust law on the basis of current economic thinking. Strong, Lyness.</td>
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<td>880</td>
<td>Seminar in Industrial Relations</td>
<td>G 2</td>
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<td>637 or 683, or permission of instructor.</td>
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<td>Not open to students with credit for 843.</td>
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<td>Selected topics and issues in contemporary trade unionism and collective bargaining. Miller, Parness.</td>
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<td>881</td>
<td>Seminar in the Economics of the Labor Market</td>
<td>G 2</td>
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<td>Prereq.: 650 or 688 or permission of instructor.</td>
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<td>Selected topics and issues in wage determination, employment and unemployment. Miller, Parness.</td>
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</table>

A-64
EDUCATION

882 Seminar in Social Insurance  G 2
Sp.
Prereq.: 629 or 680, 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. Brower.

888 Seminar in Current Economic  G 1
Literature
Repeatable to a maximum of 3 cr. hrs.
Contributions of current economic literature. Reading assignments
according to students' interests and fields of specialization. Con-
ference, reports, criticisms.

891 Seminar in Institutions and  G 2
Methods of Economic Planning
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. Lievenstein.

895 Seminar in Soviet Economic  G 3
Problems
W, 3 cr.
Prereq.: 689 or permission of instructor.
Current problems of the Soviet economy; economic growth, price
policies, changing structure of the economy. Condoce.

999 Interdepartmental Seminars A 1-5
(See under Interdepartmental Seminars.)

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

ASSOCIATE PROFESSORS: BRUENE, I. COOK, C. CORBELL,
C. FYFE, T. GIBSON, P. HACK, S. HILLES, H. HOPKINSON, G. LARANEE,
M. MACCIA, J. MACCIA, D. RAY, J. RAMSEY, J. REYNARD, L. RICCIUM,
K. SESSIONS, T. SITTON, T. TOVEY, and J. WILLIAMS.
ASSISTANT PROFESSORS: CRAWFORD, H. HOWE, H. IMMIGRAI, K. KOSTE,
J. MILLER, J. BROADEN, S. CLAIR, B. SCHROEDER, G. SMITH, R. SUES,
D. TEBBS, C. WOODRUFF, and J. ZDONIS.

Areas
Adult Education—600B, 770, 771, 774, 800B, 835B, 898, 950.
Curriculum and Supervision—K12, 600Y, 701, 702, 704, 800Y,
860, 868, 887, 950.
Dental Hygiene Education—537A.
Educational Administration—600M, 699, 727, 790M, 809, 823,
835M, 836, 837, 838, 844, 853, 870, 871, 873, 875, 876,
880, 894, 950.
Elementary Education—609, 510, 514, 515, 516, 517, 518, 521,
522, 523, 600C, 643, 649, 654, 655, 658, 659, 661, 704, 731,
741, 747, 748, 749, 753, 790C, 800C, 864, 882, 833C, 864, 885,
950.
Exceptional Children: 537L, 600T, 603, 609, 611, 617, 619,
644, 650, 651, 666, 687, 718, 719, 720, 730, 732, 734, 735,
736, 764, 766, 772, 787T, 800T.
Fine Arts—532C, 536C.
Guidance—537D, 600D, 601, 750, 752, 754, 755A, 755B, 756,
800D, 818, 835D, 950.
Health Education—539M.
Higher Education—600E, 708, 800E, 812, 832, 835E, 845, 848,
850, 851, 854, 855, 950.
Introduction to Education—498.
Music—520A, 520B, 336A, 536B.
Philosophy and History of Education—600W, 6001, 607, 624, 632,
636, 711, 717, 726, 729, 760, 775, 776, 777, 778, 800W, 8001,
809, 810, 835F, 835I, 859, 950.
Physical Education—520S, 520T, 536S, 536T.
Research Techniques—600V, 710, 800V, 802, 804, 835Y, 806,
950.
School Library Science—503, 550, 551, 552, 600W, 646, 647.

Secondary Education
General Field—535, 600K, 674, 703, 704, 705, 706, 708,
709K, 800K, 803, 883X, 841, 865, 886, 950.
Teaching of English—535N, 600N, 663, 669, 670, 671, 674,
800N, 835N, 950.
Teaching of Foreign Languages—535D, 536F, 536L, 536-O,
Teaching of Mathematics—530T, 600T, 654, 659, 660, 689, 761,
Teaching of Science—536Q, 600Q, 604, 605, 643, 681, 706, 712,
800Q, 835Q, 851, 950.
Teaching of Social Studies—536B, 600B, 669, 677, 768, 800B,
835B, 950.
Teaching of Speech—536U, 537C, 537E, 600J, 600U, 612, 613,
627, 628, 800U, 835U, 950.

Vocational and Practical Arts Education
Business Education—401, 402, 403, 434, 405, 406, 471, 472,
473, 536J, 542, 543, 544, 600A, 722, 733, 734, 725, 726, 728,
800A, 835A, 950.
Distributive Education—536X, 600X, 717, 780, 781, 782, 800X,
855X, 950.
Industrial Arts Education—440, 441, 442, 443, 444, 445, 448,
450, 451, 456, 460, 522, 536G, 547, 561, 562, 563, 581, 586,
Trade and Industrial Education—536H, 575, 600H, 695, 800H,
835H, 950.
Workshops and field experience—505, 649, 682, 799.

Office: 149 Arps Hall, 1945 North High Street.
PROFESSORS: JENSON (Chairman), ABBERTY (Emeritus),
GOOD (Emeritus), HECK (Emeritus), LANDSITTEL (Emeritus),
SEELY (Emeritus), STEITZ (Emeritus), THARP (Emeritus),
ZIBBES (Emeritus), TALLLEN, ANDERSON, ARISMAN,
IBURNEV, BURR, ICASIDES, CONRAD, COON, CORBALLY,
IDLE, IDLITZ, LEBERHART, LACWETT, LACWETT,
KIRCHER, GIBB, GIBBS, KIRCHER, KIRCHER,
HENDRICKSON, HERRICK, IKE, IHEXON, HUCK,
HUSSMAN, JENNINGS, JEWETT, KEEMP, KIRCHER,
IKOMRA, LAUGHLIN, ICAZAR, LIVINGSTON,
LORENZ, TUBBS, MEHLE, MENDENHALL, MOONEY,
PETERS, PHELPS, RASMUS, REESE, RICHARDSON,
SINGRE, SCHNEIDER, STAUB, STEWART, TOLMJOIN,
TRIMBLE, TYLER, WARNER, WELLS, and WOHLERS.
COURSES OF INSTRUCTION

EDUCATION

401 Beginning Typewriting U 0
W. 4 cl.
A. 4 cl.
Reqd. in the 2nd yr. of students majoring in business education who lack proficiency required for admission to Ed. 471.
Placement tests 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. Nuccio.

402 Beginning Typewriting U 0
W. 4 cl.
Prereq.: 401.
Continuation of 401. Nuccio.

403 Beginning Typewriting U 0
Sp. 4 cl.
Prereq.: 402.
Continuation of 402. Nuccio.

404 Beginning Shorthand U 2
A. 4 cl.
Reqd. in the 2nd year 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. Dehl.

405 Beginning Shorthand U 2
W. 4 cl.
Prereq.: 404.
Continuation of 404. Dehl.

406 Beginning Shorthand U 2
Sp. 4 cl.
Prereq.: 405.
Continuation of 405. Dehl.

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 Mus.) of freshmen and students transferring into education with less than 90 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. Cyphert and Staff.

440 The Laboratory of Industries U 4
A, W, Sp. 5 2-hr. cl. and lab.
Orientation to technological origins of industrial arts teaching through experiences with tools, materials, processes, and products. Tewers.

441 Elements of Woodworking U 4
A, Sp. 5 2-hr. cl. and lab.
Prereq.: 440 and 460 and Engr. Dr. 400.
Experience in planning and developing skills and knowledges of the construction of articles made of wood and of the industries involved. Ray.

442 Elements of Woodworking U 4
W. 5 2-hr. cl. and lab.
Prereq.: 441.
Continuation of 441. Ray.

443 Elements of Metalworking U 4
A, W, Sp. 5 2-hr. cl. and lab.
Prereq.: 440, 460, Engr. Dr. 400.
Experience in planning and developing skills and knowledge of the construction of articles made of metal and of the industries involved. Olson.

444 Elements of Metalworking U 4
W. 5 2-hr. cl. and lab.
Prereq.: 440, 460, Engr. Dr. 400.
Continuation of 443.

445 Elements of Printing U 4
A. 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. Hasu.

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 415.
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. Suess.

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 over-view of the design, function, and operation of internal combustion engines and their auxiliaries. Ecker.

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. Ecker.

456 Residential and Industrial Utilization of Electrical Power U 4
Sp. 5 2-hr. cl. and lab.
Prereq.: 446.
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. Suess.

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. Hasu.

471 Advanced Shorthand, Typewriting, and Transcription U 4
A. 4 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. Davis.

472 Advanced Shorthand, Typewriting, and Transcription U 4
W.
Prereq.: 471.
Continuation of 471. Davis.

473 Advanced Shorthand, Typewriting, and Transcription U 4
Sp.
Prereq.: 472.
Continuation of 472. Davis.
503 Organization and Administration of the School Library
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 2-15
Su, A, W, Sp. 1 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. Mangan and Staff.

School Related Experience

505A Interpretation of September Field 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.

U 3
For students in the Able Student Program.

Experience in Community Agencies—Non School

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.

U 2-5
For students in the curriculum in Fine Arts Education.

U 2-5
For students in the curriculum in Public Recreation.

U 2-5
For students in the curriculum in Physical Education for Men.

U 2-5
For students in the curriculum in Physical Education for Women.

U 2-5
For students in the curriculum in Speech and Radio-Speech.

509 Kindergarten and Pre-School Teaching
Su, A, W, Sp. 3 cl., and observation.
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
Su, A, W, Sp. 3 cl.
Prereq: 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.

EDUCATION

514 Elementary Education: Conceptions of Teaching
U 4
Su, A, W, Sp. 2 3-hr. cl., alternate 1 2-hr. cl.
Prereq.: 408, or concur.: 648. For detailed statement of additional prerequisites see college education section. If possible, 514 and 515 should be scheduled during the same quarter on the same day of the week at consecutive hrs.
Not open in Summer Qtr. to elementary majors without teaching experience.
Students may not schedule more than 20 hrs. while taking this course.
First course in basic professional sequence. Designed to acquaint students with elementary school program in general and to deepen conceptions of teaching. Tomlinson, Koop, Teukosky.

515 Elementary Education: Child Guidance
U 4
Su, A, W, Sp. 2 2-hr. cl., alternate 1 2-hr. cl.
Prereq.: 514 or concur.: 514.
Development of teacher insight and understanding in the education of children. Class work based upon significant research. Required observation of children at University School. King, Teukosky.

516 Elementary Education: The Language Arts
U 4
Su, A, W, Sp. 2 2-hr. cl., alternate 1 2-hr. cl.
Prereq.: 514 and 3rd yr. standing in the College of Education. 516 and 517 should be scheduled during the same qtr. on the same day of the week and at consecutive hrs. just prior to enrollment in student teaching.
Not open in Summer Qtr. to elementary majors without teaching experience.
Students may not schedule more than 20 hrs. while taking this course.
This course gives particular consideration to the teaching of language arts (reading, handwriting, spelling, oral and written expression) in the elementary program. School participation required. Huck, King.

517 Elementary Education: The Social Studies
U 4
Su, A, W, Sp. 2 2-hr. cl., alternate 1 2-hr. cl.
Prereq.: Educ. 3rd yr. standing and 514. 516 and 517 should be scheduled during the same qtr. on the same day of the week and at consecutive hrs. prior to enrollment in student teaching.
Not open in Summer Qtr. to elementary majors without teaching experience.
Students may not schedule more than 20 hrs. while taking this course.
This course follows the sequential arrangements of the elementary education curriculum, placing particular emphasis upon the social studies in the elementary school program. Tomlinson, Burr, Teukosky, Miller.

518 Elementary Education: Student Teaching
U 6-15
Prereq.: Educ. 4th yr. standing.
For additional information see College of Education section.
Observation, participation, and responsible teaching in a public school in the greater Columbus area. Individual and group

Teaching of Arithmetic, Language Arts, and Social Studies
Su. 12 cl.
The three courses listed above, 510, 516, and 517, will be combined in a workshop limited to graduates of Colleges of Liberal Arts.

A-67
COURSES OF INSTRUCTION

EDUCATION

conference or seminars. (Maximum transfer credit accepted is 6 hrs.) Miller, Potter, and Staff.

518A 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.

518C Sp. U 6
For students in the program for graduates with Bachelor of Arts or comparable degrees.

518D* 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, Benner.

520B Vocal Music U 3-7
Thomas.

520C Fine Arts U 3-7
A, W.
Mitchell.

520S Physical Education (Men) U 3-7

520T Physical Education (Women) U 3-7

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. Koite, Huck, Ramsey.

522 Elementary Schools Industrial U 5
Arts Activities
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. Haus, Ray and Staff.

528 Elementary Education: Science U 3
Su, A, W, Sp. 3 cl.
Prereq.: 514 and Bot. 402; Zool. 401 or Chem. 408, Physics 412 or Geol. 418.

535 Theory and Practice in Secondary Education U 5
Su, A, W, Sp. 8 cl.
Prereq.: 408.
A laboratory field experience course introducing topics, problems, and skills common to prospective secondary school teachers. Hough and Staff.

536 Student Teaching in Secondary Schools U 3-15
Prereq.: Educ. 446 yr. standing.
For additional information, see College of Education section.
Observation, participation, and responsible teaching in a public school in the greater Columbus area. Individual and group conferences or seminars.
A minimum of 9 credit hours is required to meet certification standards in Ohio and in most secondary academic curricula in this College.
The individual subject area is designated by a separate section number which should be used in enrolling. Students desiring teaching in more than one area should indicate accurately both section numbers and hours in each. Andrews and Staff.

536A Instrumental Music U 3-8
Continuation of 520A. Benner, Wilson.

536B Vocal Music U 3-8
Continuation of 520B. Ramsey, Barr.

536C Fine Arts U 3-15
W, Sp.
Barkan.

536D German U 3-15
Allen.

536F French U 3-15
Allen.

536G Industrial Arts U 3-15
Haus.

536H Trade and Industrial Education Sp.
Reese

536I Business Education U 3-15
Wells.

536L Latin U 3-15
Allen.

536M Health Education U 3-15
Schoeberger.

536N English U 3-15
Zidonits.

536O Spanish U 3-15
Allen.

536P Mathematics U 3-15
Trimble.

536Q Science U 3-15
Schlessinger.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Notes</th>
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<tbody>
<tr>
<td>536R</td>
<td>Social Studies</td>
<td>U 3-15</td>
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<td>A. W. Sp.</td>
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<td>536S</td>
<td>Physical Education (Men)</td>
<td>U 3-15</td>
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<td>536T</td>
<td>Physical Education (Women)</td>
<td>U 3-15</td>
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<td>536U</td>
<td>Speech</td>
<td>U 3-15</td>
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<td>A. W. Sp.</td>
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<td>536X</td>
<td>Distributive Education</td>
<td>U 3-15</td>
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<td>A. W. Sp.</td>
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<td>536Z</td>
<td>Russian</td>
<td>U 3-15</td>
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<td>A. W. Sp.</td>
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<td>537</td>
<td>Student Teaching in Special Fields</td>
<td>U 3-15</td>
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<td>A. W. Sp.</td>
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<td>Prereq.: Educ. 4th yr. standing</td>
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<td>For additional information see College of Education section.</td>
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<td>Andrews and Staff.</td>
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<td>537A</td>
<td>Dental Hygiene Education</td>
<td>U 3-15</td>
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<td>A. W. Sp.</td>
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<td>537C</td>
<td>Radio-Speech Education</td>
<td>U 3-15</td>
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<td>A. W. Sp.</td>
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<td>537D†</td>
<td>School Psychological Service</td>
<td>U 3-15</td>
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<td>Cassidy</td>
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<td>537E</td>
<td>Speech and Hearing Therapy</td>
<td>U 3-15</td>
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<td>A. W. Sp.</td>
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<td>537L</td>
<td>Special Education</td>
<td>U 3-15</td>
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<td>A. W. Sp.</td>
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<td>542</td>
<td>Teaching Stenographic and Clerical Subjects</td>
<td>U 3</td>
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<td>A. 3 cl.</td>
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<td>Prereq.: 4th yr. standing and 403, 406 or equiv., 535.</td>
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<td>543</td>
<td>Teaching Bookkeeping and Office Machines</td>
<td>U 3</td>
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<td>A. 3 cl.</td>
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<td>Prereq.: 4th yr. standing and 535, Acc. 403 or 413 or 503.</td>
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<td>544</td>
<td>Teaching the Basic Business Subjects</td>
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<td>W. 3 cl.</td>
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<td></td>
<td>Prereq.: 4th yr. standing and 25 cr. hrs. in Geog., Econ., and Bus. Org., and 535.</td>
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<td>547</td>
<td>The Teaching of Driver Education</td>
<td>U 3</td>
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<td>Su, A. W. Sp.</td>
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<td>1 2-hr. cl., 2 hr. lab.</td>
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<td>Prereq.: 4th yr. standing, valid driver's license and 535.</td>
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<td>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. Eckers.</td>
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<td>550†</td>
<td>Library Materials for the Secondary Schools</td>
<td>U 3</td>
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<td>Prereq.: 535.</td>
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<td>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.</td>
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<td>551†</td>
<td>Classifying and Cataloging in the School Library</td>
<td>U 2</td>
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<td>Prereq.: 535.</td>
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<td></td>
<td>Introduction to the principles of classifying and cataloging the simpler types of library materials.</td>
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<td>552</td>
<td>Practice Library Work</td>
<td>U 5</td>
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<td>W. Sp. Cl. and lab. arr.</td>
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<td>Prereq.: 503, 550, 551.</td>
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<td>Designed to bring students into touch with actual library conditions through practice work in approved school libraries. Heller.</td>
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<td>560</td>
<td>Letter Press and Offset Printing</td>
<td>U 4</td>
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<td>W. 5 2-hr. cl. and lab.</td>
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<td>Prereq.: 445, Photo. 511.</td>
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<td></td>
<td>Experience in letter press, photolithography, composition, bookbinding, editing, and publishing a limited edition. Professional consideration include course materials, and planning a graphic arts laboratory.</td>
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<td>561</td>
<td>The Teaching of Industrial Arts I</td>
<td>U 3</td>
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<td>A. 4 cl.</td>
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<td>Prereq.: 3rd yr. standing, and 535.</td>
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<td>A critical study of objectives, methods of presentation, evaluation plan and laboratory procedures, and professional problems. Towers.</td>
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<td>562</td>
<td>The Teaching of Industrial Arts II</td>
<td>U 3</td>
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<td>W. 3 cl.</td>
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<td>Prereq.: 3rd yr. standing, and 561.</td>
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<td>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.</td>
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<td>563</td>
<td>The Teaching of Industrial Arts III</td>
<td>U 3</td>
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<td>Sp. 3 cl.</td>
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<td></td>
<td>Prereq.: 3rd yr. standing, and 561.</td>
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<td>575</td>
<td>Trade and Industrial Education</td>
<td>U 3-6</td>
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<td>A. Sp. Cl. hrs. arr.</td>
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<td>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. Oliverio.</td>
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COURSES OF INSTRUCTION

EDUCATION

581 Work Experience in Industry U 3-6
Su, A, W, Sp. 5-9 hr. cl.
Prereq.: Major standing in Indust. Arts or Trade and Indust. Ed., and permission of instructor.
Credit in 509, 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 arts. Ostrer, Eddy.

600 Individual Studies in Education U G 1-4
Prereq.: 514 and permission of instructor.

600A Business Education Wells.

600B Adult Education Hendrickson.

600C Elementary Education Dunn, Harding, Hück, Tomlinson, Ramsee, King, Teckabury.

600D Guidance Anderson.

600E Higher Education Anderson.

600F History of Education and Comparative Education Sutton, Mehl, Mace.

600G Industrial Arts Education

600H Trade and Industrial Education Reese.

600I Philosophy of Education Kircher, Brauner.

600J Radio and Television Education Tyler.

600K Secondary Education

600M Educational Administration Staab, Ransger, Jensen, Conrad, Sessions, Heck, Reynold, Larmee, Laughlin.

600N Teaching of English Eberhart, Zidonis.

600O Teaching of Foreign Language Allen.

600P Teaching of Mathematics

600Q Teaching of Sciences

600R Teaching of Social Studies Griffin, Jewett.

600S Audio-Visual Materials of Instruction

600T Exceptional Children

600U Speech Education Lewis.

600V Research Techniques

600W Library Science Heller.

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. Gibbons, Williams.

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, instruments and procedures, texts and reference materials. Schlessinger, Hone, Shum.

605 Problems in the Teaching of Biological Science Su, A, 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, Hone.

607 Philosophy of Education 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 school. Kircher, Brauner, 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, and manuscript writing. Preparation for certification in braille writing. Hunt.

611 Techniques of Teaching Speech to the Deaf A. 3 cl.
Study and practice in developing speech in the deaf. Crawford.
612 Methods in Speech and Hearing Therapy
U G 3
Therapy
Sp. 2 2-hr. cl.
Prereq. or concur.: 516 or 535 or equiv., Speech 683 and 697.
Organizing speech and hearing therapy programs in schools. State requirements; professional relationships; "Coordination Day" evaluation of progress; observation and child study; group vs. individual instruction. Crawford.

613 Behavioral Aspects of Language Disabilities
U G 3
W. 2 2-hr. cl.
Prereq. or concur.: 516 or 535. Speech 684 and 698.
Classroom and therapy interrelationships. Consideration of aphasia, voice problems, deafness, and multiple handicaps. The use of records, reports, home visitsations, parent conferences, and essential equipment. Crawford.

617 Evolution of Instruction and Guidance of the Deaf
U G 3
W. 3 cl.
Prereq.: Psychol. 609.
Evolution of the oral and manual approaches of instruction of the deaf and their implication for the life adjustment problems of the deaf. Cranford.

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.

624 Social Education
U G 3
Su. 3 cl.
Prereq.: 3rd yr. standing and 514 or 535 or permission of instructor.
Analyses of social structures and processes in classroom grouping arrangements; teacher social roles, school traditions, ceremonies, clubs, and athletics. Jessee.

627 The Teaching of Speech in Secondary Schools
U G 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. Levaris.

628 Teaching Dramatic Arts in Secondary Schools
U G 3
Su, A. 3 cl.
Prereq.: 535, Speech 505, 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. Levits.

632 The History of Western Education
U G 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, Mehl, and Staff.

636 Historical Foundations of American Education
W. 4 cl.
Development of education in the United States since colonial times. Major emphasis on American education since 1830, including twentieth century developments. Mehl.

641 History of Practical Arts and Vocational Education
Su. 3 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
U G 3
Su, Sp. 3 cl.
Prereq.: 518 or 536 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
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
U G 3
A. 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. Heller.

647 Reference Work in the School Library
U G 3
W. 3 cl.
Prereq.: 514 or 535.
Includes study of the basic reference materials such as encyclopedias, dictionaries, atlases, handbooks, gazetteers, pamphlets and bulletins. Heller.

649 Practicum in Problems of Public Education
U G 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
A. 3 cl.
Prereq.: Psychol. 609, Speech 669.
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
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
U G 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 advisor.
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
Sp. 3 cl.
Prereq.: 440 or 552 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. Hanes.

656 Language Arts in the Elementary School
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 advisor.
Problems and concerns for inservice teachers stressing current methods, issues and practices through study of significant literature and research findings. Huck, King.

657 Social Studies in the Elementary School
A, W. 3 cl.
Prereq.: 518 or 536 or 3 yrs. teaching experience.
Not open to students in elementary education except by permission of departmental advisor.
The educational values of social studies, reasons for, and ways and means of integrating history, geography, and civics. Burr, Teakshury.

659 Teaching Mathematics in Secondary 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. Lazer.

660 Teaching Mathematics in Secondary Schools II
Su, A, W. 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. Trimble.

661 Guidance Problems in the Elementary School
Su, Sp. 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 High-School Teachers
A, Sp. 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 Mentally Retarded Children
Su, A. 3 cl.
Prereq.: Psychol. 609.
Study of causal factors, evaluations, learning potential, and general characteristics of the retarded child. Cavin.

667 Instructional Programs for Exceptional Children
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 Social Studies
Su, A, W, Sp. 3 cl.
Prereq.: 555.

670 Teaching Literature in Secondary Schools
Su, A, W, Sp. 4 cl.
Prereq.: 535 and 20 cr. hrs. in Engl. including Engl. 418 and 564. At least one of the two courses in methods of teaching Engl. (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 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 Engl. (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 Secondary Schools
A, Sp. 3 cl.
Prereq.: 535 or equiv.
Not open for graduate credit to Jour. majors.
For journalism teachers in secondary schools and advisers. Covers editorial, advertising, circulation, mechanical production, and publishing phases of school newspapers, magazines, and annuals. Barton.

676 The Core Program in the Junior High School
A, Sp. 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. Pyper.

677 The Teaching of the Social Studies I
Su, A, W, Sp. 4 cl.
Prereq.: 535 and Hist. 404 or 423.
Illustrative materials will be drawn primarily from history, with some attention to the other social studies. Griffin.

678 The Teaching of the Social Studies II
A, W, Sp. 4 cl.
Prereq.: 535 and Hist. 404 or 423.
A continuation of Ed. 677. The illustrative materials will be drawn primarily from the fields of economics, sociology, and political science, with some attention to geography and anthropology. Jecsett.
681 Laboratory Practicum for Teachers U G 2-3
of Science
Su, A, W, Sp.  3 hr., cl.
Prereq.: 604 or 684 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. Schlessinger, House, Shrum.

682 Field Laboratory in Conservation U G 6-S
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 cr.
A. W. For French majors and minors.
B. F. 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 Laboratory Work for Teachers of Mathematics U G 3
Su.  2-3 hr. cl.
Prereq.: 660 or equiv. 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. Lazor.

692 The Teaching of Modern Foreign Language U G 4
A. W. 4 cr.
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, Span. 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.: 535, Latin 407, 408, and an additional 8 cr. hrs. in Latin.
Values, Teachers' equipment, objectives, and methods. Classroom procedures. Lectures and assigned readings. Titchener.

695 Trade and Industrial Vocational Education for Out-of-School Youths and Adults U G 3
A. 3 cr.
Prereq.: 575 or equiv. 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 cr.
Prereq.: 535 or equiv.
A study of the student activities program including home room, assemblies, clubs, publications, debating, dramatics, social activities, athletics, administration, and financial control. Laughlin.

701 Fundamentals of Curriculum U G 3
Su, A, W, Sp. 3 cr.
Prereq.: 703 or 747.
Not open to students with credit for 707, 824, or 851.
A beginning course in curriculum designed to serve as an overview of the field of curriculum and instruction: Kindergarten through 12 grade. Klohr.

702 Fundamentals of Supervision U G 3
Su, A, W, Sp. 3 cr.
Prereq.: 701.
Not open to students with credit for 526 and 889.
A beginning course in supervision of instruction emphasizing general principles and practices in elementary and secondary schools. Klohr.

703 The Role of the Secondary School U G 3
in the Social Order
Su, W, Sp. 3 cr.
Prereq.: 518 or 536 or equiv.
An orientation course for teachers and administrators which deals with the basic purposes of secondary education in relation to major issues and current trends. Frymier.

704 Laboratory Study of the Ohio State University School U G 2-5
Sp.
Prereq.: 514 or 535 or equiv.
Reqd. minimum of 12 hrs. of observation.
The philosophy and program of the University School, as revealed through reading, directed observation, and planned conferences with the staff. Frazier.

705 Trends in the Organization of Secondary Education U G 3
Su, A, Sp. 3 cr.
Prereq.: 518 or 536 or equiv.
Historical background and present status of American secondary education, district organization, vertical and horizontal organization, state and federal control. Laughlin.

706 The Supervision of School Science U G 4
Programs
Su, W. 4 cr.
Prereq.: 694 or equiv. 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, Schlessinger.

708 Evaluation in Secondary Schools U G 3
Su, W. 3 cr.
Prereq.: 518 or 536 or equiv.
Study of techniques of evaluation in secondary schools. Attention is given to current evaluation practices with emphasis on procedures appropriate to Ohio schools. Duncan, Frymier.

A-73
COURSES OF INSTRUCTION

EDUCATION

710 Introduction to Educational Research  G 3
Su, A, W, Sp. 3 cl.
Prereq.: 518 or 536 or equiv.
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.: 706 or equiv.
Foundations for science curriculum, current developments, planning and evaluation procedures. Richardson.

713 Educational Planning for Mentally Retarded Children and Youth  U G 3
Su, W.
Prereq.: 668 or equiv.
Not open to students with credit for 775.
A basic course for teachers and administrators which deals with curriculum goals and related educational planning for mentally retarded children and youth. Cowin.

714 Industrial Arts Curriculum Planning  U G 3
Su. 3 cl.
Prereq.: 538 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
W. 3 cl.
Principles of industrial arts and technical laboratory planning including equipment selection for all school levels and meeting all curriculum requirements. Suen.

717 Survey of Vocational Education  U G 3
Su. 3 cl.
Prereq.: 535 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. Logius 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.: 666 and 713.

Cowin.

719 Practicum in Educational Planning for Mentally Retarded Children: Communicative Arts; Arithmetic; Natural and Social Science  U G 3
Su, A. 3 cl.
Prereq.: 718.
Continuation of 718, Cowin.

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, Cowin.

722 Principles of Business Education  U G 3
Su. 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. Wells.

723* Organization and Teaching of Office Practice  U G 2
Su.
Prereq.: 4th yr. standing and Bus. Org. 510.
The purpose, content, organization, and materials for an office practice course with practical application in an office practice laboratory.

724* Administration and Supervision of Business Education  U G 3
Su. 3 cl.
Prereq. or concur.: 4th yr. standing and 543 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.

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.

726† Teaching Bookkeeping and Related Subjects  U G 2
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.

727 Introduction to School Administration  U G 3
Su, A, W, Sp. 3 cl.
Prereq.: 518 or 536 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. Samberger, Laras, Laughlin.

728 Improvement of Instruction in Secretarial Subjects  U G 2
Su. 2 cl.
Prereq.: 542 or equiv.
Teaching procedures basic to the development of vocational proficiency in typing, shorthand, and transcription. Available instructional materials, evaluation, standards of achievement. Wells.

730 Educational Implications of Visual Impairments  U G 3
Su, A. 3 cl.
Prereq.: Biol. 408 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 biology of the eyes with emphasis on educational implications of visual disabilities of blind and partially seeing children. Hunt.
731 Trends and Issues in Teaching U G 3
Reading in the Elementary School
Su, W. 3 cl.
Prereq.: 656 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 com-
prehensive research in the field. King, Hack.

732 Theory and Practice in the U G 3
Education of Blind Children
Su, Sp. 3 cl.
Prereq.: 730.
Current theories and techniques in the education of blind chil-
dren, adapting general curriculum, specialized content, materials
and equipment for the blind child. Hunt

734 Teaching Reading and Arithmetic to U G 4
the Deaf
W. 4 cl.
Prereq.: 650.
Developing skills in reading and arithmetic in the deaf. Crawford.

735 Teaching Social Studies and Science U G 3
to the Deaf
Sp. 3 cl.
Prereq.: 734.
Teaching skills in academic subjects to the deaf on the inter-
mediate and high school levels. Crawford.

736 Education of Multihandicapped U G 3
Children
Su, W. 3 cl.
Differential diagnosis, classification, educational placement, and
adjustment of multihandicapped children. Ames.

741 Advanced Course in Children's U G 3
Literature
Su, Sp. 3 cl.
Prereq.: 521 or 656.
An evaluation of the changing role and increased importance of
literature in the education of children and youth today. Hack, Katze.

747 Foundations of Elementary Education G 3
Su, A. 3 cl.
Utilization of research in the basic sciences in developing back-
ground and understanding of present trend in elementary educa-
tion. Critical examination of current theories.

748 The Changing American Elementary G 3
School
Su, W. 3 cl.
Prereq.: 516 or 536 or teaching experience.
Involves investigation of objectives, issues, and curriculum or-
ganization of the modern elementary school program. Burr.

749 Evaluation in Elementary Schools G 3
Su, Sp. 3 cl.
Prereq.: 516 or 536 or teaching experience.
Appraisal of materials and methods in terms of educational aims
and research findings. Consideration of instruments and pro-
cedures for comparing achievements with established objectives.
Harding.

750 Introduction to Guidance Services U G 3
Su, A, W, Sp. 3 cl.
Prereq.: 525.
Background and purposes of guidance service, techniques used in
studying the individual; informational services; counseling service;
placement and follow-up developing a guidance program. Peters,
Ricco and Staff.

752 Group Processes G 3
Su, A, W, Sp. 3 cl.

753 School Problems in Child Development G 3
Su, Sp. 3 cl.
An advanced course based upon research in education and related
fields which aids the teacher in guiding developmental activities
of children in the elementary school.

754 Organization and Administration of G 3
Guidance Services
Su, W. 3 cl.
Prereq.: 750 or equiv.
The selection, organization, and presentation of guidance mate-
rial. Analysis of types of organization, methods of initiating a
program, and types of in-service programs. Riccio.

755A Guidance Appraisal Techniques G 3
Su, A, W, Sp. 3 cl.
Prereq.: 750.
Not open to students with credit for 755.
Basic concepts and techniques in guidance work in the
appraisal of the individual. Kemp.
A. Individual Appraisal—Non-Standardized Methods.

755B Guidance Appraisal G 3
Techniques
Su, A, W, Sp. 3 cl.
Prereq.: 750.
Not open to students with credit for 755.
B. Individual Appraisal—Standardized Methods.

756 Resources for Educational and G 3
Vocational Guidance
Su, A. 3 cl.
Prereq.: 750 or equiv.
Educational and vocational resources which provide assistance in
fostering the optimum physical and psychological development of
students.

757 Conceptions of Mind in Educational G 3
Theory
Su, W. 3 cl.
Prereq.: 607 or equiv.
A study of the doctrines of the mind that have exercised a deter-
mining influence upon educational theory and practice. Brueuer.

758 The Thinking Process in Its G 3
Educational Bearings
Su, Sp. 3 cl.
Prereq.: 607 or equiv.
A study of the thinking process for the purpose of tracing its
implication for educational theory and classroom practice. Brueuer.

759 Modern Trends in Educational G 3
Philosophy
Su, A. 3 cl.
Prereq.: 607 or equiv.
A discussion of alternative philosophies and their implications for
current educational theory. Kircher.

760 Moral and Religious Ideals in G 3
Education
Su, Sp. 3 cl.
Prereq.: 607 or equiv.
An inquiry into the role of religion in public education practices,
court decision, and controversial proposals. Kircher.
761 The Use of Certain Concepts of Philosophy and Logic in the Teaching of Mathematics
Su, W. 3 cl.
Pre req.: 660 or eqv.
A study of the role of physical materials and certain concepts of philosophy and logic in the teaching of arithmetic, algebra, and geometry. Lasar.

762 The Teaching of Algebraic Concepts
Su, Sp. 4 cl.
Pre req.: 660 or eqv.
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.

764 Supervised Teaching in Special Classes
Pre req.: 518 or 536. Psychol. 600 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
W. 3 cl.
Pre req.: Psychol. 600.

768 Directing Student Teaching
G 3
Pre req.: 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
Su, A, W. 3 cl.
Pre req.: 4th yr. standing, for Ed. majors, 514 or 525.
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
Su, W. 3 cl.
Pre req.: 4th yr. standing, for Ed. majors, 514 or 535.
Nature, extent, and significance of the parent education movement; home and school relationships; methods and resources; training professional and lay leaders; local and state programs. Hendrickson.

772 Preparation of Handicapped Children, for Post-School Adjustment
Su, Sp. 3 cl.
Pre req.: 667 or eqv.
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. Hendrickson.

774 Discussion Methods in Adult Education
W. 3 cl.
Pre req.: 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
Su. A. 3 cl.
Pre req.: 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
Su. 3 cl.
Pre req.: 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
Su, A. 3 cl.
Pre req.: 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
W. 3 cl.
Pre req.: 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
Su, W. 3 cl.
Pre req.: 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 Education
W. 3 cl.
Pre req.: 780.
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.
Pre req.: 535.
A practical study of the development and operation of a distributive education program. Logan.

784 Discussion Methods in Adult Education
W. 3 cl.
Pre req.: 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.

799 On-Campus Education Workshops
Su. 4 cr. hrs. or 3 week workshops, 5 cr. hrs. for 6 week workshops.
Pre req.: 514 or 535 or eqv.; 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.
EDUCATION

799A† Workshop on Office Automation and its implications for Business Education in the Secondary School and the Community College.

799C Elementary Education Workshop: Reading.
W. (June 22-July 10)

Huck.

799C Elementary Education Workshop: Science.
Su. (July 27-August 14)

Ramsey.

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 22-August 13)

Duncan.

799M On-Campus Education Workshop: Simulation of Selected Problems in School Administration.
(July 27-August 14)

Larmee, Huck, Ramsey, Laughlin.

799R† Workshop on the Teaching of Ohio History.

799T† Slow Learning Adolescents.

799T† Workshop on the Education of Multi-Handicapped Children.

799T† Workshop in Occupational Orientation and Training for Slow Learning Adolescents.

799X† Workshop designed to revise distributive education course of study and develop instructional materials.

800 Seminars in Education


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.

Wells.

800B† Adult Education.

800C Elementary Education

A. Research and Experimentation in the Language Arts for the Elementary School. Stuck, King.


800D Guidance.
A† Foundation for Guidance and Counseling.
Kemp.


Sp.† Counseling Supervision. Peters.

800E Higher Education.

Anderson, Burnett.

800F History of Education and Comparative Education.

Su. Education as a Means of Maintaining National Identity. Sutton


A. History of American Education. For international students only. Sutton.


800G Industrial Arts Education.

Warner, Haux.

800H Trade and Industrial Education.
Su, W.

Reese.

800I Philosophy of Education.
A.

Brauner.

800J Radio and Television Education.
A, W.

Tyler.

800K Secondary Education.

Furnier, Hough.

800M Educational Administration.

Staub, Huck, Laughlin, Larmee.

800N Teaching of English.
Su, W, Sp.

Eberhart.

800O Teaching of Foreign Languages.
Su.

Allen.

800P Teaching of Mathematics.

Faucett, Lasaar, Tremble.

800Q Teaching of Sciences.

Richardson.

800R Teaching of Social Studies.

Griffin.

800S Audio-Visual Communication.
A.

Dole.

800T Exceptional Children.
Su.

Staff.
COURSES OF INSTRUCTION
EDUCATION

500U Speech.
A. College Service Course Program. Knaus.
W. Communication and Persuasion. Fotheringham.

500V Research Techniques.

500X Distributive Education.
Logan.

500Y Curriculum and Supervision: K-12.
A. Sp.
Klohr.

802 Research Methods
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. Ramseyer.

804 * Educational Experimentation
Sp. 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. Duncan, Frymier.

808 Administration of the Secondary School
Su. A. Sp. 3 cl.
Prereq.: 727 or equiv.
Major problems and issues in the organization and administration of the secondary school. Loughlin.

809 Social Philosophies and Their Educational Bearings
Su. Sp. 3 cl.
Prereq.: 607.
A study of social philosophies in terms of their significance for educational procedures and programs. Jesuit.

810 * The Educational Philosophy of John Dewey
Su. Sp. 3 cl.
Prereq.: 758 or equiv.
A systematic study of the writings of John Dewey in their bearings upon educational theory and practice. Bramer.

812 Seminar in Methods of College Teaching in the Sciences Basic to the Health Professions
Sp. 2 cl.

815 Organization and Administration of Industrial Education
A. 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. Warner.

818 Practicum in School Guidance Work
Su. A. W. Sp. 9 0.5 cr. 9 to 4 hr. lab.
Prereq.: 753, 755, 756, Psychol. 811 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.
Correll.

823 Legal Aspects of School Administration
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. Ramseyer.

825 The Elementary School Principalship
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
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. Frymier.

832 The Community Junior College
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
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, Hanna.

835B Adult Education.
Hendrickson.

835C Elementary Education.
Burr, Harding, Huck, Tomlinson, King, Ramsey.

835D Guidance.
Peters, Kemp, Rischio.

835E Higher Education.
Anderson, Kicher, Burtett.

835F History of Education and Comparative Education.
Sutton, Mihli, Maccia.

835G Industrial Arts Education.
Haus, Warner.

835H Trade and Industrial Education.
Rosse.
833I Philosophy of Education.  
Kircher, Brauner.
833J Radio and Television Education.  
Tyler.
833K Secondary Education.  
Mendenhall, Cypher, Prymer, Hough.
833M Educational Administration.  
833N Teaching of English.  
Eberhart.
833O Teaching of Foreign Language.  
Allen.
833P Teaching of Mathematics.  
Faucett, Lazar, Trimble.
833Q Teaching of Science.  
Richardson, Schlessinger.
833R Teaching of Social Studies.  
Griffin, Jewett.
833S Audio-Visual Materials of Instruction.  
Dale.
833T Exceptional Children.  
Cassidy, Huelten, Smith.
833U Speech.  
Knauver, Lewis.
833V Research Techniques.  
Dale, Mooney, Guba, Cook.
833X Distributive Education.  
Logan.

836 Practicum in Educational Administration G 4  
A. 1 cl., lab. arr.  
Prereq.: Master's degree, 727.  
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, Staub, Hack, Larace, Laughlin.

837 Practicum in Educational Administration G 4  
W. 1 cl., lab. arr.  
Prereq.: 836.  
Continuation of 836.

838 Practicum in Educational Administration G 4  
Sp. 1 cl., lab. arr.  
Prereq.: 837.  
Continuation of 837.

840 The Teaching of Geometric Concepts G 4  
Su. 5 cl.  
Prereq.: 695 or 680 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. Faucett.

841 Guiding Learning Activities in the Secondary School G 3  
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  
W. 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  
Sp. 2-3 hr. cl.  
Prerequisites: 667 and 727, Psychol. 609.

846 Theories and Curricula of Higher Education G 5  
Su. A. 2-3 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  
Sp. 3 cl.  
Prereq.: 687 and 727, Psychol. 609.

850 Teacher Training G 5  
Su. W. 2-3 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.  
Prereq.: 604 or 684 or equiv. and 706 or 712 or equiv.  
Courses and curricula for teacher preparation programs in 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.: 727 or equiv.

854 Administration of Higher Education II G 5  
Sp. 2-3 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.
855 Interaction of the Student and the College Environment G 3
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. 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. Werner.

859 Comparative Philosophy of Education G 3
Sp. 3 cl.
Prereq.: 755 or 759 or equiv.
A study of alternative philosophies of education and the speculative development of their implications for educational practice. Kitcher.

863 Curriculum Theory G 3
Su., W. 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
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. Burn, Tomlinson.

865 Problems of Secondary School Supervision and Curriculum Development G 3
Sp. 3 cl.
Prereq.: 702.
Not open to students with credit for 831.
An advanced course in supervision and curriculum development emphasizing the problems involved in initiating and conducting change in the secondary school curriculum. Premier, Mendenhall.

866 Research in the Laboratory of Industries G 3
W. 3 cl.
Prereq.: 714 or 715 or 716, teaching experience in Indus. Arts or Vocational Industr. 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. Bay.

868 Supervision Theory G 3
A, Sp. 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
A. 3 cl.
Prereq.: 727 or equiv.
Emphasis on such problems as school-community relations, finance, school facilities, staff personnel, pupil personnel, instruction, and organization. Haack.

871 Administrative Problems of the City Superintendent G 3
Sp. 3 cl.
Prereq.: 727 or equiv.
A study for practicing administrators of the problems peculiar to the educational administrator in large public school systems. Stresses applications of theory to practice. Ramagyer.

872 Administration of Pupil Personnel G 3
Su., Sp. 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. Staub and Staff.

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, orientational, appraisal, in-service training, promotion, certification, dismissal, personnel policies, salary, provisions, and welfare. Larmee.

875 School Finance G 3
Su., A, Sp. 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. Haak.

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. Haak.

880 School Plant Planning G 3
Su. 1 2-hr. cl., 1 hr. arr.
Prereq.: 737 or equiv.
Problems and techniques in determining school building needs, evaluating school building, planning new construction or remodeling, utilizing specialized personnel; related legal and financial aspects. Conrad, Wohlers.

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. Klohr, Burn, Mendenhall.

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.

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.
Electrical Engineering

Office: 105 Caldwell Laboratory, 2024 Neil Avenue.

PROFESSOR: DRESE (Chairman), JAYRES, BOONE, COSGRIFF, DAVIS, KAWANO, KIMBERLY (Emeritus), IKO, KOUTOUMJIAN, KHAUS, LEVIS, MATHIS, RICHMOND, TAI, THURSTON, TWARREN, TWED, and WIEBER; ASSOCIATE PROFESSORS: BACON, ICHANG, CORNETT, COVAN, COLEFERT, HIGG, ISHU, KENNAUCH, lipid, PEETERS, SMITH, and WALTER; ASSISTANT PROFESSORS: BATTOCCIETTI, DAVIS, EREDMAN, EACKLEY, LONG, NASH, POTTS, and TODOSEY, and INSTRUCTORS.

504 Professional Aspects of Electrical Engineering U 1 cl.

Employment problems of graduating seniors, professional aspects of engineering and professional societies and ethics. Discussion of employment practices. Agree.

612 Circuit Theory I U G 3 or 4 A, W, 3 or 4 cl.
Preq.: Math 534 and 544, Physics 533, concur. 617.
Not for graduate credit to students majoring in Elec. E.

Basic principles of linear circuit theory. Network equations and topology, phasor algebra, resonance and the analysis of transient and steady state behavior of simple circuits.

613 Circuit Theory II U G 3 or 4 W, Sp, 3 or 4 cl.
Preq.: 612.
Not for graduate credit to students majoring in Elec. E.

Network theorems and network equivalence, magnetically coupled circuits, polyphase circuits and Fourier Series and integral with circuit applications.

614 Circuit Theory III U G 4 A, Sp, 4 cl.
Preq.: 613.
Not for graduate credit to students majoring in Elec. E.

LaPlace transform analysis, zero-pole structure of network impedance functions, Foster's reactance theorem, synthesis of simple networks.

615 Circuit Theory IV U G 4 A, W, 4 cl.
Preq.: 614, concur. 626, Math 824.
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.
Preq.: Physics 533, Math 543, concur. 612.
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.
Preq.: 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.
Preq.: 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 industrial experience following the 9th qtr., or 1 yr. of acceptable industrial experience before the end of the 9th yr.

Students must register with and obtain complete information and forms from course supervisor prior to undertaking the industrial work for credit. Agree.

626 Electron Device Circuit Theory I U G 3 or 4 A, W, 3 or 4 cl.
Preq.: 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.
Preq.: 615 and 626.
Not for graduate credit to students majoring in Elec. E.

Multistage amplifier coupling, broadbanding; feedback analysis and applications; power amplifiers; Class B and C large signal analysis; single-frequency oscillators.

Preq.: 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.
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Contents</th>
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| 642         | Electrical Engineering             | U 4     | A, W, Sp. 3 cl., 3-hr. lab.  
Prereq.: Physics 533, Math. 543.  
Not open to students majoring in Eee 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 Eee 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 introduced in the preceding course. Cowan. |
| 644         | Electron Devices and Controls      | U 4     | A, W, Sp. 3 cl., 3-hr. lab.  
Prereq.: 643.  
Theory and applications of semiconductors, transistors; photoelectric, vacuum and gas filled tubes. Study of control circuits, feedback, amplifiers, oscillators, filters, magnetic amplifiers and instrumentation. Weed. |
Prereq.: 614 and 618.  
Not for graduate credit to students majoring in Eee E.  
Properties and theory of magnetic circuits as applied to electromechanical 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 Eee E.  
Field and circuit concepts of idealized rotating machines; steady and transient states; thermal transients; control machines and systems. |
Prereq.: 651.  
Not for graduate credit to students majoring in Eee E.  
Field and circuit concepts of realistic rotating machines; generalized two-phase machines as control components; magnetic amplifiers. |
| 662         | Electrical Laboratory I             | U 2     | A, W. 1 cl., 1 3-hr. lab.  
Concur. 612 and 617, Math. 543, and Physics 533.  
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. Gilchrist. |
| 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 loci, coupled circuits, network theorems, and circuit transients. Gilchrist. |
| 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.  
Prereq.: 663, concur. 615 and 618.  
Determination of terminal characteristics of vacuum, gaseous, and solid state electron devices; non-sinusoidal waveform frequency analysis; power supplies, three-phase rectifiers, single state amplifiers. 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. 638.  
Amplitude modulation; demodulation of a modulated wave; production of shaped waveforms; switching and control circuit applications; design and evaluation of a single-frequency oscillator; filters. Endres. |
| 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 718.  
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 C 3 or 4 |  
A, W. 3 or 4 cl.  
Prereq.: 615 and 638, or 644 and Math. 544 with permission 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 considerations. |
| 718         | Radiation from Antennas             | U G 3   | W. 3 cl.  
Prereq.: 619, concur. 719.  
Dipole, loop, aperture, reflector, lens, surface wave and other antennas; array theory; radiation resistance, directivity and input impedance. Kruszewski. |
| 719         | Antenna Laboratory                  | U G 1   | W. 1 cl., 1 3-hr. lab.  
Prereq.: 664, concur. 718.  
Measurements and interpretation of antenna field patterns, impedances, gains, and current distribution. Kruszewski. |
| 723         | Digital Computer Laboratory        | U G 2   | Sp. 1 cl., 1 3-hr. lab.  
Concur. 742.  
Laboratory study of counting, arithmetic and digital circuits. Cosgriff. |
724 Microwave Circuits Laboratory U G 1
A. 1 3-hr. lab.
Prereq.: 619 and 664, concur. 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.
Concur. 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 concur. 718, 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 beating; X-ray. Weed.

731 Magnetic Amplifiers U G 3
Sp. 3 cl.
Prereq.: 652, 718; or 643 and 644, with permission of instructor.

733 Feedback Control Systems U G 3
W. 3 cl.
Prereq.: 716 and 652 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.
Concur.: 731 or 738.
May be taken without 725.
Experiments chosen by student interest from the course content of advanced control systems and magnetic amplifiers. Weimer, Weed.

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, concur. 734 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. Cagriğ.

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, Peake.

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.
S, Sp.
Prereq.: Permission of instructor.

763 Circuit Theory of Solid State Devices U G 3
W, Sp. 3 cl.
Prereq.: 628 and 769 or equiv.
COURSES OF INSTRUCTION

ELECTRICAL ENGINEERING

764 Solid State Device Laboratory U G 2
W. 1 cl., 1-3 hr. lab.
Prereq.: 667, concur. 763.
Laboratory study of solid state devices and materials. Boone, Thorson.

765 Special Advanced Laboratory U G Arr.
A.
Prereq.: Professional division standing and permission of instructor.

766 Special Advanced Laboratory U G Arr.
W.
Prereq.: Professional division standing and permission of instructor.

767 Special Advanced Laboratory U G Arr.
Su, Sp.
Prereq.: Professional division standing and permission of instructor.

768 Electron Device Physical Theory I U G 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 U G 3 or 4
A, W. 3 or 4 cl.
Prereq.: 768.
Applications of band theory of electron energy states; junction theory applications to transistors; photoconduction; fluorescence and phosphorescence; dielectric and magnetic phenomena.

781 Advanced Electronic Circuits U G 3
Sp. 3 cl.
Prereq.: 728.
Integrating and differentiating circuits; counting circuits; timing circuits; pulse circuits; wave-forming and wave-shaping circuits. W. Davis.

782 Advanced Electronic Circuits Laboratory U G 2
Sp. 1 cl., 1-3 hr. lab.
Prereq.: 628 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 U G 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. Knuts, Ko.

787 Quantum Electron Devices U G 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 U G 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. Commet.

789 Parametric Electron Devices U G 3
W. 3 cl.
Prereq.: 619 and Physics 610 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 U G 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 U G 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 U G 3
W. 3 cl.
Prereq.: 619 and 652.
Fault calculations, network analysis, relay studies, and traveling wave analysis applied to electric power system problems. Ayres, Smith.

793 Power System Laboratory U G 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 U G 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 G Arr.

802 Advanced Theoretical Study in Electrical Engineering W.

803 Advanced Theoretical Study in Electrical Engineering Sp.

805 Advanced Laboratory Study of Electrical Engineering Equipment G Arr.

806 Advanced Laboratory Study of Electrical Engineering Equipment W.
817 Advanced Electromagnetic Theory I  G 3
A.  3 cl.
Prereq.: 822 or equiv.
Representation of fields by vector wave functions and dyadic
Green's functions; Huygen's principle for electromagnetic waves;
application to antenna and scattering problems. Kousyounian.

818 Advanced Electromagnetic Theory II  G 3
W.  3 cl.
Prereq.: 817.
Asymptotic methods and the geometrical theory of diffrac-
tion. Integral equations and variational methods; propagation through
inhomogeneous media and anisotropic media; surface waves. Kous-
ouyounian.

827 Communication Theory I  G 3
W.  3 cl.
The application of Fourier Series and Fourier Integrals to the
analysis of circuit problems. Theory of random signals, auto-
correlation, power density spectra, optimum filters. Warren.

828 Communication Theory II  G 3
Sp.  3 cl.
Prereq.: 827 and Math. 607.
Continuation of 827. Warren.
COURSES OF INSTRUCTION

ELECTRICAL ENGINEERING

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 transformations; directional devices; non-reciprocal devices, non-linear elements. Peake.

854 Solid State Electron Devices I G 3
   A. 3 cl.
   Prereq.: 628, 787, concurs. 769, Math. 609, or equiv.
   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, unipolar transistors, four-layer switches, variable capacitance diodes, and parametric amplifiers. Thurston.

857 Quantum Electron Devices G 3
   A. 3 cl.
   Prereq.: 787, 832, Math. 732 and Physics 728, or equiv.
   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.: 638, 815, or equiv.
   Theory of magnetic materials. Steady state and transient analysis of magnetic amplifiers; suppressed and free harmonics; power gain; resistive, inductive and capacitive load. Weed.

861 Analysis of Magnetic Amplifiers, Memory Devices and Components G 3
   Sp. 3 cl.
   Prereq.: 860 and 847, or equiv.
   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. Richman, Walter.

881 Seminar in Electrical Engineering G 1-3
   Prereq.: Permission of instructor. Repeatable.

895 Interdepartmental Seminar in Radio Astronomy G 1-5
   (See under Interdepartmental Seminars.)
   Radio Astronomy Theory I
   See under Astronomy 896.
   Radio Astronomy Theory II
   See under Astronomy 897.

899 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

Office: 218 Brown Hall, 190 W. 17th Ave.

PROFESSORS PFaffenbarger (Chairman), Cooper, Field (Emeritus), Parkinson, Shupe, and Watkins; Associate Professors Hang, Kearns, Reed, and Yarrington; Assistant Professors Ackley, Baldwin, Devereaux, Rickly, and Romeo, and 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. Rickly.

4161* Elements of Drawing and Lettering U 2
W. 3 2-hr. lab.
Instruction in single stroke commercial gothic, inclined, display lettering, and layout. Hang.

439 Drawing in Business U 3
W. 3 2-hr. cl. and lab.
Reqd. in industrial management curriculum.
Not open to students who have previous credit in Engr. Dr. Dr.
Fundamentals of engineering drawing with emphasis on reading and understanding. Orthographic and pictorial shape description, conventional practices, thread fasteners, dimensions and 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. 418 or 439.
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. Shape.

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.
Intersection 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 Graphics 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 material; charts and graphs; curve fitting; graphical calculation; slide rule. Watkins.

504 Technical Drawing U 4
A. 4 2-hr. cl. and lab.
Prereq.: 403 or 442.

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. Watkins.

508 Production Illustration U 4
Sp. 4 2-hr. cl. and lab.
Prereq.: 506.
Commercial and industrial applications of pictorial representation. Includes both instrument and freehand techniques, rendering and preparation for presentation and reproduction. Hang.

537 Graphic Presentation U 5
A, Sp. 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.

710 Advanced Graphics U 3
W. 3 cl.
Prereq.: 442 and Math 543 or 443 or equiv.

755 Chemical Plant Design U 3
Sp. 3 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 lwest (Chairman), Clark, Folks, Graham, lindenuhr, and OTT (Emeritus); Associate Professors sLeissa and Tucker (Emeritus); Assistant Professors Barnes, Chiu, Kordi, and MAhriG; and Instructors.

511 Applied Mechanics U 4
A. 3 cl., 1 2-hr. lab.
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., 1 2-hr. lab.
Prereq.: 511.
Continuation of 511.
COURSES OF INSTRUCTION

ENGINEERING MECHANICS

513 Applied Mechanics
Sp. 3 cl., 1 2-hr. lab.
Prereq.: 512.
Continuation of 512.

521 Statics
Su, A, W, Sp. 5 cl.
Prereq.: Physics 331 and/or concur. Math. 543.
Resultants and equilibrium of coplanar and noncoplanar force systems; trusses, frames, and connected bodies; friction; centroids and moment of inertia of masses and areas. Barnes.

602 Strength of Materials
A, W, Sp. 4 cl., 1 2-hr. lab.
Normal and shearing stresses and strains; energy; torsion; flexural stress; beam deflections; combined stress; theories of failure; columns.

605 Stress Analysis I
A, W, Sp. 3 cl.
Prereq.: 602.
Statistically indeterminate and variable section beams by area moments; bending of non-symmetrical section; energy of bending and shear; beam limit design; torsion of open and closed non-circular sections. Mahig.

606 Stress Analysis II
A, W, Sp. 3 cl.
Prereq.: 602.
Not open to students with credit for 714.
Failure theories; Mohr’s circle for strain rosettes; thick cylinders; non-circular torsion; curved beams; Castigliano’s theorem. Graham, Polk.

607 Dynamics
A, W, Sp. 3 cl.
Prereq.: 521.
Not open to students with credit for 617.
Linear and angular motion; constant and variable forces; connected bodies; impulse; moment of momentum; energy. Chin.

617 Dynamics
W, Sp. 5 cl.
Prereq.: 602 or concur. Math. 544 or 608 or 611.
Dynamics of particles and rigid bodies; impulse; momentum, work, energy; three dimensional vector acceleration; conservative systems; single degree of freedom vibration analysis. Chin.

650 Digital Computer Programming:
Engineering Applications
A, W, Sp. 2 cl., 1 2-hr. lab.
Prereq.: Professional division standing.

703 Experimental Stress Analysis
A, Sp. 4 lab. hrs.
Prereq.: 602.
Experiments with electric strain gages, stress coat, brittle models, and photoelastic analysis of structures; determination of fatigue limits. Clark, Barnes.

704 Photoelasticity
W. 4 lab. hrs.
Prereq.: 602.
Construction of two and three dimension models and analysis of stress distribution by photoelastic methods. Clark.

707 Mechanical Vibrations
A. 3 cl.
Prereq.: 607 and Math. 544, 608 or 611.
Acceleration, velocity, and displacement from variable cyclic forces; free and forced vibrations; torsional vibrations; dynamic balance; vibration and whipping of shafts. West, Chin.

712 Advanced Strength of Materials
W. 3 cl.
Prereq.: 602 and/or concur. Math. 609 or 626.
Beams on elastic foundations; beam columns; deflection curves by trigonometric series; limitations of superposition. Mahig.

715 Theory of Elastic Stability
A. 3 cl.
Prereq.: 605 or 606, Math. 544 or 608 or 611.
Buckling of bars under axial and lateral loads; effect of curvature and eccentricity; determination of critical loads by energy; tube and beam buckling. Niedenfuhr.

716 Elastic Energy Theory
A. 3 cl.
Prereq.: 605 and one of: Civil Eng. 701, 711, Aero-
Astr. E. 710.
Deformations and stress in frames, beams, beams, rings, arches, and columns; redundant beams and frames; combined direct and torsional stresses; shear deformations. Clark, Graham.

717 Advanced Engineering Dynamics
W. 3 cl.
Prereq.: 607 and Math. 544 or 608 or 611.
Three dimensional vector statics; kinematics and kinetics of particles and rigid bodies; energy, momentum, stability; application of Lagrange’s equations to machinery, vehicles, ballistics, gyroscopes. West, Chin.

718 Theory of Dynamic Stability
Sp. 3 cl.
Prereq.: 707.

725 Theory of Thin Elastic Plates
Sp. 3 cl.
Prereq.: 605 and Math. 544 or 608 or 611.
Pure bending of rectangular plates; thermal stresses; equations for small deflections for various edge conditions and shapes; large deflections; approximate methods. Niedenfuhr, Mahig.

735 Elementary Theory of Continuous Media
A. 3 cl.
Prereq.: 609, 607, Math. 544.

740 Applied Elasticity I
A. 3 cl.
Prereq.: 605 or 606, and/or concur. Math. 609.
Not open to students with credit for 813.
Analysis of stress and strain; laws of elasticity; torsion; plane stress and strain. Niedenfuhr.

741 Applied Elasticity II
W. 3 cl.
Not open to students with credit for 814.
A continuation of 740.
750 Methods of Engineering Analysis  U G 3
W. 3 cl.
Comprehensive study of techniques and devices for solving equations arising in engineering mechanics. West, Kostle.

799 Special Problems in Advanced  U G 2-5
Engineering Mechanics
A. W. Sp.
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.

801 Advanced Theoretical Mechanics  G 2-5
Prereq.: 605, 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 subject in the areas indicated below and may register for more than one at a time.

807 Vibrations of Continuous Media  G 3
W. 3 cl.
Prereq.: 707 and/or concur. Math. 609 or 628.
Equations of motions for strings, membranes, prismatical bars, and plates for various boundary conditions; approximate methods for complicated shapes; wave propagation in elastic media. West, 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, 622, 624 or equiv.
Basic equations and concepts of inviscid fluid flow, solutions to two and three dimensional problems; conformal transformation, approximate methods. Leisar.

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, Niedenfuhr.

820* Theory of Plasticity  G 3
W. 3 cl.
Prereq.: 813.
Plastic range stress-strain relation; elasto-plastic behavior of beams, trusses; torsion of prismatic bars; plane strain; shears lines; limit analysis. Graham.

825* Theory of Thin Elastic Shells  G 3
A. 3 cl.
Prereq.: 725, 813.
Equation of deformation of an arbitrary shell; thermal effects; exact and approximate solutions; Rayleigh’s bending theory; membranes; shells of variable thickness, orthotropic shells. Niedenfuhr.

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.

830* Energy Principles in Mechanics  G 3
A. 3 cl.
Prereq.: 605 or 606 or 718 and Math. 544 or 608.
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.: 740.
Complex variable methods; anisotropic elasticity; three-dimensional elasticity; mixed boundary value problems; thermoelasticity. Leisar.

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.: 741 and/or concur Math. 722.
Finite displacements; finite strain; non-linear interaction of stress states. Niedenfuhr.

850 History of Mechanics  G 3
A. 3 cl.
Prereq.: 10 cr. hrs. 700-900 level in Engr. Mech. and reading knowledge of French or German.
Evolution of concepts in engineering mechanics; impact on scientific thought; effect on engineering analysis and design; critical study of original literature. West.

Research for thesis or dissertation purposes only.
COURSES OF INSTRUCTION

ENGLISH

Office: 421 Denney Hall, 164 W. 17th Ave.

PROFESSORS: OSTRICH (Chairman), TAUTICH, M. CHAIUS, HUBBERT, SPIGGIN, MILLER, CHUH, S. COX, CRAGG, EMMETT, MARKELS, MAUBER, SHEDD (Lakewood), SNOW (Emeritus), and TANG; ASSOCIATE PROFESSORS BAUMBACH, BEA., F. COOL, BICKLE, BRADLEY, ALCOCK, D. BURD, T. WEBBER, WHEELER, and WOODSON.

400 Review of the Elements of Composition

Three cr. hrs. will be added to graduation requirements.
This course is designed for students who are not adequately prepared to undertake the work of Eng. 416. Students may be assigned to the course because of unsatisfactory performance in the placement test or because of inability to maintain a satisfactory standard in Eng. 416. This course may not be taken concurrently with Engl. 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
(Credit not counted toward graduation)

406 General English for Foreign Students

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

Develops academic and social effectiveness in the use of advanced patterns in written and spoken English. Gunter, Director.

408 Special Problems in English for Foreign Students

Attention is given to the special academic problems of foreign students. Concentrated work on idiomatic structure and diction in writing reports, themes, examinations, and theses. Gunter, Director.

416 Composition and Reading

Not open to students with credit for 401, 402, or 405.
Training in the fundamentals of expository writing, as illustrated in the student's own writing and in essays of professional writers. Robbins, Director.

417 Composition and Reading

Prereq: 416 or 410.
Not open to students with credit for 401, 402, 411, 413, or 419.
Continued training in expository writing with emphasis on the logical elements in exposition. Robbins, Director.

418 Composition and Reading

Prereq: 417 or 411.
Not open to students with credit for 412, 414, or 419.
Continued training in expository writing, approached specifically through the study of imaginative literature. Robbins, Director.

419 Composition and Reading

A, 3 cr.
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

A, 3 cr.
Prereq: 419 or Em credit for 417.
Not open to students with credit for 412, 414, 415 or 505.
Designed for proficiency students only, as a substitute for 419.
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 412, or 420.

501 Readings in Recent Drama

A, Sp.
Not open to students with credit for 570. Not for credit on the Engl. major.
Wide reading in American and European plays since 1920. Lecture and discussion. Dumble.

502 Readings in Recent Prose Fiction

W.
Not for credit on the Engl. major.
Wide reading with particular attention to the novel. Lecture and discussion. Dumble.

505 Informative Writing

Prereq: 3rd yr. standing and 401, 430, 412, or 418 or the equive.
Intensive advanced training in the art of informative writing. Markels, Director.

506 Critical Writing

A, W.
Prereq: 3rd year standing in English, or the equive.
Intensive advanced training in the art of informative writing with emphasis upon the analysis and interpretation of literary texts. Markels, Director.

507 Narrative Writing

A, W.
Prereq: Permission of instructor.
Guided practice in the writing of short fiction. Baumback, Var-
wooden, Dumble.

508 Verse Writing

Sp.
Prereq: Permission of instructor.
The technique of writing verse. The students will write in various forms and meters and study the works of established poets as models. Parks.
510 Masterpieces of American Literature U 5
Su, A. W., Sp.
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, Melville, Whitman, Dickinson, Twain, James, Frost, Eliot, Faulkner and Hemingway. Charvat, Director.

519 Technical Writing U 3
A, W, Sp. 2 cl., I hr. conf.
Prereq.: 3d yr. standing in the Bachelor of Science curricula.
Training in practical writing for industry, business, and research, with emphasis on the special requirements and techniques for the professional report. Blickle, 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 techniques of fiction. Bickel, 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. Fullington.

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, Ford, Conrad, Eliot, Robinson, Forster, Yeats, and Forster. 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 576 instead of 550.
Intensive study of selected plays of Shakespeare designed to give an understanding of drama as theatrical art and as an interpretation 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 or 562.
Designed to lead to an appreciative understanding of some great poetry and prose written before 1675; emphasis upon Beowulf, Chaucer, Spenser, Milton, and selected lyrics. Hughes and Logan, Directors.

564 Masterpieces of English Literature U 5
Not open to students with credit for 560 or 562. A continuation of 563, but may be taken separately. Selections of prose and poetry will be drawn from works of major British writers from 1675 to 1900. Hughes and Logan, Directors.

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, W.
The readings of this course do not duplicate those of 510.

610 American Literature, 1865-1914 U G 5
Su, W.
The readings in this course do not duplicate those in 511.
Studies in fiction and poetry emphasizing such major figures as Twain, Howells, James, Dickinson, Reinhart, Crane, Dreiser, and Willa Cather. Charvat, Bruckell.

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.

615 Twentieth Century American Writers U G 5
Su, Sp.
A study of the development of American literature after World War I, with emphasis on the major poets and novelists: Brubacher, Solomon.

616 A Writer's Approach to Fiction U G 5
W.
Prereq.: 507 or equiv. 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. Brubacher.

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. Simpson.

621 History of Literary Criticism U G 5
A. 5 cl.
Intensive study of the basic texts in literary criticism from Plato to T. S. Eliot. Wheeler.

625 English Usage U C 5
Prereq.: The general prerequisites for 600 courses as listed above, or Jour. 505 or 600.
Usage and stylistic variety in written and spoken English, for student interested in writing and teaching. Gunter, Adams, Kalseo.

626 Structure of English U G 5
W.
An investigation of the linguistic structure of modern English. Gunter.

627 History of the English Language U G 5
A.
Prereq.: the general prerequisites for 600 courses as listed above, or Jour. 505 or 600.
A study of the historical development of the English language and the internal and external influences which have determined its characteristics. Howard, Gunter.

A-91
COURSES OF INSTRUCTION

ENGLISH

635 The Age of Wit and Satire U G 5
Sw., A.
The skeptical mind of the Early Enlightenment as shown in lyric and satiric verse, essays, and drama, from Dryden to Pope. Meurer.

636 Literature of the Eighteenth Century U G 5
W.
The ideas and artistry of the Age of Reason as reflected in the work of major figures; Swift, Pope, Fielding, Stere, Boswell, Johnson, Blake.

640 Nineteenth Century Prose U G 5
Sp.
Selections from the principal romantic and Victorian non-fictional prose writers; read both as literary art and as documents of contemporary thought.

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. Logan, Kuhn.

642 Victorian Poetry U G 5
Su, 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.

643 The Writing Laboratory U G 5
Sp. 3 cl., conf.
Prereq.: Permission of instructor.
Detailed analysis in conferences 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 concur.: 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. Baumbach.

653 Introduction to Chaucer U G 5
Su, Sp.
Not open to students with credit for 753.
A close study of Troilus and Cressida and The Canterbury Tales as introduction to the artist and his period. Under.

654 Introduction to Medieval Literature U G 5
W.
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
W.
Readings in a group of major novelists, such as Austen, Dickens, Thackeray, and others, with special emphasis upon social and humanistic values. Logan.

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. Baumbach.

671 Early Seventeenth Century U G 5
Literature
W.
A study of the lyric modes of Jonson and Donne, the principal achievements in English literary prose, and the works of John Milton, Hobbes.

674 The English Renaissance U G 5
Su, A.
A study of Tudor 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, Sp.
A critical consideration of the art, personality, and achievement of Shakespeare in the light of Renaissance and modern significance. Walley, Markels.

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 concept and theatrical art. Walley.

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. Vardanjan.

690 Senior Seminar and Tutorial U 5
Prereq.: Engl. majors in their last qtr.
Not open to students with credit for 689.
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. Babb, 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. 5 cl., 2 1-hr. workshops.
Prereq.: Permission of Director. 702, 703, 704 to be taken concur.
The study of the principal methods of the analysis of the English language.
Structural Analysis of English  U G 3
Expository Prose
Su. 5 cl., 2 1-hr. workshops.
Prereq.: Permission of the Director. 702, 703, 704 to be taken concurrently.
The theory and practice of modern expository prose composition. Robbins.

Principles and Methods of Literary Analysis  U G 3
Su. 5 cl., 2 1-hr. workshops.
Prereq.: Permission of the Director. 702, 703, 704 to be taken concurrently.
Principles and methods of the study of English poetry, drama, and prose fiction. Master.

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 B 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. Must.

Honors Course  U G 3-10

W.
See Prereq. for 705.

Honors Course  U G 3-10

Sp.
See Prereq. for 705.
A continuation of 706.

Studies in the American Renaissance  U G 5
Su, W.
Prereq.: 609 or equiv.
An intensive study of several authors drawn from the following list: Cooper, Poe, Hawthorne, Melville, Emerson, Thoreau, Whitman. Chaucer, Spenser.

Studies in American Literature, 1865-1914  U G 5
Sp.
Prereq.: 610 or equiv.
An intensive study of several major authors of the period, including Twain and James. Chaucer.

Studies in Critical Theory  U G 5
W.
A review of theory and practice in some of the principal forms of literary analysis. Baldwin.

Studies in English or American Literature  U G 5
Prereq.: Permission of the Chairman of the Department of Graduate Committee.
Under this number, the Department occasionally offers an intensive course on some phase of English or American literature.

The Writing of Fiction  U G 5
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.

Twentieth Century Poetry  U G 5
W.
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. Grigely.

Studies in Twentieth Century Fiction  U G 5
Su, A.
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. Brucoli.

Dryden  U G 5
A.
A detailed study of the poems, plays, and essays of John Dryden, as exemplifying the principles and practices of the Early Enlightenment. Wilson.

Pope  U G 5
Su.
Pope's poems considered formally and as representative documents of his age. Maurer.

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. Elliott.

Studies in the Eighteenth Century  U G 5
W.
Intensive work in an important aspect of eighteenth century literature or thought. Kahn.

Studies in Victorian Poetry  U G 5
Su, 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. Attick.

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.

Studies in Romantic Poetry and Poetics  U G 5
Sp.
Literary romanticism, 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 1964-65: Wordsworth. Logan.

Introduction to Middle English Language and Literature  U G 5
Sp.
A study, with some cultural background, of important Middle English writings, in their original form.

Studies in Early English Literature  U G 5
Su, A.
Prereq.: 751, 749, or 653 or equiv.
749 * Introduction to Old English Language and Literature  
A. 5 cl.  
The reading of Old English prose with special attention to the language and to cultural backgrounds.

750 Masters' Thesis  
G 1-5  
Su., A. W., Sp.

751 * Old English Poetry  
W.  
Prereq.: 749 or equiv.  
A critical reading of the major Old English poems: form, content and style.

754 * Beowulf  
Sp.  
Prereq.: 751 or equiv.  
A close study of the text of Beowulf and its background. Estrich.

755* Linguistics and English  
W.  
An advanced approach to linguistics, language and culture, phonetics, the history and structure of English, and the teaching of English language and literature. Utley.

756* Linguistics and English  
Sp.  
Prereq.: 755.  
Continuation of 755.

757† Studies in Chaucer  
G 5  
A. 5 cl.  
A critical study of some aspect of Chaucer's work in depth. Topic for 1985-86: to be announced.

771 * Studies in Renaissance and Early Seventeenth Century Poetry  
Su., Sp.  

772 * Studies in Renaissance Prose  
W.  
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. Hughey.

773 * Spenser  
Su.  
A study of Spenser's poetry, its literary significance and its relation to foreign, classical, and native English poetic traditions. O'Kelley.

775 Milton  
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. Toivier.

835 * Studies in Eighteenth Century Literature  
Sp.  
Problems in the literature and ideas of the Age of Reason. Elliott.

836† Studies in Eighteenth Century Literature  
G 5  
Su.  
Prereq.: 835.  
Continuation of 835. Elliott.

837* Research in the Restoration Period  
W.  
Individual research in Restoration literature, Dryden to Pope; oral and written reports. Wilson.

838* Research in the Restoration Period  
Sp.  
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  
W.  
Prereq.: 842  
Continuation of 842. Altick.

852* Studies in the Medieval Period  
G 65  
A.  
Individual research in a major aspect of Old and Middle English literature. Topic for 1985-86 to be announced. Utley.

853* Studies in the Medieval Period  
W.  
Prereq.: 852  
Continuation of 853.

854 * Research in Chaucer  
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  
W. 5 cl.  
A continuation of 854.

865 Studies in American Literature and Cultural History  
G 5  
W.  
Individual research in problems in American literature. Charvat.

866 Studies in American Literature and Cultural History  
Sp.  
Prereq.: 865.  
Continuation of 865. Charvat.

875 * Studies in the Age of Shakespeare  
G 5  
W.  
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 G 5
Su. Sp.
Prereq.: 875.
Continuation of 875. Hughey, Walker.

877† The English Renaissance G 5
W. 5 cl.
Reading and research in non-dramatic literature of the English Renaissance. Topics may vary from year to year. Hughey.

878† The English Renaissance G 5
Sp. 5 cl.
A continuation of 877. Hughey.

880 Bibliography and Method G 5
A.
A course for the advanced graduate student in the methods and tools of literary research. Altick.

881 Textual Criticism and Editing G 5
A.
Prereq.: 880.
Evaluation of literary editorial methods, past and present; training in skills requisite to the textual critic and scholarly editor; practices in textual editing. Hughey.

950 Research in English G Arr.
Research for dissertation purposes only.

Entomology
PROFESSORS: O’HARTON (Chairman), IBORROR, IBRIGGS, CUTRIGHT (Emeritus), IDAVIDSON, DcLONG, (Emeritus), IHOLDSWORTH, KNULL (Emeritus), G. R. NEISWANDER (Emeritus), J. R. NEISWANDER, PETERSON (Emeritus), IRSING, IROTHENBUHLER, ISLEESMAN, STEPHEN, and I. VENARD, ASSOCIATE PROFESSORS: BRITT, DUNHAM (Emeritus), IFISK, KNULLE, I. POLIVKA, I. SHAMBAUGH, I. TRIPPLEHORN, I. WARE, and I. WEAVER, ASSOCIATE PROFESSESSORS FORSYTHE, GUTHRIE, STILL, TREacle, and IVALENTINE; INSTRUCTORS: BLAIR, JOHNSTON, LYON, and ASSISTANTS.

For related courses see Biology.

550 General Entomology U 5
A, W, Sp. 3 cl., 2 3-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. Holdsworth, Triplehorn, Valentine.

551 Economic Entomology U 5
A, W, Sp. 3 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.

566 Horticultural Entomology U 3
Sp. 3 cl.
Prereq.: 551.
A detailed study of insects and mites attacking horticultural crops. Davidson.

600 Insect Physiology HUG 5
A. 3 cl., 2 3-hr. labs.
Prereq.: 550 or equiv., 10 additional cr. hrs. Biol. Sc. and Chem. 551 or equiv. or Agr Biochem. 610.
The general physiology of insects and other arthropods. The laboratory will stress the use of insects to demonstrate fundamental physiological processes. Fish.

608 Biology of the Honey Bee UG 3
Sp. 3 cl.
The behavior, social organization, morphology, physiology, reproduction, diseases and genetics of the honey bee studied from a comparative and evolutionary viewpoint. Ebenbuhler.

640 Advanced Economic Entomology UG 5
A. 3 cl., 2 3-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 UG 5
Su. 3 cl., 2 3-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 UG 5
A. 2 cl., 6 hrs. lab.
Prereq.: 10 cr. hrs. of Zool. 10 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. Borrow.

653 Principles of Insect Toxicology UG 5
W. 3 cl., 2 3-hr. labs.
Prereq.: 550 or 551 and 15 additional cr. hrs. of Biol. Sc. and Chem. 411, 412 or equiv.
deals with the physiochemical properties and physiological action of insecticides, miticides, and adjuvants. Methods of securing, evaluating, and presenting toxicological data are stressed. Waer.

655 Medical Entomology UG 3 or 5
Sp. 3 cl., or 3 cl. and 3 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 UG 4
Su (1st Term). 3 all day classes.
Prereq.: 550 or equiv. and 15 additional cr. hrs. of Biol. Sc.
Given only at the Franz 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.

A-95
671+\* Aquatic Entomology U G 4

Prereq.: 670 or equiv. and 15 additional cr. hrs. of Biol. Sc.

Given only at the Francis Theodore Stone Laboratory.

A course designed for preparation in the teaching of biology or research on aquatic resources. Taxonomy and ecology of aquatic larvae are stressed.

701 Special Problems U G 2-5

Su, A. W., Sp.

Individual work in the field of the chosen problem. Permission of instructor.

c. Insects causing or transmitting diseases of animals. Borror, Davidson, Venard.
d. Insects causing or transmitting diseases of plants. Briggs, Davidson.
e. Insect control. Davidson, Ware.
g. Insect morphology. Borror, Fish.
h. Insect physiology and toxicology. Fish, Shambaugh, Ware.
i. Insect taxonomy. Borror, Davidson, Triplehorn, Valentine.
j. Laboratory technique and rearing methods. Fish.
k. Insect behavior. Fish, Holdsworth, Rothenbuhler.
l. Field and Experiment Station Problems. Davidson, Forsythe, Neuscamner, Polioka, Rings, Shambaugh, Streeter, Treese, Ware.
m. Arachnology—3 weeks. Summer Program. Wharton.

701+* 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. Borror.

706+* Systematic Entomology U G 5

W. 2 cr., 6 lab. hrs.

Prereq.: 651.

Continuation of 705, covering the Diptera, Lepidoptera, and Hymenoptera. Borror.

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

Su, A. W., Sp.

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. lab.

Prereq.: Permission of instructor.


8161* Research Methods: Living Insects G 5

W. 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. Fish.

917* Internal Morphology of Insects G 5

W. 9 cr., 3 3-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. Fish.

850 Advanced Insect Physiology G 5

Sp. 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. Fish.

896 Interdepartmental Seminar in Polar and Alpine Studies G 1-3

Sp.

(See under Interdepartmental Seminars)

987 Interdepartmental Seminar in Natural Resources G 1


(See under Interdepartmental Seminars)

990 Seminar G 1 or 2

(See Zoology 900).

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: HAUSSMAN (Director), FANNING (Emeritus), FREY (Emeritus), HOFHEINS (Emeritus), ROBINSON (Emeritus), TAYLORN, IBARRAN, HOGATAY, JR., GATRELL, KRUPP, KING, LITTLEFIELD, LUDDEN, RIVERINO, and TSHERMAN.

ASSOCIATE PROFESSORS CHASEY (Emeritus), RANNELLS (Emeritus), ELACK, SCHAFER, TUCKER, HALL, DEBNER, FRIELEY, JR., GATRELL, JONES, PAVITT, SPATTON, ZIMMER, MILLIKIN, MITCHELL, CHASEY, TEMPLETON, THOMPSON, WALLSCHLAGER, and WYNNE, INSTRUCTORS BAICELL, HOLLANG, HORN, KOTTLE, KRUEGER, WALLA, and RUBRIGHT.

The courses in Fine Arts may be grouped as follows:

Art Education 459, 548, 549, 550, 570, 609, 799.

Ceramics 484, 490, 491, 587, 591, 592, 593, 594, 595.

400 Field Experience U 0
Su, A, W, Ss.
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 degrees B.F.A. and B.Sc., in Ed. with Fine Arts as a major, nor to students with credit for 421 or 430.
An investigation of visual form, its perception, development, and use. Holohiln and staff.

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 P 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, Bogdany, Friley, Sherman, Thompson.

407 Water Color U 3
Sp. 2 2-hr. lab.
Prereq.: 404 or 421.
Not open to majors in Fine Arts.
Painting from still life, models, and landscape. Lectures, laboratory work, and criticisms.

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.

421 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.

423 Drawing U 5
Su, A, W, Sp. 5 2-hr. lab.
Prereq.: 421 or permission of instructor.
The use of various drawing fields 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 569.
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.: 401 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.: 420 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 ct.
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 561.
An introduction to the principles of sculpture, emphasizing basic forming processes and materials. Black, Freeman, Thompson, Wenkirk.

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, model 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 Arts 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
Su, 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

502 History of Western Art II
Su, A, W, Sp. 3 cl.
Prereq.: 3rd yr. standing or 494 or 497.
A survey of Renaissance and Baroque Art.

503 History of Western Art III
Su, A, W, Sp. 3 cl.
Prereq.: 3rd yr. standing or 494 or 497.
A survey of the art of the Modern period.

505 Life Drawing
Su, A, W, Sp. 5 3-hr. lab.
Prereq.: 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.

509 History of Oriental Art
Sp. 3 cl.

526 Introduction to Printmaking
Sp. 5 2-hr. lab.
Prereq.: 423 and 431.
The basic tools, methods, and materials of printmaking. Study and examination of original prints. Chafets.

527 Water Color Painting
Su, Sp. 5 3-hr. lab.
Prereq.: 427 or 431, and 500.
Special emphasis on water color's unique capacities for personal expression. Problems in landscape, still life, and the figure.

528 Oil Painting
Su, A, W, Sp. 5 3-hr. lab.
Prereq.: 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.

530 Orientation to Environmental Design and Planning
Sp. 3 cl.

534 Sculpture Design Materials
A, W, Sp. 5 2-hr. lab.
Prereq.: 430 or 431.
Study of three-dimensional form through the use of power and hand tools.

545 Art Education Laboratory
W. 5 3-hr. lab.
Prereq.: 459.
Laboratory problems with a variety of design materials, with attention to the nature of different media and their educational potential. Mitchell.

549 Art Education Laboratory
Sp. 7 lab. hrs.
Prereq.: 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.

554 Visual Communication Design
A. 5 2-hr. lab.
Prereq.: 530 and 558.
Development of knowledge and skills in the application of color, lettering, typography, illustration, graphic technology to diverse two and three-dimensional graphic communication problems. Horn, Walschleger, Zimmer.

555 Visual Communication Design
W. 5 1-hr. lab.
Continuation of 554.

556 Visual Communication Design
Sp. 5 2-hr. lab.
Prereq.: 555.
Continuation of 555.

558 Lettering
A, W, Sp. 1 cl., 3 2-hr. lab.
Prereq.: 421.
The principles of lettering and its application to advertising design.

562 Intermediate Sculpture
Su, A, W, Sp. 5 3-hr. lab.
Prereq.: 461, 505, 534.

569 Art for Elementary Teachers
Su, A, W, Sp. 5 2-hr. lab.
Laboratory experiences with two-dimensional and three-dimensional materials toward understanding the visual arts as background for teaching in the elementary schools.

570 Art for Elementary Teachers
Su, A, W, Sp. 3 3-hr. lab.
Prereq.: 430 or 569.
Problems of teaching in terms of personal knowledge about art, insight into children's art work, and understanding of elementary school curriculum. Sheck, Mitchell, Eckel.

572 Elements of Weaving
A, W, Sp. 5 2-hr. lab.
Prereq.: 431.

573 Weaving
A, W, Sp. 3 2-hr. lab.
Prereq.: 431.
The use of weaving materials and equipment, with an emphasis on creative design of function fabrics. Baughman.

576 Space and Enclosure Design
Sp. 1 cl., 5 2-hr. lab.
Prereq.: 537.
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, Walschleger.

577 Fundamentals of Design
A. 3 2-hr. lab.
Prereq.: 401 or 450 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.
582 Product and Environmental Design U 5
A. 5 2-hr. lab.
Prereq.: 550, 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 3-hr. lab.
Prereq.: 583.
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. Baigell.

587 Ceramic Laboratory U 3
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.
A course in ceramic compositions, designed for art students. Methods of representing ceramic composition; discussion of ceramic raw materials and their use in building bodies and glazes. Littlefield.

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, 535.
Problems of art education in the public schools; observation in the public schools. Barkan, 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 equive.
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, Carolean, Georgian, and Regency Periods—considering the aesthetic, political, and economic implications. Krumm.

607 Development of Interior Design III U 3
Sp. 3 cl.
Prereq.: 606.
A survey of American interiors since 1650, followed by a study of the development of interior design in the Western world since 1850. 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.: 608.
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.
<table>
<thead>
<tr>
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<td>Su, Sp. 5 3-hr. lab.</td>
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<td>632</td>
<td>Early Christian and Byzantine Art</td>
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<td>633</td>
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<td>635</td>
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<tr>
<td>636</td>
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<td>637</td>
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<td>643</td>
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<td>644</td>
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<td>654</td>
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<td>U G 5</td>
<td>Su, A. 5 cl.</td>
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<td>660</td>
<td>Advanced Oil Painting</td>
<td>U 5</td>
<td>Su, A, W, Sp. 5 3-hr. lab.</td>
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</tbody>
</table>

**Courses of Instruction**

**Fine Arts**

- The Art of Japan
  - A. 3 cl.
  - A cultural art history of Japan in terms of monuments, people, and beliefs. Kaplan.

- Contemporary Art
  - A, Sp. 5 cl.
  - Twentieth Century European Art. A study of the major achievements in painting, sculpture, and architecture since 1900. Lueckf.

- Advanced Water Color Painting
  - Su, Sp. 5 3-hr. lab.
  - Prereq.: 505, 537.
  - Painting from still life, models, and landscapes. Special problems in organization and development of pictures.

- Early Christian and Byzantine Art
  - A. 3 cl.
  - Not open to students with credit for 673.
  - The Christian art of the Mediterranean region to the eighth century and the art of the Byzantine Empire to the fifteenth century. Ludden.

- Romanesque and Gothic Art
  - Su, W. 3 cl.
  - Not open to students with credit for 673.
  - The art of Western Europe from the Carolingian period to the fourteenth century. Ludden.

- Advanced Visual Communication
  - A. 5 2-hr. lab.
  - Prereq.: 507 and 556.
  - Explorations coordinating graphic media, technology, and techniques in advanced two-dimensional and three-dimensional graphic problems. Research and development projects. Walschlaeger, Zimmer.

- Advanced Visual Communication
  - W. 5 2-hr. lab.
  - Prereq.: 635.
  - Continuation of 635.

- Advanced Visual Communication
  - Sp. 5 2-hr. lab.
  - Prereq.: 636.
  - Continuation of 636.

- Graphic Processes
  - W. 5 3-hr. lab.
  - Prereq.: 500. Graduate students must have 15 cr. hrs. in drawing and painting.
  - Lithography and intaglio explored by students as part of their professional experience in print-making. Carroll.

- Advanced Water Color Painting
  - Sp. 5 3-hr. lab.
  - Prereq.: 537.
  - Further practice in the water color medium, with emphasis on the critical capacity of the student. Laboratory problems and field trips.

- Renaissance Arts in Italy
  - Su, A. 5 cl.
  - 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.

- Advanced Oil Painting
  - Su, A, W, Sp. 5 3-hr. lab.
  - Prereq.: 505, 528.
  - Painting in oil from still life and the costume model. Advanced problems in composition.

- Special Problems
  - U G 2-5
  - A.
  - Prereq.: Permission of instructor. Repeatable to a maximum of 45 cr. hrs.
  - Advanced study for students in specialized programs. Hausman and Staff.

- Special Problems
  - U G 2-5
  - Su, W.
  - Prereq.: 661.
  - Repeatable to a maximum of 45 cr. hrs.
  - Continuation of 661.

- Special Problems
  - U G 2-5
  - Sp.
  - Prereq.: 662.
  - Repeatable to a maximum of 45 cr. hrs.
  - Continuation of 662.

- Twentieth Century American Art
  - U G 3
  - W. 3 cl.
  - Prereq.: 503 or 585.
  - A study of significant developments in twentieth century American architecture, painting, and sculpture. Baignell.

- The Art of Ancient Egypt and the
  - U G 5
  - Near East
  - W. 5 cl.
  - The specialized study of the art and archaeology of the valleys of the Nile and Tigris Ruphrates in ancient times. Rubright.

- Ancient Greek and Roman Art
  - U G 5
  - Sp. 5 cl.
  - The development of Greek and Roman art from Minoan to late Roman times; the contribution of archaeology to the knowledge of Greek and Roman art. Rubright.

- Latin-American Art
  - U G 3
  - W. 3 cl.
  - A survey of the Pre-Columbian, Colonial, and Modern periods in Hispanic America and Brazil. Baigell.

- Nineteenth Century European Art
  - U G 5
  - W. 5 cl.
  - A study of European art from NeoClassicism through Post Impressionism. Emphasizing the study of the works of the major painters. Fattow.

- Primitive Art
  - U G 3
  - W. 3 cl.
  - Prereq.: Two basic courses in the history of Art, or two basic courses in Anthropology, or permission of instructor.
  - The art of various ethnic groups from prehistoric times to the present. Kaplan.
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 Brueghel. 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. Rubright.

701 Minor Problems G 1-5
A.
Repeatable to a maximum of 15 cr. hrs.
Hauser and staff:
A. History
C. Ceramics
D. Design
E. Art Education
G. Graphic Arts
P. Painting
S. Sculpture

702 Minor Problems G 1-5
Su, 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. Lawall.

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 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, Hauserman.

714 Art Education in the Secondary Schools Su (1st term), A.
The role of the Arts Supervisor for curriculum development and instruction in secondary school programs. Barkan, Hauserman.

715 Minor Seminar for the Practicing Art Teacher G 3-5
A.
Curriculum problems in teaching the visual arts. Studio work in related arts; theoretical considerations. Barkan, Eker.

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, Eker, Hauserman.

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. Gatell, King, Sherman, Cauth.

725 Painting G 3-5
W.
Prereq.: 724.
Continuation of 724.
COURSES OF INSTRUCTION
FINE 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 661S, and 663S, or 663S.
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, Winkle.

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 Masaccio); emphasis on how paintings of major Tuscan artists reflect cultural trends. Melnikas.

799† Art Workshop for Elementary Teachers
UG 4
Su (2nd 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
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
SU, W.
Prereq.: 801.
Repeatable to a maximum of 15 cr. hrs.
Continuation of 801.

803 Research Problems
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
Su, 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.
Patterson.

804F Italian Renaissance
Sp.
Melnikas.

813 Problems in Ceramic Composition
G 3-5
W.
Research in the development of special ceramic compositions pertinent to particular problems in ceramic design. Littlefield.

814 Problems in Ceramic Composition
G 3-5
Sp.
813.
Continuation of 813.

815 Historical Materials and Processes
G 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. Atherton.

816 Historical Materials and Processes
G 3-5
Sp.
Prereq.: 815.
Continuation of 815.

817 Painting
G 3-5
W.
Emphasis on the principles of abstraction in pictorial organization. Attention to the relationships of subject matter and abstraction as related to contemporary and traditional approaches. Gelles, King, Sherman.

818 Advanced Sculpture
G 3-5
A.
Advanced sculpture with a wide range of choice in media. Freeman.

819 Advanced Sculpture
G 3-5
W.
Prereq.: 818.
Continuation of 818.

820 Advanced Sculpture
G 3-5
Sp.
Prereq.: 819.
Continuation of 819.
950 Research in Fine Arts
G Arr.
Research for thesis and dissertation purposes only.

Forestry

PROFESSORS: HOWLETT (Chairman), IALBAN, BRATTIE, 2BSOWN, ICHADWICK, IGOULD, IHARTMAN, IHILL, JOHNSON, IKFLING, and LAURIE (Emeritus); ASSOCIATE PROFESSORS: ICEISMAN, IKRETICHMAN, IMARLOWE, IMILLER, and IRREISCH; ASSISTANT PROFESSORS: IDONOH, and ITOUSE.

402 Farm Forestry
U 3
Sp. 2 cl., 1 2-hr. lab.
Farm forestry as related to farm management, good land use, and the conservation of soil, water, and wildlife. The measurement, harvesting, utilization, and marketing of farm forest products. Touse.

406 Forest Products
A 3 cl., 1 3-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. Touse.

408 Hardwood Dendrology
U 3
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. Touse.

409 Coniferous Dendrology
U 3
A. 2 cl., 1 3-hr. lab. One Saturday field trip.
Prereq.: Bot. 401 and 402.
A study of the principal species of Gymnosperms in the United States with emphasis on identification, range, and silvical characteristics. Touse.

410 Principles of Forestry
U 5
A. 3 cl., 2 3-hr. lab.
History of American forests, their character and occurrence; underlying fundamentals of silviculture and forest management; introduction to forest management and protection. Touse.

502 Silvics
U 3
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. Touse.

701 Minor Investigations
G 2-5
Prereq.: Permission of instructor.
Special problems in the field of pomology, vegetable gardening, floriculture, and ornamental horticulture, horticultural products or forestry.

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

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

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

French
Office: 116 Derby Hall, 154 North Oval Drive.

PROFESSORS: IABCOCK (Chairman), IADAMSON, IDEMP, IDAVEN, IEHAVEN, IMOORE, IOBART, ICARLUT,ILEO, IMOORE, and INMURST; ASSISTANT PROFESSORS: IAUIE, IBART, and IMOORE.

401 Elementary French
U 5
Su, A, W, Sp. 5 cl.
May not be taken concur. with Span. 401-402, Ital. 401-402. Not open to students who are not eligible to take Engl. 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
U 5
Su, A, W, Sp. 5 cl.
Prereq.: 401.
May not be taken concur. with Span. 401-402, Ital. 401-402.

403 Intermediate French
U 5
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.
404 Intermediate French  U  5
Su, A, W, Sp. 5 cl.
Prereq.: 403.
Course conducted in French.

405 Reading of French  G  0
Su, A, W, Sp. 5 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  U  5
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  U  5
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  U  5
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 French Literature  U  5
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  U  2
A, Sp. 2 cl.
Prereq.: 410.
Review of French grammar; composition on assigned topics and practice in translation.

521 Intermediate French Conversation and Composition  U  2
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  U  2
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  U  5
Sp. 5 cl.
Prereq.: 517.
Mrs. Bulatkin.

530 Masterpieces of French Literature: Seventeenth and Eighteenth Centuries  U  5
W. 5 cl.
Prereq.: 517.

532 Elementary French Pronunciation  U  5
Su, A, W, Sp. 5 cl.
Prereq.: 410.
Not open to students with credit for 632.
Formation of French sounds, rules of pronunciation and dictation; lectures and practical exercises; use of phonetic symbols.

535 * La civilisation française des origines à nos jours  U  5
A. 5 cl.
Prereq.: 518 or 521 or 522.
Course conducted in French.
Major developments of French culture down to 1900. Carlot.

570 French Classics in Translation  U  3
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.

6031* The Romantic Period in French Literature, 1800-1850  U  G  5
W. 5 cl.
Prereq.: 517 and either 539 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  U  G  5
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.

6161* French Literature of the Renaissance  U  G  5
A. 5 cl.
Prereq.: 517 and either 529 or 530.
Selections from Marot, Rabelais, the Pléiade 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  U  G  5
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.

6181* French Literature of the Enlightenment  U  G  5
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.
FRENCH

619 French Translating U G 3
W. 3 cl.
Prereq.: 638 or equivo.
Translations from French to English and from English to French. Aster.

628 Modern French Syntax U G 5
W, Sp. 5 cl.
Prereq.: 518.
Systematic review of French grammar with composition and other exercises, based on contemporary authors. Modern tendencies in syntactic analysis. Maiden.

634 * Contemporary French Drama U G 3
A. 3 cl.
Prereq.: 517 and either 529 or 530.
Plays of Lucermont, Ronsard, Claudel, Giraudoux, Cocteau, Mouchet, Anouilh, Sartre, Camus and Ionesco. The different theatres and directors from Copeau to the present day. Aster.

636I* La civilisation française contemporaine U G 3
A.
Prereq.: 518 and 521 or 522.
Course conducted in French.
Life, institutions, and culture of contemporary France. Carlot.

638 Advanced Spoken and Written French U G 3
Sp. 3 cl.
Prereq.: 521, 522 and 628 or equivo.
Intensive practice in speaking and writing French. Based on contemporary usage.

639 * Explication de textes U G 3
Su, Sp. 3 cl.
Prereq.: 517 and either 529 or 530.
Repeatable to a maximum of 6 cr. hrs.
Intensive linguistic and literary exploration of representative passages from modern French authors. Davidson.

640I* Contemporary French Literature U G 5
S. 5 cl.
Prereq.: 517 and either 529 or 530.
Twentieth century literary currents, and their significance, with special attention given to the novel. Proust, Gide, Malraux, Mauriac, Berranos, Saint-Exupéry, Camus, Sartre and others. Aster.

643 Advanced French Pronunciation and Phonostylistics U G 3
W. 2 cl., 1 lab. hr.
Prereq.: 532 or permission of instructor.
Training in auditory and oral aspects of French pronunciation. Special emphasis on analysis of different types of spoken French. Ldon.

645I* French Literature U G 3-5
Su. W. 5 cl.
Prereq.: 517 and either 529 or 530.
Repeatable to a maximum of 15 cr. hrs.

651I* Modern French Poetry U G 3
A. 3 cl.
Prereq.: 517 and 529 or 530.
Source and processes of poetic creations as exemplified in selected works of French poets from Baudelaire to the present time. Aster.

670 French Literature in English Translation U G 5
A. 5 cl.
Prereq.: 3rd yr. standing.
Not open to French majors.
A survey of French masterpieces in English translation from Montaigne to Proust with special reference to their bearing on English or American literature. Mitchell.

701 Minor Problems in French U G 1-5
Prereq.: Permission of instructor.

705 Honors Course in French U 3-10
A.
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.
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.

706 Honors Courses in French U 3-10
W.
Prereq.: same as 705.
Continuation of 705.

707 Honors Courses in French U 3-10
Sp.
Prereq.: same as 705.
Continuation of 706.

717 * Topics and Problems in 17th Century French Literature U 3
W. 3 cl.
Prereq.: 617 or permission of instructor.
Intensive exploration of a special topic or problem, with readings in literary works and in relevant criticism and scholarship. Davidson.

718I* Topics and Problems in 18th Century French Literature U 3
W. 3 cl.
Prereq.: 618 or permission of instructor.
Intensive exploration of a special topic or problem, with readings in literary works and in relevant criticism and scholarship. Davidson.

719I* Topics and Problems in 19th Century French Literature U 3
Sp. 3 cl.
Prereq.: 603 or 604 or permission of instructor.
Intensive exploration of special topics or problems with readings in literary works and in relevant criticism and scholarship. Carlot.

720 * Topics and Problems in 20th Century French Literature U 3
Sp. 3 cl.
Prereq.: 640 or equivo.
Intensive study of a specific topic or problem, with readings of selected literary and critical works. Aster.
Topic for 1964-65: The Concept of "Literature engagée."
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. Balakin.

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
   A. 3 cl.
   Prereq.: Knowledge of Latin.
   The evolution of sounds from Latin to Modern French. Balakin.

802 History of the French Language: Morphology
   W. 5 cl.
   Prereq.: 801.
   The evolution of grammatical forms from Latin to Modern French. Balakin.

803 Old Provençal
   A. 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. Balakin.

804 Old Provençal
   W. 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. Balakin.

805 Middle French Literature
   A. 3 cl.
   Prereq.: 813.

811 Seminar in French Literature
   Su (2-3 cr. hrs.), A (3-5 cr. hrs.).
   Prereq.: Permission of instructor.
   Mitchell.

812 Seminar in French Literature
   Su (2-3 cr. hrs.), W (3-5 cr. hrs.).
   Prereq.: Permission of instructor.
   Astier.

813 Old French Literature
   W. 3 cl.
   Lectures on main currents of Old French literature to 1300. Reading of the Chanson de Roland, Yvain of Chrétien de Troyes, Béroul Tristan, representative lyrics. Balakin.

817 Seminar in French Literature
   S.
   Prereq.: Permission of instructor.
   Balakin.

880 Bibliography and Method
   Sp. 3 cl.
   A course to acquaint graduate students with tools, problems, and methods of linguistics and literary research. Davidson.

950 Research in French Language or Literature
   Research for thesis and dissertation purposes only.

Geodetic Science

Office: 239 Graduate School, 104 West 19th Avenue.

PROFESSORS: BRANDENBERGER, IHEISENEN, and ILARIA; ASSOCIATE PROFESSORS: MUeller and TUOTILA.

GENERAL PREREQUISITES FOR ALL 600 COURSES
Prerequisites for all 600 courses include Mathematics 538 or 543, Physics 412 and 413 or 512 and 513 and Civil Engineering 502. Civil Engineering 502 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 astronomical 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; concurr. 653.
   Not open to students with credit for 645.
   Radial triangulation, Rectification, Map compilation. Single oblique photogrammetry, Terrestrial photogrammetry. Introduction to second order stereoscopic instruments.
623 Photogrammetry III U G 3
Sp. 2 cl., 1 3-hr. lab.
Prereq.: 622 or 645, concur. 654.
Not open to students with credit for 745.

625 Photo Interpretation U G 3
W. 2 cl., 1 3-hr. lab.
Prereq.: 521 or 545 or 631, Geol. 401 or 435, 451.
Not open to students with credit for 655.
The use of air photographs for material surveys, route and site locations, soil mapping, geologic mapping, urban planning and special studies.

631 Map Projections U G 3
A. 3 cl.
Not open to students with credit for Geog. 612.
The description of the various map projections used for major map series.

653 Adjustment Computations I U G 4
W. 3 cl., 1 3-hr. lab.
Prereq.: 611 or concur. 611.
Not open to students with credit for 600.
The principles of the theory of errors and of adjustment computations.

654 Adjustment Computations II U G 3
Sp. 2 cl., 1 3-hr. lab.
Prereq.: 653 or 660, concur. 612.
Not open to students with credit for 760.
Adjustment of observed data with method of variation of parameters and of correlates. Standard error of unknowns and functions.

656 Field Work in Geodesy U G 5
Su (1st term). 4 cl., 5 4-hr. lab.
Prereq.: 612 or 640.
Not open to students with credit for 602a.

657 Field Work in Geodetic Astronomy U G 5
Su (2nd term). 4 cl., 5 4-hr. lab.
Prereq.: 617.

658 Field Work in Photogrammetry U G 5
Su (2nd term). 4 cl., 5 4-hr. lab.
Prereq.: 612 or 640, 623 or 745.
Not open to students with credit for 602b.

659 Field Work in Distance Measurements U G 5
Su (1st term). 4 cl., 5 4-hr. labs.
Prereq.: 758.

PREREQUISITES FOR ALL 700 COURSES
Prerequisites for all courses in this group include Geodetic Science 622 or 645, 654 or 745, or permission of instructor and at least five hours of Mathematics courses beyond Mathematics 543.

711 Geodesy III U G 3
A. 2 cl., 1 3-hr. lab.
Not open to students with credit for 749.

721 Aerial and Terrestrial Photography U G 3
W. 2 cl., 1 3-hr. lab.
Prereq.: 623 or 745.
Not open to students with credit for 757.
Design, calibration, and testing of photogrammetric cameras. Physical characteristics, processing, and quality control of photography. Photogrammetric aircraft and auxiliary devices.

723 Stereophotogrammetry U G 3
A. 2 cl., 1 3-hr. lab.
Prereq.: 623 or 745 or permission of instructor.
Not open to students with credit for 664.

725 Photogrammetry in Practice U G 3
A. 2 cl., 1 3-hr. lab.
Prereq.: 623 or 745.
Not open to students with credit for 756.
Organization and execution of photogrammetric projects. Consideration of accuracy and economy.

751 Physical Geodesy U G 4
W. 3 cl., 1 3-hr. lab.
Prereq.: Geol. 735 and Geod. Sc. 711.
Not open to students with credit for 600.
Basic potential theory and the principles of applying gravimetry in Geodesy.

753 Advanced Adjustment Computations U G 3
A. 2 cl., 1 3-hr. lab.
Not open to students with credit for 800.

758 Electronic Surveying I U G 3
A. 3 cl.
Prereq.: 711 or 740.
Not open to students with credit for 742.

759 Electronic Surveying II U G 3
W. 2 cl., 1 3-hr. lab.
Prereq.: 742 or 758.
Not open to students with credit for 743.
Special problems, soil conductivity, curvature of ray path, propagation velocity of electromagnetic waves, maximum range. Reduction of spatial data onto the ellipsoid. Applications.

794 Special Studies in Geodetic Science U G 3-9
Repeatable.
Assigned reading, laboratory, or field work, under the guidance of a staff member, arranged to meet the requirements of individual students.

795 Seminar in Geodetic Science U G 1-3
Prereq.: Permission of instructor.
Repeatable.

A-107
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 C 3
Sp. 2 cl., 1 3-hr. lab.
Not open to students with credit for 861.

823 Stereophotogrammetry II G 4
W. 3 cl., 1 3-hr. lab.
Prereq.: 723 or 864.
Not open to students with credit for 865.

824 Aerial Triangulation G 3
Sp. 2 cl., 1 3-hr. lab.
Prereq.: 823 or 855.
Not open to students with credit for 866.

825 Analytical Photogrammetry G 4
Sp. 3 cl., 1 3-hr. lab.
Prereq.: 823 or 864.

831 Advanced Map Projections G 4
W. 3 cl., 1 3-hr. lab.
Prereq.: 621 or Geog. 612.
The theory of various map projections with special attention on maps used in the United States.

851 Advanced Physical Geodesy C 4
Sp. 3 cl., 1 3-hr. lab.
Prereq.: 751, 752 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 G 4
A. 3 cl., 1 3-hr. lab.
Prereq.: 617.
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.

Geography
Office: 136 Haggerty Hall, 1775 South College Road.
PROFESSORS: TAFFEE (Chairman), HOFFMAN, RANDALL, and SMITH; ASSOCIATE PROFESSORS: BASILE, BROWN, HUNKER, PATTON, SIEWALL, and VILLAMAY; ASSISTANT PROFESSORS: GAUTHIER and SILVERSTON.

The courses in the field of geography may be grouped as follows:
Physical environment: 401, 615, 701.
Economic and cultural geography: 403, 503, 603, 604, 634, 651, 697, 701.
Political and historical geography: 701, 710, 712.
Regional geography: 504, 505, 605, 606, 631, 622, 624, 625, 626, 627, 701.
Techniques: 510, 611, 612, 700, 702, 798.
Commerce: 30, 631, 633, 634, 701.

401 Introduction to Geography U 5
Su, A, W, Sp. 5 cl.
The elements of the natural environment, their characteristics, their distribution, and their significance in the human habitat. Geography in relation to the physical and social sciences. RANDALL, BASILE, VILLAMAY, SIEWALL, and assistants.

403 Economic Geography U 5
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. SMITH, HOFFMAN, HUNKER, BROWN, and assistants.

503 Fundamentals of Economic Geography U 3
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. HOFFMAN, HUNKER.

504 World Regional Geography U 5
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 developments in relation to their geographic conditions. RANDALL.

505 Geography of the United States and Canada U 3
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. HUNKER.

510 An Introduction to Cartography U 3
A. 3 cl.
Cartographic techniques, map compilation, scales, generalization, symbolization, grid systems, reproduction, and map-making instruments and equipment. BASILE.

603 Localization of Manufacturing U G 3
Industries W, Sp. 3 d.
Prereq.: 4th or 5th yr. standing in Engineering or 401, 403, 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 U G 3
A. 3 cl.
Prereq.: 401, 403, 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. Smith.

615 Climatology U G 4
A. 4 cl.
Prereq.: 15 cr. hrs. of natural or social science, including one of the following: 401, Physics 420, Bot. 405, 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. Smith, Banfield.

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.
The resources, their assessment, development, and related problems in Eastern Europe. The geographic significance of each state to the Communist bloc and to the West. Brown.

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. Villmow.

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. Villmow.

624 Geography of Latin America U G 3
W. 3 cl.
Prereq.: 4th yr. or grad. standing in a Social Science or 401, 403.
Geographic regions of Latin America. Development of the political division in relation to their geographic conditions. A geographic analysis of inter-American affairs.

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. Hoffman.

620 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. Randall.

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
Su, W. 3 cl.
Prereq.: 401, 403, or 504, or 15 cr. hrs. of allied subjects.
A geographical analysis of the nature and distribution of rail, water, highway, pipe line and air transport facilities and their importance in regional development. Seacull.

631 The Historical Geography of Commerce U G 3
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. Hoffman.

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 areal expansion, and interrelations: center relations, each examined in relation to city planning. Hankaer.

651 Philosophy of Cultural Geography U G 3
A. 3 cl.
Prereq.: 4th yr. standing and 401, 403 or 504.
Cultural geography, treating of environmentalism, regionalism and other doctrines: An examination of the philosophical elements in geography. Randall.

Natural Resources Problems, Programs, and Policies.
(See Agricultural Economics 697.)

700 Field Work in Geography U G 2
Sp.
Prereq.: 12 cr. hrs. in Geog.
A course in the practice of field observation and geographic mapping. Banfield.

701 Special Problems in Geography U G 2-5
Prereq.: 10 cr. hrs. in Geog. and permission of instructor.
Individual study of a special problem or a particular region.
702 Special Problems in Cartography U G 2-5
A, W, Sp. Conf. and lab. arr.
Prereq.: 15 cr. hrs. in Geog. or closely allied fields and permission of instructor.
Individual study of cartographical subjects such as: map compilation, map design, color separation, map reliability, analysis of source materials, toponymy, graphical symbolism, phsyiographic drawing, etc. Smith, Bastie.

National Security Policy Studies
(See National Security Policy Studies 702, 703, 801.)

710 Military Aspects of World Political Geography U 4
A, W, Sp. 4 cl.
Prereq.: 401, 403, or Pol. Sci. 613, or 10 cr. hrs. in Hist. or 4th yr. standing in advanced ROTC.
The power position of a state or group of states. The security of the United States, geographic, economic, and political factors and the power potential of a state. Randall, Brown.

712 Political Geography U G 3
W. 3 cl.
Prereq.: 401, 403, or Pol. Sci. 613, 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. Randall.

798 Special Studies in Geography U G 2 or 3
Prereq.: 10 cr. hrs. in Geog. and permission of instructor. Repeateable 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.

803 Economic Geography G 2-5
Su, A, W.
Prereq.: 30 cr. hrs. in Geog. and 10 cr. hrs. in related sciences.
A study of economic, industrial, or urban geography. Smith, Huffman, Hunter, Brown.

804 Regional Geography G 2-5
A, W.
Prereq.: 40 cr. hrs. in Geog. and allied subjects.
The geographical investigation of a selected area. The region under study to be announced by the department. Smith, Randall, Huffman, Hunter, Villmow, Brown.

805 Political and Historical Geography G 2-5
A.
Prereq.: 30 cr. hrs. in Geog. and 10 cr. hrs. in related social sciences.
Readings and research in political and historical geography. Smith, Randall.

807 Physical Geography G 2-5
A, W.
Prereq.: 40 cr. hrs. in Geog. and Geog.
The study, at an advanced level, of land forms, climate, soils, and other aspects of physical geography. Smith, Bastie.

811 History of Geography G 3
Sp. 3 cl.
Prereq.: 15 cr. hrs. in Geog.
Readings in the classics. The history of the development of geographic theories. Modern tendencies as seen in current literature. Smith.

812 Cartography and Map Intelligence G 2-5
Sp.
Prereq.: 30 cr. hrs. in Geog. and closely allied fields.
Readings and research in cartography, graphics, and map intelligence. Smith, Randall.

850 Seminars in Geography G 2
Subjects 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 C Arr.
Research for thesis and dissertation purposes only.

Geology

Office: 107 Mendehall Laboratory, 125 South Oval Drive.

PROFESSORS: INCUS (Chairman), LAMEY (Emeritus), CAR- 
MAN (Emeritus), SPEAKER (Research Professor), STEPHEN- 
SON, STEWART (Emeritus), GOLDSWORTHY, FULLER, 
SCHROEDER, LAFRANCE, and BATIES; ASSOCIATE PROFESSORS: BULL, MOORE, SWEET, SIEGEL, and WHITE; ASSISTANT PROFESSORS: FAURE, MARPLE (Emeritus), SHROEDER, STEPHENS, and SUMMERSON.

416 Introduction to Geology U 5
Su, A, W, Sp. 4 cl., 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. Bates and Staff.

417 Physical Geology U 5
A, W, Sp. 4 cl., 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.
418 Historical Geology U 5
A. W. Sp. 4 cl., 1 2-hr. lab., 1 half-day field trip.
Prereq.: 416 or 401 or 451.
Not open to students with credit for 402.
The history of the earth and its inhabitants through geologic time.

505 Study of Geologic Maps U 3
A. 3 2-hr. lab.
Prereq.: 417, 418.
Geologic structures as interpreted from geologic maps and aerial photographs. Summer.

520 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, Sevast.

525 The Common Rocks U 3
Sp. 3 2-hr. lab.
Prereq.: 401 or 451 or 416 and Mineral. 511, 512.
A study of the common rocks, their associations and occurrences, and elementary concepts regarding their origin. Moore.

533 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. Weiser.

600 The Common Mineral Deposits U 3
A. 3 2-hr. lab.
Prereq.: 525.
Not open to students with credit for 520.
A study of the component minerals of the common mineral deposits, their associations and relations; elementary concepts regarding origin of mineral deposits. Faure.

601 Geomorphology U G 5
A. 4 cl., 1 2-hr. lab., field trips.
Prereq.: 417 or permission of instructor.
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. White.

602 Structural Geology U G 5
W. 4 cl., 1 2-hr. lab.
Prereq.: 505, and Math. 417 or 422.

605 Economic Geology: Metals U G 5
W. 5 cl.
Prereq.: 525 or 600.
A study of the characteristics and origin of metallic mineral deposits. Faure.

607 Economic Geology: Petroleum U G 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.

609 Petrology U G 5
A. 4 cl., 1 2-hr. lab.
Prereq.: 525 and Mineral. 512.
The origin, occurrence, association, chemical relationships, and distribution of rocks; laboratory study of rocks. Moore.

GEOLOGY

610* Geomorphology of Eastern U G 5
United States
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.

611* Geomorphology of Western U G 5
United States
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.

613 Glacial Geology U G 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.

615 Geologic Surveying U G 3
Sp. 1 cl., 2 3-hr. lab.
Prereq.: 505, and Math. 417 or 423.
Techniques used in field mapping; field practice in the use of instruments; use of aerial photographs. Moore.

618 Paleozoic Stratigraphy U G 3
W. 3 cl.
Prereq.: 530.
The principles of stratigraphy and related historical geology, developed by study of selected American and European Paleozoic examples. Weiser.

619 Mesozoic and Cenozoic Stratigraphy U G 3
S. 3 cl.
Prereq.: 530.
The principles of stratigraphy and related historical geology, developed by study of selected American and European Mesozoic and Cenozoic examples. Speicher.

622* Vertebrate Paleontology U G 3
W. 3 2-hr. lab.
Prereq.: 4th yr. standing in Zool. or Anat. or 520 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.

623* Micropaleontology U G 3
Sp. 2 2-hr. lab.
Prereq.: 530.
A study of fossil microorganisms, especially the foraminifera, ostracodes and conodonts; structure, habits, taxonomic relationships, and phylogenetic development; preparation of faunas and their use in stratigraphic correlation. Smeed.

624 Advanced Invertebrate Paleontology U G 3
A. 3 2-hr. lab.
Prereq.: 530.
Laboratory study of fossil faunas, including paleontological techniques and procedures. La Rocque.

625* Paleobotany U G 3
Sp. 2 cl. 2 2-hr. lect. and demonstration.
Prereq.: 418 and 10 cr. hrs. in Biol. 5c.
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. Schopf.

A-111
627A Field Geology

Su (1st term). Requires full time of student.
Prereq.: 505, 525 and 615 and permission of instructor; 520, 618 and 619 recommended.
Concentrated training in the basic essentials of field observation and mapping. The work is done in central Utah, with headquarters in Ephraim. Speaker.

627B Field Geology

Su (2nd term). Requires full time of student.
Prereq.: 627A.
Continuation of 627A.

629 Geologic Report

A. 2 cl., conf.
Prereq.: 627B.
Preparation of geologic report based on field data in Geol. 627A and 627B.

630 Field Geology for Science Teachers

G 3
Sp. 5 day period during recess between W. and Sp. pre-trip meeting and post-trip report.
Prereq.: 416. Open only to students registered in the Academic Year Institute, or permission of instructor. Not open to Geol. majors.
Application of geological principles in the field. Interpretation of earth features observable on a traverse crossing the Appalachian Mountain system. Bates.

634 Fundamentals of Geophysics

UG 3
A. 3 cl.
Prereq.: 491 or 493 or 416 and Physics 412 or 413 or 522 or 533.

635A Exploration Geophysics, Principles

UG 3
Sp. 3 cl.
Prereq.: 401 or 451 or 416 and Physics 412 or 413 or 522 or 533.
Principles and techniques of exploration geophysics, with emphasis on gravimetric, geomagnetic, seismic, electrical, and radioactivity surveys. Bull.

635B Exploration Geophysics, Practical

UG 2
Sp. 2 2-hr. lab.
Prereq. or conc.: 635A or permission of instructor.

636 Engineering Geology and Hydrogeology

UG 5
W. 5 cl.
Prereq.: 6th yr. standing in Civil E., Min. E. or Petr. E. or 602 or conc. 609.
Principles and techniques of geology in support of engineering and hydrology. Pincus.

701 Special Problems

UG 1-5
Prereq.: Permission of instructor.
Special problems in any branch of geology for which the student has the proper qualifications.

705* Coal Geology

UG 3
Sp. 2 cl., 2 2-hr. lect. and demonstration.
Prereq.: 606 and permission of instructor.
Origin, occurrences, and variation in carbonaceous deposits; geology and economic application of coal; analytic and resources data. Schopf.

706* Glaciology

UG 4
Sp. 2 2-hr. cl.
Prereq.: 603, Physics 412, 413, Math. 440 or 536, Mineral. 511, or permission of instructor.
Types of glaciers, their feeding, mass budget, climatic relations, motion, and existing structures. Bull.

708* Stratigraphic and Economic Geology

UG 5
Of Ohio
A. 10 day period preceding A; post-trip readings and report.
Prereq.: 525, 618 or permission of instructor.
Not open to students with credit for 608.

709* Economic Geology: The Industrial Minerals

UG 3
A. 3 cl.
Prereq.: 520 or 600.
Not open to students with credit for 606.
The occurrence, origin, and distribution of the nonmetallic or industrial minerals, and their properties and uses. Bates.

712 Microscopic Sedimentary Petrology

UG 3
Sp. 2 cl., 1 3-hr. lab.
Prereq.: Mineral. 723 or equiv.
Lectures on the petrology of sedimentary rocks, together with specimen study, particularly by microscopic methods. Weiss.

713* Sedimentary Petrography I

UG 3
W. 3 cl. 1 3-hr. lab.
Prereq.: 609, 618 and 619.
The theory and application of various techniques in the laboratory study of sediments and sedimentary rocks, chiefly by non-microscopic methods. Summerman.

714* Sedimentary Petrography II

UG 3
W. 3 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

UG 3
Sp. 3 cl.
Prereq.: Senior standing in Geol. or permission of instructors.
Repeatable to a maximum of 9 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

UG 3
A. 3 2-hr. lab.
Prereq.: 602, 609, 618, or 619 and Math. 418 or 419.
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. Pincus.

735 Geophysics, Gravimetry

UG 3
A. 3 cl.
Prereq.: 4th yr. standing in Geol. and Math. 440 or 536 and Physics 412 or 413 or 522 or 533; or 4th yr. standing in Geol. or Physics and 401 or 451 or 452; 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.
736* Advanced Geophysics

A study of selected topics and problems in geophysics. Bull.

740* Introduction to Isotope Geology

Theory of natural isotope abundance variations and applications to problems in the Earth sciences. Faure.

812 Principles of Sedimentation and Stratigraphy

The origin, constitution, and relationships of stratified rocks; an approach to the outstanding problems of stratigraphy; processes of sedimentation and their results; interpretation, correlation. Speicher.

815* Metamorphism

A study of the processes of metamorphism, with a critical analysis of the rock types produced. Faure.

820* Precambrian Geology

A study of the principles of Precambrian geology, and the Precambrian geology of important areas. Faure.

821* Paleozoic Geology

A study of the Paleozoic systems of the United States, subdivision, faunal sequences, and correlation with homotaxial deposits abroad. Bates.

822* Mesozoic and Cenozoic Geology

A study of the outstanding Mesozoic and Cenozoic sections of the world, with emphasis on principles of nomenclature, subdivision, correlation, and interpretation. Speicher.

823* Quaternary Geology

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

Recognition and interpretation of geological structures; application of theoretical analysis, field observation, and experimental methods to selected problems. Fincus.

827* Advanced Geomorphology

A seminar devoted to current and classical problems in geomorphology; such as, the origin of submarine canyons or pediments. Goldthwait.

851* Seminar in the History of Geology

Discussion of the development of geology, intended to give the student a firm basis for comprehension of the science as it exists today. LaRocque.

855* Seminar in Paleoecology

A study of the principles of paleoecology with illustrations from the literature and selected faunules. LaRocque.

896 Interdepartmental Seminar in Polar and Alpine Studies

(See under Interdepartmental Seminars.)

950 Research in Geology

Research for thesis and dissertation purposes only.

German

Office: 213 Derby Hall, 154 North Oval Drive.

PROFESSORS T.CUNZ (Chairman), J.FLEISCHHAUER, MAHR (Emeritus), I.SEBIDLIN, and SPERBER (Emeritus); ASSOCIATE PROFESSORS T.BEKKER, T.GROENKE, and I.WITTKOWSKI; ASSISTANT PROFESSOR GOTTWALD.

PLACEMENT AND PROFICIENCY EXAMINATIONS

Students with two years of high school German register for German 401; however, in order to insure proper registration, placement tests are required of all students who continue their study of German in the department after beginning their language in high school. Such tests are given on the first day of instruction in each quarter. Consult 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

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

A-113
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>403</td>
<td>Intermediate German</td>
<td>U 5</td>
<td>Su, A, W, Sp. 5 cl. Prereq.: 402 or equiv. Reading of narrative prose; oral and written practice; grammar review.</td>
</tr>
<tr>
<td>404</td>
<td>Intermediate German</td>
<td>U 5</td>
<td>Su, A, W, Sp. 5 cl. Prereq.: 403, 420, or 412. Reading of narrative prose; oral and written practice; vocabulary building.</td>
</tr>
<tr>
<td>412</td>
<td>Intensive German</td>
<td>U 15-10-5</td>
<td>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 comprehensive knowledge of German in shortest possible time. Students will devote their entire time to this course.</td>
</tr>
<tr>
<td>417</td>
<td>Elementary-Intermediate German for Selected Students</td>
<td>U 5</td>
<td>W. 5 cl. Prereq.: Grade of A in 401.</td>
</tr>
<tr>
<td>418</td>
<td>Elementary-Intermediate German for Selected Students</td>
<td>U 5</td>
<td>Sp. 5 cl. Prereq.: 417. Successful completion of the sequence 401-417-418 fulfills language requirements and provides eligibility for 500 courses. Continuation of 417.</td>
</tr>
<tr>
<td>420</td>
<td>Intermediate Scientific German</td>
<td>U 5</td>
<td>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.</td>
</tr>
<tr>
<td>421</td>
<td>Intermediate Scientific German</td>
<td>U 5</td>
<td>A. 5 cl. Prereq.: 420, 403, or 412. Not open to students with credit for 404. Readings in scientific German.</td>
</tr>
<tr>
<td>499</td>
<td>Basic German for Graduate Students</td>
<td>G 0</td>
<td>Su, A, W, Sp. 5 cl. Prereq.: Grad. standing. The fee for this course will be the same as that for a five credit hour course. No audit. The fundamentals of German grammar, as required for the reading of German texts in the sciences and humanities.</td>
</tr>
<tr>
<td>501</td>
<td>Rapid Reading for Graduate Students</td>
<td>G 0</td>
<td>Su, A, W, Sp. 3 cl. Prereq.: Grad standing, 490 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.</td>
</tr>
<tr>
<td>503</td>
<td>Intermediate German Conversation</td>
<td>U 3</td>
<td>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.</td>
</tr>
<tr>
<td>504</td>
<td>German Composition</td>
<td>U 2</td>
<td>A, Sp. 2 cl. 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.</td>
</tr>
<tr>
<td>571</td>
<td>German Civilization I</td>
<td>U 3</td>
<td>A. 3 cl. Taught in English. The cultural heritage of the German people from the beginning to about 1500. Institutions, phases of civilization, interrelationship of social and literary history. Cunc.</td>
</tr>
<tr>
<td>572</td>
<td>German Civilization II</td>
<td>U 3</td>
<td>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. Cunc.</td>
</tr>
<tr>
<td>575</td>
<td>Introduction to German Literature; German Literature of the Classical Period</td>
<td>U 5</td>
<td>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.</td>
</tr>
<tr>
<td>576</td>
<td>Introduction to German Literature; German Literature of the Nineteenth Century</td>
<td>U 5</td>
<td>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.</td>
</tr>
<tr>
<td>577</td>
<td>Introduction to German Literature; Modern German Literature</td>
<td>U 5</td>
<td>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.</td>
</tr>
<tr>
<td>590</td>
<td>German Literature in Translation from Goethe to Thomas Mann</td>
<td>U 5</td>
<td>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. Seidlin.</td>
</tr>
</tbody>
</table>
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.

650 Proseminar  U G 1 or 3
Su.  3 cl. 3 cr. hrs.
Su. (first term), 3 cl. 1 cr. hr.
Wittkowski.

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"  U G 3
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  U G 3
W.  3 cl.
Reading and analysis of masterpieces of the 19th and 20th centuries: Schiller, Kleist, Grillparzer, Hebbel, Brecht, Wittkowski.

685 Advanced Conversation and Composition  U G 3
W.  3 cl.

691 Practical German Pronunciation  U G 2
Sp.  2 cl.

701 Minor Problems  U G 2-10
Prereq.: Permission of chairman.
Repeatable.
Investigation of minor problems in the various fields of German literature and philology. Cunz, Fleischhauer, Hoffmann, Seidlin, Wittkowski.

705 Introduction to the Study of Language  U G 3
Sp.  3 cl.
Elements of linguistics with emphasis on the historical study of languages and on semantics: the position of Germanic in the Indo-European family of languages. Groeske.

721 German Literature of the Eighteenth Century  U G 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.
The literature of the Enlightenment and Storm and Stress: Lessing, Klopstock, Wieland, young Goethe and Schiller. Cunz.

722 German Classical Literature  U G 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  U G 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  U G 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.

725 German Literature of the Nineteenth Century  U G 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, Buehner, Hebbel, Raimund, Masser, Stifter, Keller, Meyer. Wittkowski.

726 Contemporary German Literature  U G 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, Scholzler, Mann, Bulke, George, Hofmannsthal, Kafka, Brecht. Hofman.

801 Middle High German  G 4
A.  4 cl.
Middle High German texts. Methods of textual criticism. Fleischhauer.

805 Old High German  G 3
W.  3 cl.
Fleischhauer.

810 Gothic  G 3
Sp.  3 cl.
Fleischhauer.

821 History of German Literature until 1700  G 3
A.  3 cl.
Prereq.: Graduate standing.
Readings from the earliest period to the end of the 17th century. Beckert.

822 History of German Literature until 1700  G 3
W.  3 cl.
Prereq.: Grad. standing.
Continuation of 821.

823 History of German Literature until 1700  G 3
Sp.  3 cl.
Prereq.: Grad. standing.
Continuation of 822.

860 Seminar in German Literature  G 3
Selected topics from German Literature after 1600; problems of methods and interpretation. Cunz, Beker, Hoffmann, Seidlin, Wittkowski.
COURSES OF INSTRUCTION

GERMAN

570 Seminar in German Linguistics
A, W 2 cl.
Selected topics from medieval literature, word history, stylistics, and psychology of language. Fleischauer, Gronke.

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

Graduate School Course

Office: 164 West 19th 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.

GREEK

Office: 217 Derby Hall, 154 North Oval Drive.

PROFESSORS: TITCHENER (Chairman), ABBOTT, and FORBES; ASSOCIATE PROFESSOR W. R. JONES; ASSISTANT PROFESSORS HOLSINGER and LENARDON.

See also Classical Languages and Literatures.

401 Elementary Greek
U 5
A. 3 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.

402 Elementary Greek
U 5
W. 5 cl.
Prereq.: 401.
Continuation of grammar and selected reading.

403 Intermediate Greek
U 5
Sp. 5 cl.
Prereq.: 402.
Reading in the easier dialogues; the personalities of Socrates and Plato and their work.

415† Intensive Introduction to Greek
U 15
Su. 10 cl. and 19 or more hrs. of supervised study.
Full time of study is req’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. Lenardon.

506 New Testament Greek
U 3
W. 3 cl.
Prereq.: 403.

603 Greek Orators
U 3 cl.
Prereq.: 401, 402, 403, 504.
The theory and practice of the grand and the plain style in oratory; Demosthenes and Lycurgus. Morford.

604 Herodotus
U G 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
U G 3
W. 3 cl.
Prereq.: 401, 402, 403, 504.
The tragedies of Sophocles; with Aristotle’s analytic criticism. Lenardon.

607 Euripides
U G 3
W. 3 cl.
Prereq.: 401, 402, 403, 504.
Tragedies of various types by the last Greek tragedian. Lenardon.

608 Thucydides
U G 3
Sp. 3 cl.
Prereq.: One Greek 600 level course.
Assessment of Thucydides’ contributions to literature and history. Lenardon.

609 Plato
U G 3
Sp. 3 cl.
Prereq.: One Greek 600 level course.
Readings from the longer Dialogues. Lenardon.

631 Private Reading and Minor Problems
U G 1-6
Prereq.: 504.
Repeatable.
Passages for private reading and topics for investigation will be suggested to meet the needs of the individual students. Lehtieks, Morford.

700 Advanced Reading
G 1-6
Prereq.: 2 qtrs. of 631 or 6 cr. hrs. in 631.
Repeatable.
Lenardon, Lehtieks.
705 History of Greek Literature G 3
A.
Prereq.: 10 cr. hrs. of 631 or equiv.
Repeatable 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 G 3
W.
Prereq.: 10 cr. hrs. of 631 or equiv.
Repeatable for graduate credit.
Continuation of 705.

707 History of Greek Literature G 3
Sp.
Prereq.: 10 cr. hrs. of 631 or equiv.
Repeatable for graduate credit.
Continuation of 706.

Health Education

Offices: (Men) 124 Physical Education Bldg., 337 West 17th Ave. (Women) 317 Pomero Hall, 1760 Neil Avenue.

PROFESSORS ALLENBAUGH, CUSHMAN, and OBERTEUFFER; ASSOCIATE PROFESSORS BEYER and FOGLE; ASSISTANT PROFESSORS CARROLL and SOLLEDER; INSTRUCTORS BOCK, NOLTE, and STAFF.

400 Hygiene U 1
Su, A, W, Sp. 1 cr., 1 lab. hr.

Designed to influence knowledge, attitudes, and behavior related to individual health. Solleder, Coordinator.

473 First Aid U 1
Su, A, W, Sp. 2 cr., lab.
A consideration of first aid practices to the injured. Completion leads to Red Cross certificates in first aid.

510 Hygiene U 5
A, Sp. 5 hr.

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.

600 Health Education for Elementary U G 3
Teachers
Su, A, W, Sp. 3 cr.
Not open to undergraduate or graduate minors or majors in Phys. Ed. or Health Ed.


610 Health Education for Secondary U 3
Teachers
Su, A, W, Sp. 3 cr.
Not open to students preparing for secondary school teaching of Health Ed. or Phys. Ed.

A study of health problems as they relate to the individual secondary school student. Emphasis on the role of the teacher in the secondary school health program. Cushman, Beyrer, Allenbaugh, Solleder, Nolte, Carroll.

641 Personal Health Problems U G 3
A. 3 cr.

An advanced course in personal health problems. Extensive reading and reporting in selected health areas. Beyrer.

644 The Teaching of Health U G 4
Su, Sp. 5 cr.
Prereq.: 410 or 510 or equiv.

645 Organizational Relationships in School Health Education U G 3
Su, W, Sp. 3 cr.
Prereq.: 692.

The relation of the school health program to the total community health program. Official and non-official health agencies are studied. Beyrer, Cushman, Fogle.

692 School Health Services U G 3
A, W. 3 cr.
Prereq.: 410 or 510 or equiv.

Considerations of healthful school living and health services, including health appraisal, counseling, educational adjustments, communicable diseases, and emergency programs. Cushman.

701 Minor Problems in Health U G 1-4
Education
Prereq.: 4th yr. or grad. standing and permission of adviser.

Investigation of selected professional problems.

705 Current Progress in Disease Control U G 2
Sp. 2 cr.
Prereq.: 4th yr. or grad. standing in a health science area.

Authorities in medicine and health sciences will interpret how current findings may effect 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 cr. workshop.
Prereq.: Permission of instructor.
Repeatable to a maximum of 8 cr. hrs.

A team approach to school health education with emphasis on instruction, health services, environment, methods, materials, resources, evaluation, interrelationships, and others. Individual and group study. Fogle.

801 Seminar in School Health Education G 2
A. 2 cr.
Cushman.
COURSES OF INSTRUCTION

HEALTH EDUCATION

820 Problems in School Health Education C 3
Advanced problems in school health education. Individual or

820J Curriculum in Health Education A.

820K Survey of Research in Health Education
Su, W.

820L Evaluation in Health Education Sp.

950 Research in Health Education C Arr.
Research for thesis and dissertation purposes only.

History

Office: 108 University Hall, 216 North Oval Drive.

PROFESSORS: GRIMM (Chairman), JREMMER, JCOLES,
IDORPHALEN, IDUZLE, IFISHER, HILL (Emeritus), IMc
DONALD, IMORLEY, IHAGES, IHAGATZ, IROSEBROOK
(Emeritus), ITIMMS, IWEISERBURG, and WOODRING
(Emeritus); ASSOCIATE PROFESSORS: IPORIER, IRROBERTS,
IRULE, and IYOUNG; ASSISTANT PROFESSORS: IBURNHAM,
IGRIEDER, HARE (Emeritus), and IEFASKE.

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)
Su, 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.

504 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.

510 Great Figures in British History U 3
W. 3 cl.
British history since 1485 as illustrated in the lives of notable figures. Roberts.

511 Great Figures in Greek and Roman U 3
Antiquity
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.

512 Great Figures of Modern Europe U 3
A. 3 cl.
A study of modern European history through an examination of the lives and times of great figures. Hale.

513 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. Coles, Young.

517 Great Figures of the Middle Ages U 3
Sp. 3 cl.
A study of medieval European history through an examination of the lives and times of great figures. Pegues.
537 Recent History of the United States U 3
(1898-1928)
Su, A, W, Sp. 3 cl.
The impact of modern industrialization upon American imperialism, society, government, and foreign policy. Laissez-faire and government regulation, the Progressive movement, and the first World War. \textit{Dulles and Staff}.

538 Recent History of the United States U 3
(since 1928)
A, W, Sp. 3 cl.
Continuation of Hist. 537, but may be taken separately. Prosperity and depression, the New Deal; the United States in international affairs, the Second World War. \textit{Dulles and Staff}.

590 Contemporary Europe U 5
(1914 to the Present)
A. 3 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. \textit{Doppen}.

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.

607 The Renaissance U G 3
W. 3 cl.
The literary, artistic, and intellectual achievements primarily of Renaissance Italy against the economic, political, and social developments in western Europe. \textit{Grimm}.

608 The Reformation U G 5
Sp. 3 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. \textit{Grimm}.

609 The History of England from Its Beginning to 1688 U G 5
A. 5 cl.
A study of the religious, political, economic, and intellectual development of the English people from the earliest times to the Glorious Revolution. \textit{Roberts}.

610 History of England (since 1688) U G 5
Su, W. 5 cl.
The course of political, social, and intellectual change, of industrial and commercial growth of Hanoverian, Victorian, and Edwardian England. \textit{Forsier}.

611 Constitutional History of England U G 3
(to 1485)
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. \textit{Fegues}.

612 Constitutional History of England U G 3
(since 1485)
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. \textit{Roberts}.

617 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. \textit{Rule}.

618 American Military Policy U G 3
A. 3 cl.
The development of American military policy, 1763 to the present, in relation to its political, economic, and social implications. \textit{Coles}.

619 Medieval Civilization U G 5
A. 5 cl.
The decline of the Roman Empire; the rise of Christianity; analysis of feudalism and manorialism; the Great Economic Revival, and the origins of Western Society. \textit{Fagues}.

620 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. \textit{Ragats}.

622 Africa and the Western World in the Nineteenth and Twentieth Centuries U G 5
Su, W. 5 cl.
Economic penetration, the conflict of cultures, political developments, and social advance. \textit{Ragats}.

623 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. \textit{Ragats}.

624 The French Revolution and Napoleon U G 5
Sp. 5 cl.
The background of the Revolution; the social bases and political alignments of the first three Revolutionary governments, 1789-1795; the program and role of Napoleon. \textit{Rule}.

625 France since 1815 U G 5
Sp. 5 cl.
The social and economic evolution of France, 1815-1970; the evolution of French politics and social classes, 1870-1914; the problems of France between two wars; the Fourth Republic.

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. \textit{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. \textit{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. \textit{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. Dorpelar.

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. Dulles.

632  The Slavery Controversy in the United States Su, A. 3 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) Su, W. 3 cl.
The controversy over construction; 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 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 S. 5 cl.
Emphasis on these topics: overseas expansion, U. S. relations with Latin America, the Far East, and with Europe since 1914. Dulles.

639  The Influence of Immigrant Groups upon United States History W. 5 cl.
The share of different immigrant groups in the building of the nation, from the colonial period to the present. Weisenburger.

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 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
Su, 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. Taylor, Bowers.

645  Latin America U G 3
A. 3 d.
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 d.
The development of the South American republics from the Wars of Independence to the present with special emphasis upon Argentina and Brazil. TePaske.

A continuation of 644 but may be taken separately. Primary emphasis is on social, intellectual, and economic factors. Coles, Taylor.

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.

655  Greek History U G 5
W. 5 cl.
A history of Greece from the early Minoan period to the age of Demosthenes and Philip of Macedon. Readings in the Greek historians in translation. McDonald.

656  Roman History U G 5
Su, Sp. 5 cl.
A history of Rome from the early Bronze Age to the fall of the Roman Republic. Readings in the Roman historians in translation. McDonald.

668  The Emergence of Modern America, 1825-1848 Sp. 5 cl.
An intensive study of the political, social, and cultural transformation of the United States in the late nineteenth century. Weisenburger.

673  History of American Science Before Darwin U G 3
A. 3 cl.
Beginnings and flowering of scientific inquiry in colonial America; impact of the Enlightenment; coming of technology and expansion of science in early nineteenth-century America. Burnham.
674 History of American Science Since Darwin U G 3
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. Barnham.

675 History of Russia (to 1801) U G 3
A. 3 cl.
Not open to students who have 5 cr. hrs. for Hist. 676.
A survey from the origins of the Russian state to the end of the eighteenth century. Curren.

676 History of Russia (1801-1914) U G 3
W. 3 cl.
A survey from the accession of Alexander I to the outbreak of the First World War. Morley.

677 Soviet Russia U G 3
A., Sp. 3 cl.
Beginning with the background and events of the revolution of 1917, this course analyzes developments in Russian history from World War I to the present. Morley, Curren.

678 Modern Poland U G 3
A. 3 cl.
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.

679 Latin America U G 5
Sp. 5 cl.
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.

680 Contemporary England U G 3
A. 3 cl.
A study of Britain since 1900 with special emphasis on the rise of the Labour party and the development of the social welfare state. Poirier.

681 The Age of Liberalism U G 5
W. 5 cl.
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.

682 The History of Ohio U G 3
A. 3 cl.
A general survey of state history—social, economic, religious, and political—from the Indian period to the present time. Weisenburger.

683 Major Influences in the History of Western Civilization U 3
W., Sp. 2 cl.
Offered by senior members of the staff and designed to acquaint the student with problems in the interpretation of the history of western civilization. Rule.

684 History of the Far East to 1800 U G 5
A. 5 cl.
The development of the civilizations of China, Korea, and Japan from the earliest times to the beginning of large-scale Western influence. Grieder.

685 History of the Far East since 1800 U G 5
W. 5 cl.
The transformation of China, Korea, and Japan in modern times under the impact of the West. Grieder.

686 American Social Thought and Reform, 1890-1929 U G 5
Sp. 5 cl.
Not open to students with credit in 692.
Philosophy and institutions of social reform in the United States in the late nineteenth and early twentieth century. Bremner.

687 American Social Thought and Reform since 1929 U G 3
Su. 3 cl.
A historical examination of trends in American social thought and criticism since the Great Depression. Bremner.

688 History of Modern China U G 5
Sp. 5 cl.
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.

700 Minor Problems in History U G 1-3
Prereq.: Permission of instructor.
Individual study in some field of historical development; designed to allow the student to work upon a problem in which he is particularly interested.

705 Honors Course U 3-5
A.
Prereq.: 4th yr. standing and 43 cr. hrs. in Hist. with a grade of A in at least half of the Hist. 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 History. Failure to receive a grade of B in this course is a disqualification for special honors.
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.

706 Honors Course U 3-5
W.
See prereq. for 705.

707 Honors Course U 3-5
Sp.
See prereq. for 705.

737 Recent History of the United States (1898-1928) G 5
Su, A. 5 cl.

738 Recent History of the United States (since 1928) G 5
W. 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. Dulles.
STUDIES IN RUSSIAN HISTORY

UNITED STATES

1915-1914
W. 2 or 3 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. Dornalen.

1914 TO THE PRESENT
A. Sp. 3 cl.
Prereq.: Grad. standing, or 4th yr. majors in Hist. with permission of instructor.

Political, social, and economic developments: World Wars I and II; Communism, Nazism; present-day Europe. Emphasis on methods of historical research and documentary analysis. Dornalen.

1 Seminar in European History
A. 1 cl.
Prereq. or concur.: 812B.
Research topic to be announced. Grimm.

2 Seminar in European History
Sp. 1 cl.
Prereq. or concur.: 812B.
Research topic to be announced. Dornalen.

3 Seminar in European History
W. 1 cl.
Prereq. or concur.: 812B.

4 Introduction to Historical Research
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. Weissenburger.

5 Introduction to Historical Research
Su. A. 3 cl.
Prereq.: 1st qtr. Master's degree candidates in European Hist.

A practice course dealing with the problems involved in the preparation of the Master's thesis. Ragatz.

6 Great European Historians
A. 1 cl.
A study of the leading historical writers and schools of Europe, with selected readings from representative writers. Roberts.

GREAT AMERICAN HISTORIANS
W. 1 cl.
A study of the leading American writers and schools of history. Simms.

SEMINAR IN EUROPEAN HISTORY
Su. 1 cl.
Prereq.: 812B and reading knowledge of French.

SEMINAR IN EUROPEAN HISTORY
W. 1 cl.
Prereq.: 812B.
Research topic: Imperial Russia. Morley.

SEMINAR IN EUROPEAN HISTORY
Sp. 1 cl.
Prereq. or concur.: 812B.
Fisher.

SEMINAR IN EUROPEAN HISTORY
W.
Prereq.: 812A and permission of instructor.
819 must be followed by 820.
Bremer.

SEMINAR IN EUROPEAN HISTORY
Sp.
Prereq.: 812A, 819, and permission of instructor.
Bremer.

SEMINAR IN AMERICAN HISTORY
W. 1 cl.
Prereq. or concur.: 812A.
Research topic to be announced. Weissenburger.

SEMINAR IN AMERICAN HISTORY
Su., A. 1 cl.
Prereq. or concur.: 812A
Research topic to be announced. Simms.

SEMINAR IN AMERICAN HISTORY
Sp. 1 cl.
Prereq. or concur.: 812A.
Research topic to be announced. Dulles.

SEMINAR IN AMERICAN HISTORY
A. 1 cl.
Prereq. or concur.: 812A.
Research topic to be announced. Coles.

SEMINAR IN HISTORY
Prereq.: Permission of the Graduate Chairman and the Chairman of the department.
Research topic to be announced.

INTERDEPARTMENTAL SEMINAR
(See under Interdepartmental Seminars.)

RESEARCH IN HISTORY
Research for thesis or dissertation purposes only.
Home Economics

Office: 290 Campbell Hall, 1757 Neil Ave.
PROFESSORS: SCOTT (Director), DIRKS, IGLIMORE, HAEYE, HILLMAN, JR., JOHNSON, LEHMAN, NEWARK, PRUDENT, WILSON, and WOOD; ASSOCIATE PROFESSORS ALEXANDER, BEARD, IDEACON, GREEN, HAAS, HARGER, HENDRICKSON, LAFITTSKI, LEWIS, LLOYD, MEACHAM, WIVIAN, and WARFIELD; ASSISTANT PROFESSORS BLOOM, EVENHART, KYLE, MALOCH, MESSIER, MILLCAN, MONTEI, SMITH, TASCOTT, and WERTENBERGER.

The courses in Home Economics may be grouped as follows:

General Courses—400, 599.

400 Home Economics Survey U 1
A. 1 cl. and 1 2-hr. cl.
Precon.: 1st and 2nd qtr. standing in Home Ec. only.
Exploration of educational requirements and major programs in the School. Alexander.

440 Elements of Nutrition U 5
A, Sp. 5 cl.
Not open to students majoring in Home Ec.
Nutritional needs throughout the life cycle. Herr.

505 Textiles U 5
Su., A, W, Sp. 4 cl., 1 2-hr. lab.
Precon.: 10 hrs. Chem.
Study of the physical and chemical properties of textiles and their components as they relate to care, performance and consumer satisfaction. Fasshitz.

506 Household Equipment: Introduction U 5
Su., A, W. 4 cl., 1 2-hr. lab.
Precon.: 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. Beard.

507 Needle Crafts U 2
W. 2 2-hr. lab.
Precon.: 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. Meacham.

508 Clothing: Fashion and the Ready-to-Wear Market U 5
Sp. 5 cl.
Precon.: 3rd yr. standing.
Fashion, the ready-to-wear market and current developments in the field of textiles and clothings and their relation to satisfying consumer needs.

510 Housing U 3
A, W, Sp. 3 cl.
Precon.: 562 or 10 cr. hrs. social science.
Not open to students with credit for 450.
Housing as it affects family living and is in turn affected by family needs, social and economic trends and the physical environment.

512 Home Furnishings: Principles U 3
A, W, Sp. 2 cl., 1 2-hr. lab.
Precon.: Fine Arts 430 or 431 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.
Precon.: 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 2-hr. lab.
Precon.: Major standing in Oc. Ther., or permission of instructor.
Problems of elementary garment construction.

518 Elements of Homemaking U 3
A. 3 cl.
Precon.: 3rd yr. standing.
Not open to majors in Hom. 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. 2 cl., 1 2-hr. lab.
Precon.: Fine Arts 430 or equivalent.
A critical study of aesthetic principles in relation to costume. Meacham.

531 Clothing: Design Analysis U 5
A, W, Sp. 2 cl., 2 2-hr. lab.
Precon.: 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.

541 Principles and Methods of Teaching U 5
Aplied to Home Economics U 5
A, W, Sp. 3 cl., ½ day arr.
Precon.: Admission to Home Ec. Teaching Curriculum, reqd. and 25 cr. hrs. in Home Ec. and Ed. 533.
Consideration of curriculum, methods of teaching, management, and other problems of the home economics teacher.

542 Supervised Home Economics U 10-15
Teaching U 5
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 3.25 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 vocational certification. For vocational certification,
543 School-Community Problems of the Home Economics Teachers U 3
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 regular day school and extended school program.

545† Introduction to Educational Principles for Home Economics U 4
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 nonschool situations. Wood.

548 Fundamentals of Nutrition U 5
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 U 5
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 U 4
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. Wertenberger.

552 Nutrition: Recent Developments U 3
A, Sp. 3 cl.
Messier.

555 Food in Different Cultures U 3
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 U 3
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. Newkirk.

560 Home Management U 5
Su, 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. Newkirk, Lloyd.

561 Introduction to Child Development U 4
A, W, Sp. 3 cl. 2 morning hrs. 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. Davis, Heyns, Hendrickson.

562 Family Development U 5
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.

563 Child Development U 5
Su, A, W, Sp. 5 cl.
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.

570 Introduction to Food Service Management U 2
Sp. 1 2-hr. cl.
Prereq.: 549.
Orientation to the field of food service management. Herger.

571 * Menu Planning for Food-Serving Establishments U 3
W. 3 cl.
Prereq.: 548 or permission of instructor.
549 or concur. recommended.
Principles and practices of menu planning for school, industrial, and commercial food units. Menus planned for each type of institution. Herger.

580 Household Equipment: The Home Economist in Business U 5
W. 3 cl., 2 2-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 3-15
Prereq.: Permission of instructor.
Student participation in work of community agencies, county extension programs or business concerns to which home economics is related. Bloom, Heyns, Millison, Warfield, Wood.
Credit limited to 5 hrs. except in qtrs. indicated below.

585A Foods 5
585B Nutrition 5
585C Textiles 5
585D Clothing 10
A. 10 cr. hrs.
585F Household Equipment 5
585G Home Management 5
585H Institution Management 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 3
W. Sp. 2 3-hr. lab.
Prereq.: 531 or equiv.
Application of principles of tailoring in the construction of a suit or coat. Meacham.

604 Clothing: Advanced Design Analysis U G 5
Su, A, W, Sp. 2 cl., 3 2-hr. lab.
Prereq.: 531 or equiv.
Not open to students with credit for 503.
Creative interpretation of dress design terminating in finished garments developed through the media of flat pattern and draping. Meacham, Millcom.

610 Nutrition U G 5
W. 5 cl.
Prereq.: 545, 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 the diet. Prudent.

615 Experimental Work in Food Preparation U G 5
A, Sp. 2 cl., 3 3-hr. lab.
Prereq.: 556, Agr. Bio. 610 or 620, or equiv.
Application of experimental methods to problems involved in preparation of foods. Green, 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 2-cl., 1 2-hr. lab.
Prereq.: 506, 519 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
Sp. 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, Newark.

628 Selection of Furnishings for the Home U G 5
Su. 2 cl., 1 2-hr. lab. Field trips arr.
Prereq.: 512, Econ. 402 or 406, 502 or 506 or equiv.
Consumers' problems in the selection of home furnishings. Everhart.

630 Selection of Food and Equipment for Institutions U G 5
A. 5 cl.
Prereq.: 570, and Econ. 402 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.: 630, 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.

634 Sanitation for Food Serving Establishments U G 3
Sp. 1 1-hr., 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 U 2
Sp. 2 cl.
Prereq.: 4th yr. standing.
Reports based on current research, recent summaries and articles which give perspective in food and nutrition.
COURSES OF INSTRUCTION

HOME ECONOMICS

662 Child Development U G 3
W. 2 cr., 2 1-hr. observation periods.
Prereq.: 561, or equiv.
Growth and development of children from six through adolescence with emphasis on maturation patterns and individual differences. Hendrickson.

663 Infant Guidance and Care U G 3
A. 2 cr., 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. Heyes.

664 Nursery School Activities U 3
Su. A. W., Sp. 3 cr.
Prereq.: 561 or 563 and 665 or concur.
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. Heyes.

665 Nursery School Practicum U 2
Su. A, W, Sp. 1 conf. hr., 2 2-hr. lab.
Prereq.: 561 and 864 or concur.
Not open to students with credit for 661. Repeatable to a maximum of 6 cr. hrs.
Participation in the nursery school as a student teacher applying theory covered in 664.

666 Seminar in Child Development U 1
W. 1 cr.
Prereq.: 561, 563, 664 or permission of instructor.
Review, research in defined areas, with emphasis on recommended professional standards in group care of children.

670 Clothing, Fashion U G 3
Su. 3 cr.
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. Odlum.

671 Textiles U G 3
W. 1 cr., 2 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. Tappecott.

672 Textiles: Historic U G 3
W. 3 cr.
Prereq.: 505, 5 cr. hrs. Fine Arts, and 10 cr. hrs. social science.

673 Textiles: Recent Developments U G 3
Sp. 3 cr.
Prereq.: 4th yr. standing in Home Ec. and 505 or equiv.
Recent developments and research. Discussion and reports based on individual assignments. Tappecott.

680 Textiles and Clothing Seminar U 2
Sp. 2 cr.
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 U G 5
Sp. 4 cr., 1 2-hr. lab.
Prereq.: Agr. Ed. 536 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. Wardfield.

701 Special Problems in Home Economics G 1-5
Su, A, W, Sp. 1 conf. or more.
Prereq.: Grad. standing, 6 cr. hrs. in the area of Home Ec. in which the problem is taken, accumulative post 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 Child and family development

702 Supervision of Home Economics G 3
Teaching
Su. 3 cr.
Prereq.: 741 or permission of instructor.
For experienced teachers of home economics who are interested in supervising student teachers or in working with home economics teachers in service.

705 Research Methods in Nutrition G 3
A. 3 cr.
Organization, methods, analysis of data and reporting projects in nutrition research. Pruden.

715 Introductory Food Research G 3
Sp. 1 cr., 2 3-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. Pruden.

719 Home Management Development and Theory G 3
Su. A. 3 cr.
Prereq.: 590 or permission of instructor.
Historical development and present trends in home management with emphasis on theory and practices. Newark, Deacon, Maloch.

720 Home Management: Activity Analysis G 3
Sp. 2 cr.
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. Maloch.
721 Family Economic Resources and Functions
W. 3 cl.
Prereq.: Econ. 655 or equiv. and permission of instructor.

Principles, major problems and trends in the economics of the family. Newark, Deacon.

731 Food Cost Analysis for Institutions
A. 2 2-hr. cl.
Prereq.: 632, Acc. 405 or Acc. 510 or equiv.

Records used in large quantity food service and house units and their use in budgeting and food cost control. Harger.

735 Recent Development in Food and Nutrition Research
Su. 3 cl.
Prereq.: 551, Agr. Bio. 610 or 620, or equiv. or permission of instructor.

Brief survey of recent research. Prudent.

740 Home Economics in American Education
A. 2 cl.
Prereq.: 541 or equiv. and permission of instructor.

An overview of home economics at the elementary, secondary, higher education and adult levels. General trends in enrollment, curriculum and guidance, supervision, administration and research. Dirks.

741 The Teaching of Home Economics
Su. 3 cl.
Prereq.: 740 or equiv. and permission of instructor.

Home economics in integrated, core, experimental and other special types of programs. Haas.

742 Evaluation in Home Economics
Sp. 3 cl.
Prereq.: 740.

Procedure for appraising student progress in the attainment of objectives. Construction of evaluation instruments, analysis and interpretation of data from evaluation programs. Dirks.

750 Research Methods in Home Economics
Su. A. 3 cl.
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. Lehman.

761 The Family: The Early Years
Su., W. 2 1/2-hr. cl.
Prereq.: Psychol. 670, Soc. 676 or equiv., 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.

762 Administration of Day Care Centers
A. 3 cl.
Prereq.: 681 or equiv.

Program planning to meet developmental level and needs of young children. Minimum and recommended standards. Heyp.

771 Textiles: Analysis
W. 1 cl., 2 4-hr. lab.
Prereq.: 671 or equiv., 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.

799 Home Economics Workshop
Su. Full-time for 3 weeks.
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:

799A† Foods
799B† Nutrition
799C† Textiles
799D† Clothing
799E† Home Furnishing
799F† Household Management
799G† Home Management
799H† Institution Management
799I† Home Economics Education
799J† Child and Family Development

801 Seminar in Textiles and Clothing
Prereq.: Grad. standing in Home Ec. and permission of instructor.
Repeatable.

(Topics for 1964-65 listed in 235A Campbell Hall) Gilmore

810 Seminar in Foods and Nutrition
Prereq.: Grad. standing in Home Ec. and permission of instructor.
Repeatable.

(Topics for 1964-65 listed in 265B Campbell Hall) Prudent, Violan, Wilson.

820 Seminar in Home Management and Family Economics
Prereq.: Grad. standing in Home Ec. and permission of instructor.
Repeatable.

(Topics for 1964-65 listed in 166B Campbell Hall) Deacon, Maloch, Newark.

821 Seminar in Housing and Equipment
Prereq.: Grad. standing in Home Ec. and permission of instructor.
Repeatable.

(Topics for 1964-65 listed in 166B Campbell Hall) Graduate Staff.

830 Trends in Food Service Management
Su., W. 3 cl.
Prereq.: Permission of instructor.

Interpretation of principles and current research in relation to management of food service organizations at the policy-making level. Harger, Wood.

831 Seminar in Institution Management
Su. 1-2 cl.
Prereq.: Grad. standing in Home Ec. and permission of instructor.
Repeatable.

(Topics for 1964-65 listed in 262B Campbell Hall) Wood.

A-127
COURSES OF INSTRUCTION

HOME ECONOMICS

840 Home Economics in Higher Education G 3
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. Haas.

841 Seminar in Home Economics G 3-5
Education
Prereq.: Grad. standing in Home Ec. and permission of instructor.
Repeatable.
(Topics for 1964-65 listed in 347B Campbell Hall), Dirks, Lehman, Haas, Scott.

861 Seminar in Family and Child Development
Prereq.: Grad. standing in Home Ec. and permission of instructor.
Repeatable.
(Topics for 1964-65 listed in 347B Campbell Hall) Dirks, Hepe, Hendrickson.

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

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

950 Research in Home Economics G Arr.
Research for thesis or dissertation purposes only.

403 Fundamentals of Horticulture U 5
A, Sp. 5 cl.
A study of plant materials used in the horticultural industry emphasizing the development of gross plant structures in relation to cultural practices and the environment. Hartman.

407 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.

408 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
Sp. 1 cl., 2 2-hr. lab.

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 florist 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.
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 Production U 5
W. 4 cl., 2-hr. lab.
Prereq.: 402.
Practices and principles involved in the production and utilization of vegetables and potatoes, with emphasis on environmental and edaphic factors which influence growing and handling of these crops. Alber.

524 Canning, Freezing, and Dehydration U 5
W. 3 cl., 3 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. Alber.

A-128
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 operations, 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, Reichel.

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. Reichel.

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 design. Reichel.

570 Nursery Industry Experience U 2
Prereq.: Major standing in Ornamental Horticulture, Agr. Ind. curric. 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, Reichel.

601 Horticultural Plant Breeding U G 3
W. 2 cl., 1 2-hr. lab.
Prereq.: 503 or 532 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 Horticultural Crops U G 3
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. Kretschman.

610 Weed Control in Horticultural Crops U G 3
Sp. 3 cl.
Prereq.: 15 or hr. Hort. and 10 or. hrs. Bot.
A study of ecological soil, 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 G 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 Pickling and Fermentation U G 5
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. Getzeman.

629 Food Products Examination U G 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 Practices with Horticultural Products U G 5
Su. 1 cl., 2 4-hr. lab.
Prereq.: 524.
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 Floriculture U G 5
W. 4 cl., 1 3-hr. lab.
Prereq.: 542 and Bot. 605 and/or concurr. 606.
Not open to students with credit for 545.
Physiological principles and environmental factors in production of azaleas, begonias, bulbs, chrysanthemums, cyclamen, geraniums, hydrangeas, poinsettias, roses, saintpaulias, and other potted flowering and foliage plants. Kiplinger.

645 Principles and Practices in Floriculture U G 3
Sp. 4 cl., 1 3-hr. lab.
Prereq.: 543 and Bot. 605 and 606 or concurr.
Not open to students with credit for 543.
Physiological principles and environmental factors in production of aster, carnations, chrysanthemums, orchids, roses, snapdragons and other cut flower crops. Production costs of crops are analyzed. Kiplinger.

650 Principles and Practices of Nursery and Garden Store Management U G 5
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 Floral Design and Marketing of Florist's Crops U G 5
Sp. 3 cl., 2 2-hr. lab.
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. Reichel, Kiplinger.
COURSES OF INSTRUCTION

HORTICULTURE

683 Arboriculture U G 5
A. 4 cl., 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 aboriculture, city forestry, and park maintenance. Chadwick, Retseh.

701 Minor Investigations U G 2-5
Prereq.: Permission of instructor.
Special problems in the fields of pomology, vegetable gardening, floriculture and ornamental horticulture, horticultural products or forestry.

705 Seminar in the Historical Literature of Horticulture U G 3
A. 3 cl.
Prereq.: 503 or 612 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. Hoveland.

710 Theories and Techniques Employed in the Horticultural Processing Industry U G 2
Repeatable by undergraduates to a maximum of 6 cr. hrs.
a. Su. Plant Sanitation and Waste Disposal, Gelman
b. A. Processing Methodology, Gould
c. W. Packaging Materials and Methodology, Gelman

712 Experimental Horticulture U G 4
W. 2 cl., 2 2-hr. lab.
Prereq.: Grad. standing and Bot. 603 and 606 or equiv.
Effect of excesses 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 U G 5
W. 4 cl., 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 G 2 or 3
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, Gelman
g. Sp. Quality control in fruit and vegetable processing. Gould
h. A. Advanced physiological studies with floricultural crops. Kiplinger

811 Advanced Plant Nutrition G 3
A. 3 cl., 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. Roudlett.

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

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

950 Research in Horticulture and Forestry G Arr.
Research for thesis or dissertation purposes only.

Industrial Engineering

Office: 125 Industrial Engineering Bldg., 190 West 19th Avenue.
PROFESSORS: LEHOCZYK (Chairman), BAKER, CARSON, EDMONDS (Emeritus), MOORE, IMORRIS, and JEEPER; ASSOCIATE PROFESSORS: HBISHOP, IHOWLAND, and IRockwell; ASSISTANT PROFESSORS BROWN, KIBBEY, IMILLER, and ROOT; and INSTRUCTORS.

404 Foundry Practice U 3
Sp. 2 cl., 4 lab. hrs.
Prereq.: Educ. 2nd 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 U 5
A. Sp. 16 cl. and lab. hrs.
Prereq.: Eng. Dr. 400 or equiv. Educ. 2nd 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 teacher at the secondary level.

I Courses Induct. E. 404, 420, 515, 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 quarter preceding their first use. This may be done through the Ophthalmic Clinic, Ophthalmic Building, or through any registered optometrist.
INDUSTRIAL ENGINEERING

319 Manufacturing Processes†        U 4
A. W. Sp.  2 cl., 6 lab. hrs.
Prereq.: Engr. 3rd yr. standing or permission of chair-
man. Safety glasses must be worn in the laboratory.
Fundamentals and interrelationships of the principal manufacturing
processes. Laboratory work in the areas of foundry, machine tools, heat
treating and welding.

521 Machine Tool Applications†      U 5
W, Sp.  3 cl., 4 lab. hrs.
Prereq.: 519 or permission of chairman. Safety glasses
must be worn in laboratory.
Industrial Engineering aspects of machine tool usage. Emphasis
upon process choice and economic factors.

602 The Principles of Engineering Management        U 5
A, Sp.  5 cl.
Prereq.: 3rd yr. standing and permission of instructor.
A consideration from an engineering standpoint of the funda-
mentals of engineering management.

614 Manufacturing Equipment and Methods U 3
A.  2 cl., 2 1-hr. lab.
    Not open to students in the College of Engineering.
A survey including lectures, laboratory demonstrations and field
trips, to acquaint the student with industrial production methods
and equipment.

630 Junior Inspection Trip        U 2
Sp.  One week at end of W. Qtr.
Prereq.: Major standing in Indus. E.
A group visit to various industrial plants. Students must register
for the course and pay the laboratory fee at the beginning of the
Spring Quarter.

633 Motion and Time Study        U 3
A, W, Sp.  2 cl., 1 3-hr. lab.
Prereq.: Bus. Org. 676, 677, and Econ. 548.
    Not open to students in the College of Engineering.
The objectives, scope, and techniques of time study and methods
analysis are considered from the standpoint of the factory and
office supervisor.

639 Practical Experience in an Industrial Organization        U 6
A. Ten weeks during the summer between the 4th and 5th years.
To be obtained in some engineering or industrial organization.
The student shall present a satisfactory report upon the work done.

663 Methods Analysis and Time Study        U 5
A, W.  3 cl., 4 lab. hrs.
Prereq.: 662, and Math. 547.
Principles, applications, and purposes of methods analysis, work
measurement, process and operation analysis.

664 Work Measurement and Standards        U 5
A, Sp.  3 cl., 4 lab. hrs.
Prereq.: 663.
Principles, applications, and purposes of work measurement and
standards. Characteristics and limitations of techniques are dis-
cussed in detail, including link analysis and ratio delay.

667 Tool Engineering        U 3
A.  2 cl., 4 lab. hrs.
Prereq.: 519.
The design of tools, jigs, and fixtures. The basic elements of
fixture design, such as form, locating points, clamping devices,
and the use of standardized parts.

706 Industrial Quality Control        U G 3
W, Sp.  3 cl.
Prereq.: 662, 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. Bishop.

708 Design of Production Systems        U 5
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        U G 5
W, Sp.  3 cl., 6 lab. hrs.
Prereq.: 521, 663.
Not open for graduate credit for majors.
Fundamentals of production tooling and correlating with design and
specifications of the product. Kidby.

714 Time and Motion Study        U G 3
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 con-
struction, job evaluation and wage evaluation. Baker.

715 Principles of Industrial Engineering        U G 4
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. Baker.

761 Engineering Economy        U G 3
W, Sp.  3 cl.
Prereq.: Acc. 624 or 508, and Math. 547.
Not open for graduate credit to majors in Indus. E.
Economic analysis of engineering projects and methods of op-
eration. Introduction to the analysis of engineering decisions.
Morris.

764 Production Programming        U G 3
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        U 3
A, W.  3 cl.
Prereq.: 519 and 6 additional cr. hrs. in other laboratory
courses including mechanical equipment.
The nature, cause, and costs of industrial accidents and occupa-
tional diseases. Methods of accident prevention, physical, supervi-
sory, and educational. Ohio laws, regulations, and aids.

798 Advanced Studies in Industrial Engineering        U G 3-24
Prereq.: 5th yr. standing and permission of instructor.
Repeatable to a maximum of 24 cr. hrs.
The student must register for specific clauses in areas as indicated
below, and may register for more than one at a time.
<table>
<thead>
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<th>Course Code</th>
<th>Course Title</th>
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<td>798A</td>
<td>Job Evaluation</td>
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<td>798B</td>
<td>Organized Labor and Industrial Methodology</td>
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<td>798C</td>
<td>Industrial Applications for Statistics</td>
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<td>798E</td>
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<td>798F</td>
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<td>798G</td>
<td>Contemporary Problems in Plant Layout and Design</td>
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<td><em>Prereq.: 5th yr. standing and permission of instructor.</em></td>
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<td>Seminar in Industrial Engineering</td>
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<td>Methods Engineering</td>
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<td>Advanced Systems Design</td>
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<td>821</td>
<td>Problems in Production Engineering</td>
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<td>828</td>
<td>Advanced Studies in Plant Design and Materials Handling</td>
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<td>840</td>
<td>Operations Research</td>
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<td><em>Prereq.: 709 and 731, or equiv.</em></td>
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<td>Advanced work on the methodology and techniques of Operations Research.</td>
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<td>842</td>
<td>Operations Research I</td>
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<td><em>Prereq.: Calculus, probability theory and statistical methods, and permission of instructor.</em></td>
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<td>Introduction to the nature and problems of Operations Research and the study of actual case histories in the field.</td>
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<td>843</td>
<td>Operations Research II</td>
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<td>The position of the model in Operations Research and the study of the important techniques and formal approaches to research problems.</td>
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<td>844</td>
<td>Operations Research III</td>
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<td><em>Prereq.: 843.</em></td>
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<td>Consideration of topics in Operations Research including research methodology in the various sciences, and the conduct of actual Operations Research investigations.</td>
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<td>Personnel Research in Engineering</td>
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<td>Advanced work in one of the several phases of personnel management in engineering industries. Lehracky, Baker.</td>
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<td>861</td>
<td>Research in Decision Processes</td>
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<td>Advanced work in decision theory and processes including criterion research, decision making under uncertainty and in conflict situations, and gaming techniques. Morris.</td>
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<tr>
<td>862</td>
<td>Decision Theory</td>
<td>G 3</td>
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<td></td>
<td><em>A, Sp.</em></td>
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<td></td>
<td><em>Prereq.: 705, 761, and permission of instructor.</em></td>
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<td></td>
<td>Introduction to normative decision models and their applications. Morris.</td>
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<td>863</td>
<td>Control Theory</td>
<td>G 3</td>
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<td><em>A, W, Sp.</em></td>
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<td><em>Prereq.: 706, 764, 798D.</em></td>
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<td>Advanced work in the theory of control of industrial operations. Bishop.</td>
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<td>866</td>
<td>Programming and Control Research</td>
<td>G 3-12</td>
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<td><em>Su, A, W, Sp.</em></td>
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<td><em>Prereq.: 706, 761, 764.</em></td>
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<td></td>
<td>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.</td>
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<td>871</td>
<td>Safety Engineering Research</td>
<td>G 3-12</td>
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<td><em>Su, A, W, Sp.</em></td>
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<td><em>Prereq.: 771.</em></td>
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<td>Advanced work in one or more phases of safety engineering; plant design, equipment design, and other accident prevention programs. Rockwell.</td>
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Industrial Engineering

Seminars

895 Interdepartmental Seminar in Radio Astronomy
G 1-5

896 Interdepartmental Seminar in Polar and Alpine Studies
G 1-3
Sp. 1-3 hr. cl.
Permission of instructor.
Repeatability to a maximum of 9 cr. hrs.
A seminar on selected topics involving anthropology, biology, climatology, exploration, geology, glaciology, microbiology, and soils. Given cooperatively by the Institute of Polar Studies and the following departments: Agronomy, Anthropology, Botany and Plant Pathology, Civil Engineering, Geography, Microbiology, and Zoology and Entomology.

897 Interdepartmental Seminar in Natural Resources
G 1
A seminar in natural resources conservation. Given cooperatively by the Natural Resources Institute and the following departments: Agronomy, Agricultural Economics and Rural Sociology, Agricultural Engineering, Botany and Plant Pathology, Geography, Horticulture and Forestry, and Zoology and Entomology.

898 Interdepartmental Seminar in Nutrition and Food Technology
G 1
Sp.

899 Interdepartmental Seminars
G 1-5
Two or more departments may collaborate in presenting seminars on subjects of mutual interest. Topics to be announced.

International Studies

Office: 100 University Hall, 216 N. Oval Dr.
ASSOCIATE PROFESSOR INEMZER (Chairman); PROFESSORS GRIFFIN, LOVENSTEIN, IMORLEY, IRANDALL, and ISMITH; ASSOCIATE PROFESSOR IBGUIGNON; ASSISTANT PROFESSOR ILOTT.

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. 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. Nemser and staff.

601 Selected Problems in International Studies
U G 3
W. 2 cr.
Prereq.: Pol. Sci. 613 or equiv. 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. Nemser 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. 5., 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
W.
See prereq. for 705.

707 Honors Course
Sp.
See prereq. for 705.

721 Area Study Pro-Seminar
U G 2
Sw. 5 cl.
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.
PROFESSOR BABCOCK (Chairman); ASSOCIATE PROFESSOR GRIFFIN; ASSISTANT PROFESSOR ANGELO.

401 Elementary Italian U 5
A. 5 cl.
Not open to students who are not eligible to take Eng. 416. May not be taken concur. with French 401-403, 402, Span. 401-402. 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 Italian grammar with oral and written exercises. Attention to ear training and oral practice. Elementary reading based on Italian geography, history and customs.

402 Elementary Italian W 5
W. 5 cl.
Prereq.: 401.
May not be taken concur. with French 401-402, Span. 401-402.
The elements of Italian grammar with abundant oral and written exercises. Development of conversational skill. Reading, vocabulary building, attention to Italian idioms. Modern Italian prose.

503 * Modern Italian Drama Sp. 5 cl.
Prereq.: 402.
Special attention given to Goldoni and Pirandello.

504 * Modern Italian Poetry Sp. 5 cl.
Prereq.: 402.
Carducci, Pascoli, D'Annunzio and others.

505 Italian Neo-Realism A 5 cl.
Prereq.: 402.
Italian literature since the end of the second World War.

510 Italian Conversation and Composition Sp. 5 cl.
Prereq.: 402 or equiv.

611 * Dante W 3 cl. in Eng.; 2 additional cl. in Ital. for 3 cr. hrs.
Prereq.: Permission of instructor.
Introduction to the reading of the Divine Comedy. Analysis of major episodes.

612 * Petrarch and Boccaccio W 3 cl. in Eng.; 2 additional cl. in Ital. for 3 cr. hrs.
Prereq.: Permission of instructor.
Historical and aesthetic analysis of Petrarch's poetry. Petrarchism as a European phenomenon. Literary background of Boccaccio's prose and verse. Readings from the Decameron.

613 * Modern Italian Fiction A 3 cl. in Eng.; 2 additional cl. in Ital. for 3 cr. hrs.
Prereq.: Permission of instructor.
Special emphasis on the novel from Manzoni to Svevo.

701 Minor Problems in Italian U G 1-5
Prereq.: Permission of instructor.

950 Research in Italian Language or Literature G Arr.
Research for thesis or dissertation purposes only.

Japanese

Office: 415 University Hall, 218 N. Oval Dr.
ASSISTANT PROFESSORS CHING and FILLMORE.

401 Elementary Japanese U 5
A. 5 cl.

402 Elementary Japanese W 5 cl.
Prereq.: 401.

403 Intermediate Japanese Sp. 5 cl.
Prereq.: 402.

404 Intermediate Japanese A 5 cl.
Prereq.: 403.

505 Japanese Conversation W 3 cl.
Prereq.: 404 or permission of instructor.
Practice in conversation.

506 Japanese Composition Sp. 3 cl.
Prereq.: 404 or permission of instructor.
Practice in composition. Review of vocabulary and grammar.

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

Office: 903 Journalism Bldg., 242 West 18th Avenue.
PROFESSORS: KIEMZLE (Director), F. POLLARD, and J. CULLUMAN; ASSOCIATE PROFESSORS: BARTON, IMAGUIRE, and NORTON; ASSISTANT PROFESSORS: DRENTEEN, FIRST, HOLSLINGER, and SIEPFERT; LECTURERS: BOSTICK, DERTHICK, GAUMER, McGIVERT, FULLMAN, and SCHEFFER.

401 Introduction to Journalism
Su, A, W, Sp. 3 cl.
Prereq.: Engl. 416.
An introduction to newspapers, magazines, radio-television, and public relations. Luceifer, Mcgiffert.

402 News Writing
A, W, Sp. 2 cl., 2 lab. hrs.
Prereq.: 401.
Writing news and feature articles. Luceifer, Dertick.

501 Editing
Su, A, W, Sp. 2 cl., 2 lab. hrs.
Prereq.: 402.
Editing of copy, headline writing, re-writing, and general copy desk work; introduction to photo editing and make-up. Mcgiffert, Norton.

505 Reporting Public Affairs
A, Sp. 3 cl.
Prereq.: 501, Pol. Sci. 401, 419, or 507.
Reporting of court and governmental news. Students attend court trials, legislative and cocial sessions, visit governmental agencies as reporters and write news stories. Gaumer, Bostwick.

508 Technical Writing
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, Sefiert.

509 Journalism Laboratory
Su, A, W, Sp. 1 2-hr. lab.
Prereq.: 501 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, editing, makeup, critical writing, photojournalism, cartooning. First, Gaumer, Drenten.

510 Photojournalism
Su, A, W. 2 cl., 1 2-hr. lab.
Prereq.: 501 and 2 cr. hrs. of 509.
Reporting the news with a camera. How to recognize, develop, and create picture stories. Experience in coordinating words and news pictures. Picture editing. Layout. Wells.

517 History of U.S. Journalism
Sp. 3 cl.

519 Typography and Printing
Su, A, W, Sp. 2 cl., 2-hr. lab.
Typography and printing processes and their relation to graphic arts in the mass media. Gaumer.

555 Factual Writing
Su, A, W, Sp. 5 cl.
Prereq.: Engl. 418 or equiv.
Not open to students with credit for 401.
Instruction and practice in gathering and presenting factual material. Observation, research, interviewing, critical analysis, and rewriting are stressed. Barton.

602 Magazine Writing I
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
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'Toole.

605 News in Broadcasting I
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. Drenten.

606 News in Broadcasting II
A, W, Sp. 1 cl., lab. arr.
Prereq.: 605 or equiv.
Practice in writing and editing news for broadcasting at various broadcasting stations, and wiring of newscasts at WOSU and WOSU-TV. Drenten.

607 Special Radio and Television News
News

608 The Press and Basic Issues of Our Times
Sp. 1 cl., 1 2-hr. seminar.
Prereq.: Senior or graduate standing, or permission of instructor.
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. O'Toole.

613 Magazine Writing II
Su, W, Sp. 3 cl.
Prereq.: 602.
Continuation of 602 with emphasis on the full-length magazine article. Norton.
613 Journalism Laboratory
Su, A, W, Sp. 1 3-hr. lab.
Prereq.: Senior or graduate standing.
Repeatable to a maximum of 3 cr. hrs.
Laboratory work in one of the following: reporting, news writing, feature writing, editing, makeup, reviews, photojournalism, or news broadcasting. First, Derthick, Gaumer, Drenten.

615 Journalism Laboratory
Prereq.: 5 cr. hrs. Journ. lab. or permission of Director of the School of Journalism.
Repeatable to a maximum of 10 cr. hrs.
Provides credit for those holding responsible positions on the Ohio State Lantern or in approved broadcasting stations. Derthick, First, Gaumer, Drenten.

617 Public Relations I
Su, A, Sp. 3 cl.
Prereq.: 3rd yr. standing.
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.

618 Public Relations II
W. 3 cl.
Prereq.: 617.
Study of research methods in public relations and mass media. Review of contemporary research in public opinion and attitude measurement. Seifert.

619 Public Relations III
Sp. 3 cl.
Prereq.: 617 or permission of instructor.
Industrial editing. The history, development, and scope of institutional publications; practice in the planning and preparation of these publications. Seifert.

621 The Editorial Page
A, W, Sp. 1 3-hr. cl.
Prereq.: 4th yr. standing.
Study of the purpose, form, style, and spirit of the editorial. Consideration of current events, practice in news interpretation, and other editorial writing. First.

624† Mass Media Research
Su, A, W, Sp. 3 cl.
Prereq.: 4th yr. or graduate standing.
Types and methods of qualitative and quantitative research in the news media. Analysis of methods and findings of typical studies.

625 Journalism Internship
Prereq.: 501 or permission of Director of the School of Journalism.
Employment in newspaper, magazine, broadcasting, or public relations work off-campus. Kienzie, Derthick, Barton, Drenten.

626† Newspaper Management, Circulation, and Advertising
A, W, Sp. 4 cl, 3-hr. lab.
Prereq.: 4th yr. standing.
Consideration of the tasks and problems of newspaper management with emphasis on circulation policies and methods and those affecting advertising. Cullman, Pollard.

697 Public Relations IV
A. 1 3-hr. cl.
Prereq.: 617 or permission of instructor.
Public relations methods and techniques; publicity and the mass media; preparation and production of special media. Pullman.

The Supervision of Journalism in Secondary Schools
(See Education 674).

699 Senior Reporting
A, W, Sp. 1 3-hr. cl., conf. arr.
Prereq.: Journ. 4th yr. standing or permission of instructor.
Intensive reporting and writing. First, Derthick.

700 Honors Course
A
Prereq.: Senior standing, a grade of A in half of the major courses and a B in the remainder, permission of Director of School of Journalism.
A reading program for students who are candidates for a degree with distinction in Journalism. Derthick.

701 Honors Course
W
Prereq.: Senior standing, a grade of at least A in half of the major courses and a B in the remainder, permission of Director of School of Journalism.
A continuation of 700. Derthick.

702 Honors Course
Sp.
Prereq.: Senior standing, a record of at least A in half his major courses and a B in the remainder, permission of Director of School of Journalism.
A continuation of 701. Derthick.

711 Minor Problems in Journalism
Prereq.: Graduate standing or permission of Director of the School of Journalism.
Repeatable to a maximum of 15 cr. hrs.
This course is designed to permit students to make extensive and significant studies in the field of Journalism. Barton, Derthick, Drenten, Kienzie.

714 Law of the Press, Radio, and Television
Sp. 3 cl.
Prereq.: 505 or permission of instructor.
History, principles, and provisions of the law of libel, slander, copyright and other statutes affecting newspapers, other publications and broadcasting. Pollard.

802 Seminar in Journalism
Su, A.
Integrated reading and research in the fields of Journalism.

803 Seminar in Journalism
Su, W.
Integrated reading and research in the fields of Journalism.

804 Seminar in Journalism
Su, Sp.
Integrated reading and research in the fields of Journalism.
Landscape Architecture

School of Arch. and Land. Arch.
Office: 111 Brown Hall, 190 West 17th Avenue
ASSOCIATE PROFESSOR TOBEY, and LECTURERS.

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 Landscape 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., 8 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.

589 Landscape Construction U 3
Sp. 1 cl., 6 lab. hrs.
Prereq.: 588.
Continuation of 588.

617 Intermediate Landscape Design U 6
A. 1 cl., 15 lab. hrs.
Prereq.: Land. Arch. 4th yr. standing. Arch. 513.
An intermediate course in design with original problems involving outdoor space such as residential properties, land subdivisions, parks and other public areas. Tobey.

618 Intermediate Landscape Design U 6
W. 1 cl., 15 lab. hrs.
Prereq.: 617.
Continuation of 617. Tobey.

619 Intermediate Landscape Design U 6
Sp. 1 cl., 15 lab. hrs.
Prereq.: 618.
Continuation of 618. Tobey.

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. Tobey.

628 Planting Design U 3
W. 1 cl., 6 lab. hrs.
Prereq.: 627.
Not open to students with credit for 728.
Continuation of 627. Tobey.

629 Planting Design U 3
Sp. 1 cl., 6 lab. hrs.
Prereq.: 628.
Not open to students with credit for 729.
Continuation of 628. Tobey.

687 Landscape Construction U 4
A. 1 cl., 9 lab. hrs.
Prereq.: 589.

688 Landscape Construction U 4
W. 1 cl., 9 lab. hrs.
Prereq.: 687.
Continuation of 687. Tobey.

689 Landscape Construction U 4
Sp. 1 cl., 9 lab. hrs.
Prereq.: 688.
Continuation of 688. Tobey.

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.

702 Special Studies in Landscape Architecture U G 2-10
W.
Continuation of 701.

703 Special Studies in Landscape Architecture U G 2-10
Sp.
Continuation of 702.
COURSES OF INSTRUCTION

LANDSCAPE ARCHITECTURE

717 Advanced Landscape Design
A. 1 cl., 15 lab. hrs.
Prereq.: Land. Arch. 5th yr. standing, 619.
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. Packard.
Continuation of 717.

719 Advanced Landscape Design
Sp. 1 cl., 15 lab. hrs.
Prereq.: Packard.
Continuation of 718.

759 Professional Practice
A. 3 cl.
Prereq.: Land. Arch. 5th yr. standing, 689.
A study of professional practice including ethics, office organization and the preparation of contracts and specifications. Packard.

787 Advanced Landscape Construction
A. 1 cl., 9 lab. hrs.
Prereq.: 689.
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: TITCHENER (Chairman), ABBOTT, and FORBES; ASSOCIATE PROFESSOR IW. K. JONES; ASSISTANT PROFESSORS HOLZSINGER and LENARDON.

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 three 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 403, or if taken after successful completion of the fourth regular University course in another 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.: 401-402, or 412 or 2 years of high school Latin.
Readings from Cicero with review of syntax.

405 Vergil
W, Sp. 5 cl.
Prereq.: 404 or equiv. in high school Latin.
Readings from the Aeneid.

406 Horace
A. 5 cl.
Prereq.: 401-404 or three yrs. of high school Latin.
The odes of Horace through the first book with selected poems from the later books. Brunner.

407 Livy
W. 5 cl.
Prereq.: 405 and 406.
The first book of Livy describing the founding of the Roman state. Brunner.

408 Latin Comedy
Sp. 5 cl.
Prereq.: 405, or 406, or 407.
Selected plays of Plautus and Terence. Brunner.

412 Latin Review
A. 3 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.

502 Letters of Pliny and Cicero, Catullus
A. 3 cl.
Prereq.: 407 or 408.

503 Ovid, Sallust on Jugurtha, or Petronius
Sp. 3 cl.
Prereq.: 407 or 408.

505 Grammatical Review
A. 3 cl.
Prereq.: 407 or 408.

Brunner.

A-138
540* Essays of Cicero
Su. 5 cl.
Prereq.: 406, 407, 408 or equiv.
Not open to students with credit for 520.

541* Vergil: Eclogues, Georgics and Epic
Su. 5 cl.
Prereq.: 406, 407, 408 or equiv.
Not open to students with credit for 521.

542* Summer Lecture Series
Su. 2 cl.
Prereq.: 406, 407, 408 or equiv.
Not open to students with credit for 522.

543* Sallust on Catiline; Livy on Hannibal
Su. 5 cl.
Prereq.: 406, 407, 408 or equiv.

544* Ovid, Metamorphoses
Su. 5 cl.
Prereq.: 406, 407, 408 or equiv.

603 Advanced Reading
Su. 3 cl.
Prereq.: 16 cr. hrs. of Latin more advanced than 405.

612 Latin Prose Composition
W. 3 cl.
Prereq.: 16 cr. hrs. of Latin more advanced than 405.
Exercises and lectures on Latin idiom and style. Morford.

615 Proseminar I
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
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 Eclogues and Georgics. Morford.

617 Proseminar III
Su. 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. Titchener.

625 Introduction to Medieval Latin
Sp. 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
W. 3 cl.
Prereq.: 16 hrs. of Latin more advanced than 405, or French 501 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 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.

650 History of Roman Literature
Su. 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. Abbott, Titchener.

651 History of Roman Literature
W. 3 cl.
Prereq.: Three reading courses more advanced than 408.
Continuation of 650.

701 Special Problems
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
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
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
Sp. 3 cl.
Prereq.: 20 cr. hrs. of Latin more advanced than 405.
The last great literary exponent of the Greek-Roman theory of the method and value of historical writing. Forbes.

LATIN U G 3

UG 1-6

UG 3

UG 3

UG 3

UG 3

A-139
7051* Seneca U G 3 A. 3 cl.
Prereq.: 20 cr. hrs. of Latin more advanced than 405.
The moral essay and philosophic drama of the Silver Latin period. Abbott.

7061* Livy and Republican History U G 3 W. 3 cl.
Prereq.: 20 cr. hrs. of Latin more advanced than 405.
Early attempts at historical writing down to the culmination in the Augustan Period. Titchener.

7071* Prose Fiction: Petronius and Apuleius U G 3 Sp. 3 cl.
Prereq.: 20 cr. hrs. of Latin more advanced than 405.

720 Introduction to Historical Greek and Latin Grammar U G 3 A. 3 cl.
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. Abbott, Titchener.

950 Research in Classical Languages G Arr.
Research for thesis or dissertation purposes only.

Law

Office: 112 Law Building, 1659 North High Street.
PROFESSORS: ESTRONG (Dean), WALL, ISULLAHAN, FULDA, KARST, LYNN, NORDSTROM, POLLACK, RUTLEDGE, SELBY, STANGER, and WILLIS; ASSOCIATE PROFESSORS SUKE, CARRINGTON, VAN ALSTYNE, and HERMAN; ASSISTANT PROFESSOR SLAGLE, JR.; LECTURERS PLATT and GLANDER.

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, Strong.

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 Moot Court Governing Board.

093 Appellate Practice II P 0 W, Sp.
Preparation of a brief and presenting an oral argument to a panel comprising members 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 Moot Court 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 Moot 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.
Remedies for breach; offer and acceptance; consideration; third party beneficiaries; assignment of rights and delegation of duties; conditions; impossibility and frustration; statute of frauds. Stengel, 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; owner and occupier of land; torts and contract; misrepresentation; defamation; right of privacy. Karst.

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 interest; contractual modification of these interests. Callahan, Lynn.

511 Property II P 3 Sp. 3 cl.
Acquisition and transfer of ownership; adverse possession; conveyances (deeds, mortgages, and leases); interest; 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. Will, Carrington.

516 Civil Procedure II P 3 Sp. 3 cl.

520 Criminal Law P 4 Sp. 4 cl.
Criminal laws as means of attaining socially desirable ends, stressing criminal behavior and handling of those who engage in that behavior. Herman.
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; reconciliation of the primary features of this process, with traditional politico-legal theories of separation of governmental powers. Fulda, Ball.

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. Fulda, Burke.

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, Van Alstyne, Strong.

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; qualification and examination of witnesses; privilege; relevancy; documents; hearsay rule and its exceptions. Ball.

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, Slagle.

565 **Pleading** P 3
Pleading under codes and Federal Rules of Civil Procedure. Requirements of pleadings; variance and amendments; defenses; denial and new matter; counterclaims; reply; demurrer; 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, Selby.

575 **Negotiable Instruments Law** P 3
Types of commercial or negotiable paper; transfer; purchase and payment in due course; discount and security. Lynn.

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 partnerships and shareholders, partnerships and trusts. Van Alstyne.

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 Sp., A., W., for students accelerating and graduating in December, Sp., Sw., 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. Selby, Daehler.

605 **Trial Practice** P 4
A. 2 cr., W. 2 cr. Two qtr. sequence; credit given only on completion of all 4 cr. hrs.
Prereq.: 555, 565.
State and federal procedure in a civil case. Individual practice in the jury trial of a civil case. Herman, Slagle.

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
Private law pertaining to personal relations containing one or more foreign elements; jurisdiction; foreign judgments; domicile; choice of law; torts; workers' compensation acts; contracts; property; family law; decedents' estates. Nordstrom, Burke.

650 **Administration of Criminal Justice** P 2
Processes of criminal justice from arrest to parole and probation. Herman.

651 **Administration of Decedent's 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 in reaching competent solutions to legal problems. Pollack.

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. Fulda.

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.

660 **Domestic Relations** P 3
Marriage, annulment, divorce, alimony, custody, intra-family relationships and relations of family members with others; integration data from other disciplines dealing with problems of family. Selby.

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A-141
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>661</td>
<td>Estate-Gift Taxation</td>
<td>P 3</td>
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<tr>
<td></td>
<td>Federal gift and estate taxation; federal tax practice; interrelationships of death and gift taxes with federal income taxes. Glander.</td>
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<tr>
<td>662</td>
<td>Federal Courts</td>
<td>P 3</td>
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<tr>
<td></td>
<td>The Federal judicial system; original jurisdiction; removal jurisdiction; venue; substantive law in federal courts; Federal Rules of Civil Procedure. Willis.</td>
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<tr>
<td>663</td>
<td>Future Interests</td>
<td>P 3</td>
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<tr>
<td></td>
<td>Future interests in real and personal property; their classification, creation, and characteristics; class gifts; powers; rules against perpetuities. Lynn, Callahan.</td>
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<tr>
<td>664</td>
<td>Insurance</td>
<td>P 3</td>
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<tr>
<td></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, Mayer.</td>
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<tr>
<td>665</td>
<td>International Law</td>
<td>P 3</td>
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<tr>
<td></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>
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<tr>
<td>666</td>
<td>Jurisprudence</td>
<td>P 3</td>
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<tr>
<td></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. Falla.</td>
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<tr>
<td>667</td>
<td>Local Government Law</td>
<td>P 3</td>
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<tr>
<td></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. Van Alstyne.</td>
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</tr>
<tr>
<td>668</td>
<td>Appellate Practice IV</td>
<td>P 2</td>
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<tr>
<td></td>
<td>Procedural and substantive aspects of appellate practice; perfection of appeals, preparation of briefs, and oral argument. Herman.</td>
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<tr>
<td>669</td>
<td>Public Utilities</td>
<td>P 3</td>
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<tr>
<td></td>
<td>Public utility concept as developed at common law and by statute; obligations of the public utility status and their enforcement.</td>
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<tr>
<td>670</td>
<td>Real Property Mortgages</td>
<td>P 3</td>
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<tr>
<td></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>
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<tr>
<td>671</td>
<td>Receivership and Reorganization</td>
<td>P 2</td>
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<tr>
<td></td>
<td>Prereq.: 565.</td>
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<tr>
<td></td>
<td>Equity receivership and corporate reorganization under Chapter X of the Bankruptcy Act; arrangements under Chapter XI of the Act.</td>
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<tr>
<td>673</td>
<td>State and Local Taxation</td>
<td>P 3</td>
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<tr>
<td></td>
<td>Legal problems arising in property, excise, income, and estate-inheritance taxation; tax administration and procedure. Glander.</td>
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<tr>
<td>674</td>
<td>Advanced Federal Income Taxation</td>
<td>P 3</td>
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<tr>
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<td>Prereq.: 580.</td>
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<tr>
<td></td>
<td>Advanced study of federal income taxation dealing with corporations and shareholders; partnerships, trusts and decedents' estates; practice and procedure. Platt.</td>
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<td>676</td>
<td>Commercial Transactions</td>
<td>P 6</td>
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<tr>
<td></td>
<td>A. 3 cr., W. 3 cr. Two qr. sequences; credit given only on completion of all 6 cr. hrs. The legal process in its application to problems and disputes of merchants and consumers of goods; Uniform Commercial Code and pertinent federal legislation. Carrington.</td>
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<tr>
<td>677</td>
<td>Legal Problems of Foreign Trade and Investment</td>
<td>P 3</td>
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<tr>
<td></td>
<td>Principal problems confronting Americans engaged in export and import trade and in doing business in Western Europe. Fulda.</td>
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<tr>
<td>678</td>
<td>Federal Antitrust Law</td>
<td>P 3</td>
</tr>
<tr>
<td>679</td>
<td>Business Regulation</td>
<td>P 2</td>
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<td></td>
<td>Prereq.: 678.</td>
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<tr>
<td></td>
<td>Prohibition against price discrimination; regulation of certain industries with respect to rates; control of entry by certificates of public convenience and necessity. Fulda.</td>
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<tr>
<td>683</td>
<td>Individual Studies</td>
<td>P 1-6</td>
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<td></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>
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<tr>
<td>695</td>
<td>Seminars in Legal Planning</td>
<td>P 3</td>
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<td>A., W., S. 3 cr.</td>
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<td>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>
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<tr>
<td>695A</td>
<td>Business Planning</td>
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<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>
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<tr>
<td>695B</td>
<td>Estate Planning</td>
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<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>
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<tr>
<td>695C</td>
<td>Federal Tax Planning</td>
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<td>Prereq.: 550.</td>
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<td></td>
<td>Tax problems in business organizations, corporations, partnerships, and individual estates.</td>
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<tr>
<td>695D</td>
<td>General Legal Planning</td>
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<tr>
<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>
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<tr>
<td>695E</td>
<td>Planning Through Negotiation</td>
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<tr>
<td></td>
<td>Planning negotiations; weighting legal, economic and social factors and use of techniques for attainment of objectives.</td>
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</tbody>
</table>
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 6 cr. hrs.)
Topics will change as specially scheduled in any quarter.

696 Seminars in Legal Research P 3
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.: 679.
Evaluation of domestic 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.: 678.
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; exemptions; 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 by 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 requisite; 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 these 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
Governmental 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 Shareable 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 Drive.
ASSOCIATE PROFESSOR 1WANG (Chairman), PROFESSOR 1OTLEY; ASSOCIATE PROFESSORS 1GRiffin, 1CROENKE, 1LEHISTE, 1Meyers, and 1PIMSLER; ASSISTANT PROFESSORS CHING, 1FILLMORE, 1Gunter, and 1KAUFMAN.

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 Engl. 522.
A general survey of language and languages and the ways available to study them, with English as the focal language.

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. 5 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.

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 U G 5
W. 5 cl.
Prereq.: 601.
An introduction to the methods, conventions, and literature of comparative-historical linguistics with primary attention to the comparisms and reconstructions of phonological systems. Kaufman.

762 Historical Linguistics II U 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. Kaufman, Lebeise.

771 Transformational Analysis U G 5
Sp. 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.

950 Research in Linguistics U G Arr.
Research for thesis purposes only.

Mathematics

Office: 150 Mathematics Building, 211 West 18th Avenue.

UNIVERSITY RESEARCH PROFESSOR 1RADO; PROFESSORS 1BOSS (Chairman), 1DROBOT, 1HELSEL, 1KREYSZIG, 1KUHN (Emeritus), 1MANN, 1MICKLE, 1MILLER, 1MORRIS (Emeritus), 1BRECHLADERFER, 1SALTZER, 1WHITE, and 1ZASSENHAYS; ASSOCIATE PROFESSORS 1ARIAN, 1MOJANIC, 1COLSON, 1CRONHEIM, 1FISHER, 1HILDEBRANDT, 1JONES (Emeritus), 1ELEVINE, 1MARGAFIS, 1MEYERS, 1REEVES, 1RINTER, 1RUSTAGLI, 1SHAPEIRO, 1SCHREITSTON, 1TULL, and 1WOODS; ASSISTANT PROFESSORS 1BAJANSKI, 1BARNES, 1BEATTY (Emeritus), 1BUNCHMOT, 1CARI (Emeritus), 1CARROLL, 1KAPPE, 1KOHLER, 1LELAND, 1RAU, 1TROY, and 1ZILBER; LECTURERS 1KAPPE and 1YAQUB.

400 Arithmetic and Elementary Algebra U 5
Su, A, W, Sp. 5 cl.
Five cr. hrs. 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.
410 Principles of Mathematics
Su, W, Sp. 3 cl.
Prereq.: Elem. Ed. standing and Math. 400 or 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.

412 Introduction to Mathematics I
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, social sciences, and those who wish to develop habits of mind and methods of attack in quantitative reasoning.

413 Introduction to Mathematics II
W. 5 cl.
Prereq.: 412.

414 Introduction to Mathematics III
Sp. 5 cl.
Prereq.: 413.

416 First Year College Mathematics
Su, A, W, Sp. 5 cl.
Prereq.: 400 or satisfactory score on OSU Math Test.
The sequence 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, vectors, and vector spaces.

417 First Year College Mathematics
Su, A, W, Sp. 5 cl.
Prereq.: 416.
A continuation of 416. An introduction to analytic geometry, linear programming, trigonometry, matrix algebra, limits.

426 Introduction to Calculus, Probability and Statistics
Sp. 5 cl.
Prereq.: 410 and 417.
Not open to students with credit for 418, 435, 536, 537, 538, 541, 542, 543.
Differentiation, integration of polynomials, maxima, minima, mean value theorems, probability spaces, density functions, introduction to estimation, testing hypotheses.

429 Mathematics of Finance
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.

435 Elementary Mathematical Statistics
Sp. 5 cl.
Prereq.: 416 or 439.
Elementary principles of probability and introduction to the use of the binomial and normal distributions.

439 Algebra and Trigonometry
Su, A, W, Sp. 5 cl.
Prereq.: 401 or satisfactory score on O.S.U. Math Test. Students may not use the combination of 416 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.

440 Calculus and Analytic Geometry
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.

441 Calculus and Analytic Geometry
Su, A, W, Sp. 5 cl.
Prereq.: 440.
Not open to students with credit for 536.
Continuation of 440. Approximating areas, the integral, integration formulas, applications of integration, inverse functions, logarithmic and exponential functions, hyperbolic functions, integration techniques.

542 Calculus and Analytic Geometry
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.

543 Calculus and Analytic Geometry
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.

544 Differential Equations and Their Applications
Su, 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.

545 Applications of Mathematics
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.

546 Introduction to Statistics
A, W, Sp. 2 cl. 1-2 hr. lab.
Prereq.: 538 or 543.
Combinatorial probability, fundamental concepts of probability distributions, sample statistics, estimation and testing hypotheses, roots of statistical theory.

547 Statistical Methods in Engineering
A, W. 5 cl.
Prereq.: Indust. E. 3rd yr. standing and 546.
Topics included are probability, frequency distributions, testing hypotheses, and estimation.

A-145
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 G 2-5
Su, A, W, S.
Prereq.: Permission of instructor.
Repeatability.
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, W, 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 W, Sp. 5 cl.
Fundamental concepts in mathematics.

Prereq.: 601.
Not open to students with credit for 624.
Topics discussed include power series expansions, the formula of Cauchy, residues, conformal mappings, and entire functions in the complex domain.

609 Fourier Series and Boundary Values for Engineers U G 3
Problems for Engineers
A, W. 3 cl.
Prereq.: 608 or 544 or 611.
Not open to students with credit for 636.
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.

621 Advanced Geometry U G 5
A, W. 5 cl.
Prereq.: 536 or 541 or 441.
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 661.
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 concurrent.
Introduction to complex variables, analytic functions, complex integral theorems, power series, residues, conformal mapping.

626 Fourier Series and Boundary Value Problems
W, Sp. 5 cl.
Prereq.: 608 or 611 or 544.
Introduction 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
Su, A, Sp. 5 cl.
Prereq.: 536 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 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 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 number theory, congruences, polynomial domains, permutation groups.

642 Principles of Mathematics for Science and Mathematics Teachers A. 5 cl.
Prereq.: Permission of instructor. (NSF students only).
Introduction to modern mathematics, sets, functions, topology.

643 Topology U G 5
A, 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 U 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 G 5
Su. 5 cl.
(No 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 G 5
Su. 5 cl.
(No 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 U C 5
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 U C 5
Su, W, Sp. 5 cl.
Prereq.: 631.
Continuation of 651.

661 Vector Analysis U G 5
Su, W, Sp. 5 cl.
Prereq.: 601.
Not open to students with credit for 623.
The algebra and calculus of vectors with applications to mechanics. Differential operators and integral theorems. Introduction to potential theory.

665 Mathematical Logic U G 5
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: definition of mathematical proof; 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 U G 5
Sp. 5 cl.
Prereq.: 665.
A continuation of 665.

670 Matrices and Determinants U G 5
Su, W, 5 cl.
Prereq.: 537 or 542.
The fundamentals of matrix theory with emphasis on determinants, systems of linear equations, vector spaces, rank, characteristic polynomial, similarity and congruence transformations.

672 Mathematical Statistics U G 5
A. 5 cl.
Prereq.: 538 or 543.
Permutations, combinations, probability, discrete and continuous distributions. Binomial, Poisson, normal chi-square, t, F distributions. Limit theorems of probability.

673 Mathematical Statistics U G 5
W. 5 cl.
Prereq.: 672.

674 Theory of Probability U C 5
Sp. 5 cl.
Prereq.: 672.
Discrete probability spaces, random walk, Markov chains, stochastic processes, strong laws of probability.

680 Elementary Number Theory U G 5
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 U G 5
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 U G 5
Sp. 4 cl., 1 2-hr. lab.
Prereq.: 692 and 670 or 733, or permission of instructor.

695 Programming for Digital Computers U G 5
Su, W. 4 cl., 1 2-hr. lab.
Prereq.: 590 or 692 or Engr. Mech. 650, or equiv.

698* Numerical Solution of Differential Equations U G 5
Sp. 3 cl., 2 2-hr. lab.
Prereq.: 692 and 611 or permission of instructor.

699 Special Topics in Mathematics U G 2-5
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 U G 1-5
Conferences, assigned readings, and reports on minor investigations.

701 Introduction to Analysis U G 5
Su, A, W. 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 U G 5
Sp. 5 cl.
Prereq.: 701.
A continuation of 701.
### COURSES OF INSTRUCTION

**MATHEMATICS**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Type</th>
<th>Prereq.</th>
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<tbody>
<tr>
<td>704</td>
<td>Introduction to the Theory of Approximation I</td>
<td>U G 5</td>
<td>A</td>
<td>5 cl.</td>
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<td></td>
<td>Approximation by polynomials and trigonometric</td>
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<td>polynomials, Cubise's theory of best approximation</td>
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<td>and its generalizations. Interpolation processes</td>
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<td></td>
<td>and Mechanical Quadrature. Orthogonal</td>
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<td>Polynomials and elements of Harmonic Analysis</td>
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<td>705</td>
<td>Introduction to the Theory of Approximation II</td>
<td>U G 5</td>
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<td>A continuation of 704.</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>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>722</td>
<td>Mathematical Methods in Science II</td>
<td>U G 5</td>
<td>Sp.</td>
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<td>A continuation of 721.</td>
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<td>Introduction to tensor analysis with applications</td>
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<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>723</td>
<td>Mathematical Methods in Science III</td>
<td>U G 5</td>
<td>W</td>
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<td>Theory of determinants and matrices, real</td>
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<td>quadratic and Hermitian forms, groups and vector</td>
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<td>spaces, applications to physics and engineering.</td>
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<td>725 *</td>
<td>Integral Equations and Their Applications</td>
<td>U G 5</td>
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<td>5 cl.</td>
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<td>Orthogonal functions, linear, integral equations</td>
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<td>of first and second kinds, relations to ordinary</td>
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<td>differential equations, Volterra's equation,</td>
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<td>boundary value problems, practical methods of</td>
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<td>solution.</td>
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<td>726 *</td>
<td>Eigenvalue Problems</td>
<td>U G 5</td>
<td>W</td>
<td>5 cl.</td>
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<td>Distribution of eigenvalues, self-adjointness,</td>
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<td>definiteness, Green's functions, minimal</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>method, matrix eigenvalue problems, finite</td>
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<td>727 *</td>
<td>Applied Operational Calculus</td>
<td>U G 5</td>
<td>Sp.</td>
<td>5 cl.</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; application to</td>
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<td>partial differential equations; Fourier</td>
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<td>transform, applications.</td>
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<td>7281 *</td>
<td>Special Functions</td>
<td>U G 5</td>
<td>A</td>
<td>5 cl.</td>
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<td>Power series developments, asymptotic expansion,</td>
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<td>gamma functions, cylindrical functions,</td>
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<td>spherical harmonics, orthogonal polynomials,</td>
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<td>hypergeometric functions, beta functions,</td>
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<td>elliptic functions and integrals, numerical</td>
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<td>techniques.</td>
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<th>Course Code</th>
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<th>Credits</th>
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<tr>
<td>729 *</td>
<td>Applied Complex Analysis</td>
<td>U G 5</td>
<td>Sp.</td>
<td>5 cl.</td>
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<td>Basic facts of complex analysis; conformed</td>
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<td>mapping properties of elementary functions;</td>
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<td>Schwarz—Christoffel formula; distortion</td>
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<td>theorem; uniformization; applications to</td>
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<td>electromagnetic fields; fluid dynamics, heat</td>
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<td>flow.</td>
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<td>730 *</td>
<td>Non-Linear Differential Equations</td>
<td>U G 5</td>
<td>Sp.</td>
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<td>Existence and uniqueness of solutions;</td>
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<td>initial conditions; periodic solutions; Kryloff-</td>
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<td>Bogoliuboff method; graphical and numerical</td>
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<td>methods; applications to vibrational problems;</td>
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<td>relaxation theory, and nonlinear mechanics.</td>
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<td>731</td>
<td>Probability and Statistics</td>
<td>U G 5</td>
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<td>5 cl.</td>
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<td>General probability distributions, Stieltjes</td>
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<td>integral, characteristic functions, limit</td>
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<td>theorems.</td>
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<td>733 *</td>
<td>Statistics: Design and Analysis of Experiments</td>
<td>U G 5</td>
<td>Sp.</td>
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<td>Analysis of variance distribution, tests of</td>
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<td>linear hypotheses, analysis of variance in an</td>
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<td>r-way classification, non-orthogonal data,</td>
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<td>734</td>
<td>Statistical Inference</td>
<td>U G 5</td>
<td>W</td>
<td>5 cl.</td>
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<td>Point, interval estimation, maximum likelihood</td>
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<td>estimators, principles of estimation, tests of</td>
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<td>hypotheses. Neyman-Pearson theory, power</td>
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<td>function non-parametric tests, sequential tests,</td>
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<td>741</td>
<td>Introduction to General Topology</td>
<td>U G 5</td>
<td>Su, W.</td>
<td>5 cl.</td>
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<td>This sequence is designed to give training in</td>
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<td>the areas of modern geometry, particularly in</td>
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<td>analytic topology.</td>
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<td>Introduction to General Topology</td>
<td>U G 5</td>
<td>Sp.</td>
<td>5 cl.</td>
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<td>A continuation of 741.</td>
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<td>743</td>
<td>Projective Geometry</td>
<td>U G 5</td>
<td>Sp.</td>
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<td>The combinatorial and algebraic aspects of</td>
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<td>projective geometry, including non-Diireriusian</td>
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<td>and finite projective planes, coordination,</td>
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<td>the theory of collineations, incidence, matrices,</td>
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<td>latin squares.</td>
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<td>750 *</td>
<td>Introduction to Functional Analysis I</td>
<td>U G 3</td>
<td>A</td>
<td>3 cl.</td>
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<td>Linear topological spaces, normed spaces,</td>
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<td>Hilbert spaces, convex sets, integration of vector</td>
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<td>751 *</td>
<td>Introduction to Functional Analysis II</td>
<td>U G 3</td>
<td>W</td>
<td>3 cl.</td>
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<td>A continuation of 750.</td>
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761 Introduction to Higher Algebra U G 5
Su, A, 5 cl.
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 cl.
Prereq.: 761.
A continuation of 761.

763 Introduction to Higher Algebra U G 5
Sp, 5 cl.
Prereq.: 762.
A continuation of 762.

790 Advanced Computer Systems U G 3
Programming
W, 5 cl.
Prereq.: 695 or permission of instructor.
Symbolic programming. Design of symbolic programming systems, and algebraic compilers. Dynamic storage assignment. Symbol manipulation, information retrieval, and related topics. Classroom exercises involve use of computers.

793 Mathematical Foundations of the Design and Use of Automatic Systems 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.

795 Mathematical Foundations of the Design and Use of Automatic Systems Sp
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, repeatable.
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 W, 5 cl.
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 Sp, 5 cl.
Prereq.: 801.
Continuation of 801.

807 Partial Differential Equations and Their Applications G 3
A, 3 cl.
Prereq.: 702 or permission of instructor.

808 Partial Differential Equations and Their Applications W, 3 cl.
Prereq.: 807.
Continuation of 807.

815 Dimension Theory G 5
A, 5 cl.
Prereq.: 703, 749, and 763.
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
W.
Prereq.: 607 and permission of the instructor.

818 Potential Theory G 3
Sp.
Prereq.: 817.
Continuation of 817.

819 Theory of Rings G 5
Sp, 5 cl.
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 Functional 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 cl.
Prereq.: 702.

827 Measure and Integration G 5
W, 5 cl.
Prereq.: 826.
Continuation of 826.
COURSES OF INSTRUCTION

MATHMATICS

529 ° Measure and Integration G 5
Sp. 5 cl.
Prereq.: 527.
Continuation of 527.

530 ° Transfinite Arithmetic G 5
A.
Prereq.: 701 and 761.

531 ° Transfinite Arithmetic W.
Prereq.: 830.
Continuation of 830.

841 ° Differential Geometry G 5
A. 5 cl.
Prereq.: Permission of Instructor.
Curves, tensor calculus, surfaces, first and second fundamental forms, mappings, length and area, variations problems, parallelism of Levi-Civita and its generalization, special surfaces.

842 ° Differential Geometry G 5
W. 5 cl.
Prereq.: 841.
Continuation of 841.

844 ° Combinatorial Topology G 5
W. 5 cl.
Prereq.: 702, 742, and 762.
Homology and cohomology of simplicial and abstract complexes. Duality, relative homology and cohomology groups in the simplicial case. The axiomatic approach. Extension to general spaces with emphasis on the Čech theory and singular theory. Applications in geometry and analysis.

845 ° Combinatorial Topology G 5
Sp. 5 cl.
Prereq.: 844.
Continuation of 844.

849 ° Advanced Topics in Mathematical Statistics G 3
W. 3 cl.
Prereq.: Permission of instructor.
Topics to be taken from the following: multivariate analysis, stochastic processes, analysis of variance, components of variance models, advanced test design.

850 ° Advanced Topics in Mathematical Statistics Sp. 3 cl.
Prereq.: 849.
Continuation of 849.

855 ° Advanced Theory of Probability G 3
A. 3 cl.
Prereq.: 702.
Selected topics from foundations, distribution functions, limit theorems of probability, stochastic processes, weak and strong laws, infinitely divisible distributions, stable laws.

856 ° Advanced Theory of Probability G 3
W. 3 cl.
Prereq.: 855.
Continuation of 855.

857 ° Advanced Theory of Probability G 3
Sp. 3 cl.
Prereq.: 856.
Continuation of 856.

862 ° Theory of Matrices G 5
A. 5 cl.
Prereq.: 762.
Advanced topics in the theory of matrices.

864 ° Combinatorial Analysis G 5
A. 5 cl.
Prereq.: 762 or permission of instructor.
Permutations, combinations, partitions; enumerations by resources generating functions; block design and tactical configurations such as Latin squares, Steiner triples, finite geometries, incidence matrices.

865 ° Lattice Theory G 5
5 cl.
Prereq.: 762.
An introduction to partially ordered sets and lattices, distributive and modular Lattices, relations to Boolean algebras and projective geometries, applications to groups and rings.

871 ° Group Theory G 5
W. 5 cl.
Prereq.: 762.
Basic theorems on subgroups, normal subgroups, homomorphism; automorphisms; Sylow theorems; composite series and chief series; selected topics from free groups, extension theory, and other areas of current research.

872 ° Group Theory G 5
Sp. 5 cl.
Prereq.: 871.
Continuation of 871.

873 ° Analytic Number Theory G 5
Sp. 5 cl.
Prereq.: Permission of instructor.
The distribution of prime numbers. Waring's problems, and selected topics.

880 ° Theory of Algebraic Numbers G 5
A. 5 cl.
Prereq.: 762.
Ideals in algebraic number fields, unique decomposition into prime ideals; different and discriminant; ideal classes, application of Galois theory and analytical methods to the theory of algebraic numbers; distribution of prime ideals.

881 ° Theory of Algebraic Numbers G 5
W. 5 cl.
Prereq.: 880.
Continuation of 880.

890 ° Mathematical Logic G 5
W. 5 cl.
Prereq.: 701 and 761.
Topics include: pure and applied predicate calculi; formal number theory; Gödel's completeness and incompleteness theorems; selections from recursive function theory, set theory, and intuitionism.

950 ° Research in Mathematics G Arr.
Research for thesis or dissertation purposes only.
Mechanical Engineering

Office: 2072 Robinson Laboratory, 206 West 18th Avenue South.

PROFESSORS: IMARCO (Chairman), BEITLER (Emeritus), BLOZ, BUCHER (Emeritus), GHAN, MARQUIS (Emeritus), MOFFAT (Emeritus), NORMAN (Emeritus), STARKEY, STINSON (Emeritus), and ZIMMERMANN; ASSOCIATE PROFESSORS IDEOELEN, THORNUNG, JONES, MCLEAN, SMITH, and VELKOFF; ASSISTANT PROFESSORS BOYD, BRIDGE, BUXTON, FOSTER, JORDAN, and ISEFY; and INSTRUCTORS.

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 masses as related to rigid or elastic machine members, including force analysis, vibration, impact, and balancing. Starkey.

621 Heat Transfer and Fluid Flow U 5
W, Sp. 5 cl.
Pre req.: 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 4
A, W. 4 cl.
Prereq.: Professional division standing.
A study of the structure of engineering materials and their properties as used in engineering design. Marco.

672 Hydraulic Laboratory U 1
A. 1-3 hr. lab.
Pre req.: Must be taken concurrently with Civil E. 728.
A study of incompressible fluid flow through various primary elements and through a centrifugal pump. Buxton.

701 Internal Combustion Engines U G 3
A. 3 cl.
Pre req.: 635, or 614 and 722.
A study of combustion chambers, valve mechanisms, and the dynamic balance of internal combustion engines. Marco.

710 Heating, Ventilating, and Air Conditioning U G 4
A. 4 cl.
Pre req.: 610 or 611, and 733.
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. Sepey.

716 Refrigeration and Air Conditioning U G 3
W. 3 cl.
Pre req.: 610 or 611, and 733.
A study of fundamentals, processes and equipment associated with refrigeration systems using vapor compression, air cycle, absorption, magnetic and thermoelectric cooling. Sepey.

721 Principles of Energy Conversion U G 3
in Turbomachinery
A, W. 3 cl.
Pre req.: 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.

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COURSES OF INSTRUCTION
MECHANICAL ENGINEERING

722 Principles of Energy Conversion in Positive Displacement Machinery U G 3
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. Sepoy.

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
A. 3 cl.
Prereq.: 606 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 empirics 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. Burton.

755 Nuclear Power Plants U G 3
Sp. 3 cl.
Prereq.: 610 or 611, and 727 or 736 or 787, and Physics 602 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.

761 Advanced Mechanical Engineering U G 4
Instrumentation
W. 3 cl., 1 3-hr. lab.
Prereq.: 604 or 778, or equiv.
A theoretical and experimental study of measurement instrumentation. Emphasis on both principles of operation and analysis and design techniques for measurement systems of a mechanical and electromechanical nature. Doebelin.

762 Principles of Automatic Control U G 4
W, Sp. 3 cl., 1 2-hr. lab.
Prereq.: 605 or 609, 610 or 611, 616 or 620, and 778, or permission of instructor.
Not open to students with credit for 760.
A theoretical and experimental study of the principles of operation of feedback control systems, including servomechanisms and process controls. Doebelin.

763 Control Systems Design U G 4
Sp. 3 cl., 1 2-hr. lab.
Prereq.: 760 or 762 or permission of instructor.
A study of the theoretical and experimental procedures involved in the design of feedback control systems including servomechanisms and process control. Doebelin.

767 Principles of Mechanical Design U G 4
A, W. 4 cl.
Not for graduate credit to students majoring in Mech. E.
Not open to students with credit for 727-728-744-737-735-743, or 727-733-743.
A study of the application of the general principles and empirics of mechanics of solids to the creative design of mechanical equipment. Starkey.

768 Principles of Mechanical Design U G 4
W, Sp. 4 cl.
Prereq.: 616 or 620 and 767.
Not open to students with credit for 727-728-744, 727-733-743, or 727-733-743.
Continuation of 767. Starkey.

769 Principles of Mechanical Design U G 4
A, Sp. 4 cl.
Prereq.: 616 or 620 and 767.
Continuation of 767.

770 Professional Aspects of Mechanical Engineering U 1
A. 1 cl.
Prereq.: Mech. E. Professional Division 3rd yr. standing.
A study of the code of ethics, licensing law, responsibilities to professional societies and the relationship to labor and management of the professional engineer. Marco.

771 Preliminary Design U G 3
A, W. 3 2-hr. lab.
Prereq.: 720 or 721, 722, 723, 728 or 765, and 744 or 769.
Not for graduate credit to students majoring in Mech. E.
Engineering design of a selected piece of mechanical engineering equipment involving professional type problems and encompassing all the basic disciplines of mechanical engineering. Foster.

772 Preliminary Design U G 3
W, Sp. 3 2-hr. lab.
Prereq.: 771.
Continuation of 771.
Preparatory Design
A. Sp. 3 2-yr. lab.
Prereq.: 771.
Continuation of 771.

778 Mechanical Engineering Measurements
A, W. Sp. 1 cl, 1 4-yr. lab.
Prereq.: 605 or 606, 610 or 611, and 616 or 620.
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. Doebelin.

779 Mechanical Engineering Laboratory
A. Sp. 2 2-yr. lab. and 5 hrs. lab. planning and report writing.
Prereq.: 665 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-yr. lab. and 5 hrs. lab. planning and report writing.
Prereq.: 779.
Continuation of 779.

781 Advanced Studies in Mechanical Engineering
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.

782 Special Problems in Mechanical Engineering
Prereq.: Permission of instructor.
Repeatable to a maximum of 24 cr. hrs. with a maximum of 10 cr. hrs. in any one 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 fuel, heat transfer, heating, ventilating, and air conditioning, industrial hydraulics, machine design, refrigeration, steam power plants, and thermodynamics.

801 Advanced Applied Thermodynamics
A. 3 cl.
Prereq.: 601 or 605, and Math. 544, or equiv.
An analytical study of the thermodynamics of fluid flow. Zimmerman, Jones.

802 Advanced Applied Thermodynamics
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. Zimmerman, Jones.

803 Advanced Applied Thermodynamics
Sp. 3 cl.
Prereq.: 802.
Continuation of 802.

807 Advanced Heat Transfer
W. 3 cl.
Prereq.: 610, and 861 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. Markov, Han.

809 Advanced Heat Transfer
A. 3 cl.
Prereq.: 608 and Math. 544, or equiv.
A study of phase change and radioactive heat transfer processes. Markov, Han.

810 Internal Combustion Power Plants
W. 3 cl.
Prereq.: 723, or equiv.
An advanced study of reciprocating internal combustion power plants. Markov.

811 Advanced Principles of Energy Conversion in Turbomachinery
Sp. 3 cl.
Prereq.: 721 or equiv.
An advanced study of power-absorbing, generating, and transmitting turbomachinery. Zimmerman.

812 Preliminary Design of Power Systems
A. W. Sp. Conf.
Prereq.: Permission of instructor.
Preliminary design and evaluation of novel systems including analysis, synthesis, and possible experimental verification. Zimmerman.

820 Advanced Principles of Refrigeration
W. 3 cl.
Prereq.: 710 or equiv.
Advanced study of conventional and novel processes including thermoelectric, magnetic, and gas systems. Seguy.

821 Advanced Environmental Control
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. Seguy.

822 Advanced Environmental Control
A. W. Sp. Conf.
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. Seguy.

830 Advanced Steam Power Cycle and Turbine Analysis
W. 3 cl.
Prereq.: 605 or 609, 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
Sp. 3 cl.
Prereq.: 605 and 830, or permission of instructor.
### COURSES OF INSTRUCTION

**MECHANICAL ENGINEERING**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>832</td>
<td>Advanced Vapor Power Cycle and Component Studies</td>
<td>G</td>
<td>Arr.</td>
<td>A, W, Sp. Conf. Prereq.: 530 or 531, 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.</td>
</tr>
<tr>
<td>841</td>
<td>Dynamics of High Speed Machinery</td>
<td>G</td>
<td>3</td>
<td>W, 3 cl. Prereq.: 789 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 elements. Starkey.</td>
</tr>
<tr>
<td>843</td>
<td>Stress Analysis of Machinery</td>
<td>G</td>
<td>3</td>
<td>Sp. 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.</td>
</tr>
<tr>
<td>853</td>
<td>Dynamics of Inviscid Fluids</td>
<td>G</td>
<td>3</td>
<td>W, 3 cl. Prereq.: 609, and 851 or Math. 609, or equiv. Not open to students with credit for 508 or 500. Three dimensional, compressible, and incompressible inviscid flows, including irrotational and rotational motion with and without flow discontinuities. Han.</td>
</tr>
<tr>
<td>854</td>
<td>Laminar Flow and Heat Transfer</td>
<td>G</td>
<td>5</td>
<td>Sp. 5 cl. Prereq.: 810 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.</td>
</tr>
<tr>
<td>855</td>
<td>Turbulent Flow and Heat Transfer</td>
<td>G</td>
<td>5</td>
<td>A, 5 cl. Prereq.: 554. 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 stresses, and mixing length theory. Han.</td>
</tr>
</tbody>
</table>

### Medicine

Office: N-1013 University Hospital, 410 West 10th Avenue

**PROFESSORS**

WARREN (Chairman), BROWNING, DODOR, FANCHER, HAMPTON, HAYES, KIRKLAND, KIRKLAND, KNIGHT, MELODY, M'BRIAN, M'SHEIK, ROTHERMICH, RYAN, SAVAGE, SCHEIBELER, SHERRIN, SHEARER, SOWERS, SHERNOT, STONE, WALL, and WEISSLER; ASSISTANT PROFESSORS BARholmomew, BOWERS, CASHMAN, PARR, H. CASSEL, W. CASSEL, CLOPFER, CONN, D'AMATO, D'ANNO, D'NIBERG, ENGELMAN, GIFFORD, GODFREY, GOULDEN, GRAVES, GRUBER, GUTHRIE, GUYTON, GWYNNE, HARD, HATCHER, HATFIELD, HUMMEL, HUMPHREY, HUSTON, JACOBS, JOHNSON, KELLER, KIRK, KRESS, LANEVE, LEFKEN, LONG, LOVE, MATTHEW, McINTYRE, MENDelson, MERKLE, METZGER, MORRICE, MURPHY, O'BRIEN, PARKER, PHELPS, PHILLIPS, FINU, POLACHEK, POLLOCK, POWELL, PRAY, PRITCHETT, READ, ROSENOW, ROSS, SEYLER, SHARKEY, SHERRARD, SIMON, SMITH, SOTO, D. STEVENSON, TAGUCHI, TIBER, TOMASHEFSKI, TRONSTEIN, VINCENT, WEINBERG, and WOOLEY.

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>661</td>
<td>Principles of Medicine</td>
<td>P 2</td>
</tr>
<tr>
<td></td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>670</td>
<td>Clinical Medicine</td>
<td>P 0</td>
</tr>
<tr>
<td></td>
<td>A, 1 cl. Prereq.: Med. 2nd yr. standing. Lectures attempt to correlate the elemental sciences already studied with clinical medicine and to stimulate interest in those sciences. Clinical demonstrations illustrate subjects discussed in lectures.</td>
<td></td>
</tr>
</tbody>
</table>
675 Introduction to Clinical Medicine P 0
(Medical History)
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.

677 Physical Diagnosis P 2
Sp. 1 cl., 2 conf. hrs.
Prereq.: Med. 2nd yr. standing.
Seminar sessions demonstrate application of medical history and altered physical findings with the pathophysiology of disease processes. Techniques of otorhinolaryngological and ophthalmological examinations and introductory X-ray diagnosis are taught.

678 Physical Diagnosis P 3
A, W. 2 cl., 4 lab. hrs.
Prereq.: Med. 2nd yr. standing.
Techniques of development of the medical history. Demonstration and practical exercises applying methods of history taking and physical examination on selected clinical patients in University Hospital. Prior and Staff.

679 Medical Genetics P 1
W. 1 cl.
Prereq.: Med. 2nd yr. standing. Zool. 604 or Biol. 604 or equiv.
The practical applications of human heredity to medicine, with special reference to diagnosis, prevention, medico-legal cases, and genetics prognosis. The interaction of heredity and environment in health and disease will be stressed.

715 Ward Clinics in Medicine P 16
Prereq.: Med. 3rd yr. standing.
The course is related to the diagnosis and treatment of hospitalized patients with general and special medical problems. Formal instruction is between 8 a.m. and 6 p.m., but the student is on call throughout the 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 physicians are considered.

736 Dispensary Clinics in Medicine P 13
Prereq.: Med. 4th yr. standing.
The course is related to the diagnosis and treatment of ambulatory patients with general and special medical problems. A medical paper is to be prepared during this course.

749 Medical Specialties P 4
Prereq.: Med. 4th yr. standing.
Instruction in the newer and more advanced techniques of diagnosis and therapy which would have been neither feasible nor possible on the wards or in the clinics.

780 Minor Problems G 1-5
Prereq.: Permission of chairman.
Minor problems. Research is done on a minor problem in medicine under the supervision of members of the faculty of the department.

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

Metallurgical Engineering

Offices: 125 Chemical Engineering Bldg., 140 West 19th Avenue, 114 Lord Hall, 124 West 17th Avenue.
PROFESSORS: FONTANA (Chairman), T. BECK, LESLIE, MUELLER (Emeritus), NOLD (Emeritus), SPEISER, and SPEKNAK. ASSOCIATE PROFESSORS: FRANTZ, HIRTH, POWELL, and WILLIAMS. ASSISTANT PROFESSORS: MOAIZED and RAPP, and INSTRUCTORS.

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 26 weeks of approved work in metallurgical industries. Williams.

501 Foundry Technology U 4
W. 3 cl., 1-2-hr. lab.
Survey of melting procedures, fundamentals of freezing metals, bases in metals, cast structures and properties, production of machine components by casting techniques. Williams.

560 Introductory Metallography U 4
A. 2 cl., 2-3-hr. lab.
Binary phase diagrams. Phase rule. Relationship of microstructure to the phase diagram and to the physical and mechanical properties of binary alloys. Moazed.

611 Elements of Materials Science U 4
W. Su. 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. Powell.

631 Physical Metallurgy II U G 3
Su. 3 cl.
Prereq.: 560. Not for graduate credit to students majoring in Met. E. Polycrystalline aggregates. Alloying of metals and precipitation of second phase. Moazed.

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COURSES OF INSTRUCTION
METALLURGICAL ENGINEERING

632 Physical Metallurgy III U G 4
A. 3 cl., 1 3-hr. lab.
Prereq.: 631.
Not for graduate credit to students majoring in Met. E.

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. Qtrs.
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. 651 or concurs.
Not for graduate credit to students majoring in Met. E.
Introduction to the quantitative description of metallurgical processes including mineral beneficitation. Particular emphasis on

662 Principles of Metallurgical Processes II U G 4
W. 4 cl.
Prereq.: 661, concurs. Chem. 682.
Not for graduate credit to students majoring in Met. E.
Application of the Second Law of thermodynamics and reaction
rate theory to metallurgical processes. Rapp.

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.

703 Advanced Metallography U G 4
W. 3 cl., 1 3-hr. lab.
Prereq.: 632.
Not for graduate credit to students majoring in Met. E.
Determination of phase diagrams. Decomposition of austenite and
the hardenability of steels. Surface-hardening treatments for steels.
Age-hardening alloys. Mazed.

704 Physical Metallurgy IV U G 4
Sp. 3 cl., 1 3-hr. lab.
Prereq.: 703.
Determination of crystal structures of metals. Residual stresses.
Preferred orientation. Phase diagrams. Cold-work and recrystalliza-
tion. Fouell.

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.
g. Foundry.
h. Power metallurgy.

All investigations are under the close direction of instructors.
Comprehensive report required.

712 Metallurgical Thermodynamics U G 3
A. 3 cl.
Prereq.: Chem. 653.
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 equvo.
The physical metallurgy of reactor materials; the effects of
reactor environment on the structure, the physical and mechanical
properties of these materials. Fouell.

720 Advanced Ore Dressing U G 3
W. 3 cl.
Prereq.: 662.
A treatment of the unit operations and design of the flow sheets

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.

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. $prentik.
<table>
<thead>
<tr>
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<th>Credits</th>
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</tr>
</thead>
<tbody>
<tr>
<td>740</td>
<td>Advanced Physical Metallurgy I</td>
<td>U G 3</td>
<td></td>
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<tr>
<td></td>
<td>W. 3 cl.</td>
<td></td>
<td>Prereq.: 704.</td>
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<td></td>
<td>Detailed discussion of nucleation theory, preparation of single crystals, metallic crystals and grains, interpretation of microstructure in terms of interfacial tensions, grain growth, alloying. Mosaic.</td>
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<tr>
<td>741</td>
<td>Advanced Physical Metallurgy II</td>
<td>U G 3</td>
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<tr>
<td></td>
<td>A. 3 cl.</td>
<td></td>
<td>Prereq.: 704.</td>
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<tr>
<td></td>
<td>Diffusion in metals. Powell.</td>
<td></td>
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<tr>
<td>742</td>
<td>Advanced Physical Metallurgy III</td>
<td>U G 3</td>
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<td></td>
<td>Sp. 3 cl.</td>
<td></td>
<td>Prereq.: 740 and 741.</td>
</tr>
<tr>
<td></td>
<td>Classification of phase transformation, precipitation from solid solution, martensitic transformations, decomposition of austenite, order-disorder. Spretnak.</td>
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<tr>
<td>743</td>
<td>Advanced Physical Metallurgy IV</td>
<td>U G 3</td>
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<tr>
<td></td>
<td>A. 3 cl.</td>
<td></td>
<td>Prereq.: 742.</td>
</tr>
<tr>
<td></td>
<td>Relation of properties to microstructure. Mosaic.</td>
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<tr>
<td>745</td>
<td>Shaping and Forming of Metals</td>
<td>U G 3</td>
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<td></td>
<td>W. 3 cl.</td>
<td></td>
<td>Prereq.: 735.</td>
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<tr>
<td></td>
<td>Fundamental aspects of deformation of metals by forging, rolling, wire drawing, tube drawing, extrusion, piercing, and deep drawing. Spretnak.</td>
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<tr>
<td>759</td>
<td>Engineering Metallurgy I</td>
<td>U G 3</td>
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<td></td>
<td>A. 3 cl.</td>
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<td>Prereq.: 703.</td>
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<tr>
<td></td>
<td>Basic properties of metals and alloys, cost structure, design factors, specifications, statistical methods. Selection of metals and alloys, service failures. Spretnak.</td>
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<tr>
<td>760</td>
<td>Engineering Metallurgy II</td>
<td>U G 3</td>
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<tr>
<td></td>
<td>W. 3 cl.</td>
<td></td>
<td>Prereq.: 759.</td>
</tr>
<tr>
<td></td>
<td>Continuation of 759. Spretnak.</td>
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<tr>
<td>761</td>
<td>Principles of Extractive Metallurgy I</td>
<td>U G 3</td>
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<tr>
<td></td>
<td>W. 3 cl.</td>
<td></td>
<td>Prereq.: 663, 712, or permission of instructor.</td>
</tr>
<tr>
<td></td>
<td>Unit processes in metal extraction and refining. St. Pierre.</td>
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<tr>
<td>762</td>
<td>Principles of Extractive Metallurgy II</td>
<td>U G 4</td>
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<tr>
<td></td>
<td>Sp. 3 cl., 1-3-hr. lab.</td>
<td></td>
<td>Prereq.: 761.</td>
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<tr>
<td>763</td>
<td>Process Metallurgy</td>
<td>U G 3</td>
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<td></td>
<td>W. 3 cl.</td>
<td></td>
<td>Prereq.: 762.</td>
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<tr>
<td>770</td>
<td>Theory and Properties of Metals</td>
<td>U G 3</td>
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<tr>
<td></td>
<td>Sp. 3 cl.</td>
<td></td>
<td>Prereq.: 704, Chem. 683, and Math. 544, or permission of instructor.</td>
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<tr>
<td></td>
<td>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. Speizer.</td>
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<tr>
<td>771</td>
<td>Theory and Properties of Metals</td>
<td>U G 3</td>
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<tr>
<td></td>
<td>A. 3 cl.</td>
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<td>Prereq.: 770.</td>
</tr>
<tr>
<td></td>
<td>Continuation of 770. Speizer.</td>
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<tr>
<td>772</td>
<td>Theory and Properties of Metals</td>
<td>U G 3</td>
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<td></td>
<td>W. 3 cl.</td>
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<td>Prereq.: 771.</td>
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<td></td>
<td>Continuation of 771. Speizer.</td>
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<tr>
<td>774</td>
<td>Electrical Properties as Related to Materials Science</td>
<td>U G 3</td>
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<td></td>
<td>Sp. 3 cl.</td>
<td></td>
<td>Prereq.: Elec. E. 769, or permission of the department.</td>
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<tr>
<td></td>
<td>Relationship of crystal structure, defect structures, and deformation to the electrical properties of metals, alloys, insulators, and semiconductors. Diffusion and nucleation. Hirth.</td>
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<tr>
<td>780</td>
<td>Structures of Metals and Alloys</td>
<td>U G 3</td>
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<td></td>
<td>W. 3 cl.</td>
<td></td>
<td>Prereq.: 632 and 704, Math. 544, Chem. 683, or permission of instructor.</td>
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<tr>
<td>790</td>
<td>Energetics and Kinetics of Surfaces</td>
<td>U G 3</td>
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<td>Sp. 3 cl.</td>
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<td>Prereq.: 712 or equiv.</td>
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<tr>
<td></td>
<td>Discussion of properties of interfaces and their role in rate processes. Mosaic.</td>
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<tr>
<td>801</td>
<td>Graduate Seminar</td>
<td>G 1</td>
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<td></td>
<td>Repeatable to a maximum of 6 cr. hrs.</td>
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<td></td>
<td>Discussion of current thesis problems and outstanding current literature in metallurgical engineering. Round table discussion of selected metallurgical topics.</td>
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<tr>
<td>815</td>
<td>Physical Chemistry of Process Metallurgy</td>
<td>G 3</td>
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<td></td>
<td>Sp. 3 cl.</td>
<td></td>
<td>Prereq.: 763 or permission of instructor.</td>
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<tr>
<td></td>
<td>Detailed discussion of current literature related to the refining of metals. St. Pierre.</td>
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<tr>
<td>820</td>
<td>Quantitative Dislocation Theory</td>
<td>G 3</td>
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<td></td>
<td>W. 3 cl.</td>
<td></td>
<td>Prereq.: Math. 544 and permission of instructor.</td>
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<tr>
<td>830</td>
<td>Point Defects in Crystalline Materials</td>
<td>G 3</td>
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<td></td>
<td>Sp. 3 cl.</td>
<td></td>
<td>Prereq.: 712 and 730 or equiv., or permission of instructor.</td>
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<td></td>
<td>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.</td>
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<tr>
<td>8331</td>
<td>Theory and Properties of Metals</td>
<td>G 3</td>
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<td>A. 3 cl.</td>
<td></td>
<td>Prereq.: 772 or Elec. E. 769, or permission of instructor.</td>
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<tr>
<td></td>
<td>Continuation of 770-771-772. Speizer.</td>
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</tbody>
</table>
Courses of Instruction
Metallurgical Engineering

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. Spectroscopy.

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. Speier.

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: M. IRKELAND (Chairman), D. DODD, HUDSON (Emeritus), J. D. MACPHERSON, IR. DINDLES, IR. MEHLS, J. W. RIDDLE, H. A. SLAW, ISTAKH, J. W. VIEEGER, and WOOLPERT.
ASSOCIATE PROFESSORS: R. BOYD and J. F. CORMO, ASSISTANT PROFESSORS: ORPENNING, DUGAN, KINSLEY, IR. KREGER, and WEAKER.

For related courses see Biology.

409 Microbiology for Dental Hygienists U 4
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, antisepsis, and disease prevention. Stahl, Mye, and Assistant.

509 Microbiology in Relation to Man U 5
Su, A, W, Sp. 3 cl., 2 3-hr. lab.
Prereq.: 10 hrs. of natural science.
Not open to students with credit for 600 level courses in Microbiol.
Not to be taken concurrently 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. Birkenland, Boye, Mye, Stahl, Weis, and Assistant.

510 Microbiology for Nurses U 5
Su, W. 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 applications to nursing. Stahl, Weis, Weis, and Assistant.

511 General Microbiology U 5
A. 3 cl., 6 lab. hrs.
Prereq.: Superior performance in biol., chem., and math. in high school and permission of instructor.
A special course for first year college students. Morphologic and physiologic characteristics of microorganisms. Stahl, Boyd, Kinsley, Randles.

512 General Microbiology U 5
W. 3 cl., 6 lab. hrs.
Prereq.: Superior performance in biol., chem., and math. in high school and permission of instructor.
A special course for first year college students. Genetics and ecology of microorganisms. Stahl, Boyd, Kinsley, Randles, and Assistant.

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 P G 5
W. 3 cl., 2 2-hr. lab.
A study of the mechanism of infection and resistance to disease, followed by discussion and laboratory exercises on characteristics of bacteria pathogenic for animals. Kreiter, Ross, and Assistant.
603 Veterinary Microbiology

Sp. 3 cl., 3 2-hr. lab.
Continuation of Microbiol. 602. Lectures and laboratory exercises deal with the characteristics of bacteria, fungi, rickettsiae, and viruses that are pathogenic for animals. Kreier, Ross, and Assistants.

605 Basic Microbiology for Science

UG 5

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. Stehly and Assistants.

607 General Microbiology

UG 5

Su, A, W. Sp. 3 cl., 3 2-hr. lab.
May not be taken concur. with 509.
Not for graduate credit to students majoring in Microbiol.
Not open to students with credit for 500.
The characteristics of microorganisms, and their applications in everyday processes; experience in isolating and identifying bacteria. Stehly, Boyd, Dugan, Kinlay, Kreier, Randles, Weiler, and Assistants.

608 Introduction to Pathogenic Microbiology

UG 3

Sp. 3 cl.
Prereq.: 607.

A general course dealing with the mechanism of infection and resistance, and the epidemiology of microbial diseases of man. Sirkland, Rhode.

610 Dairy Microbiology

UG 3

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. Weiler.

611 Dairy Microbiology: Laboratory

UG 3

W. 3 2-hr. lab.
Prereq.: or concur.: 610.
A study of standard methods used to control microorganisms discussed in Microbiol. 610. Normal and abnormal fermentation are studied in detail. Weiler and Assistants.

622 Principles of Infection and Resistance

UG 3

Su, A, W. Sp. 3 cl.
Prereq.: 607 or equiv.

A study of host-parasite relationships, with emphasis on pathogenicity and immunity. Dodd, Charpentier.

623 Serology

UG 5

Su, A, W. Sp. 3 cl., 3 2-hr. lab.
Prereq.: or concur.: 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, Charpentier and Assistants.

633 Advanced General Bacteriology

UG 5

A. 3 cl., 2 3-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. Randles, Boyd, and Assistants.

634 Sanitary Microbiology

UG 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. Dujon and Assistant.

635 Physiology of Bacteria

UG 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.

636 Food Microbiology

UG 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. Weiler, Kinlay.

637 Food Microbiology Laboratory

UG 3

A. 3 2-hr. lab.
Prereq.: 607, 636 or concur. 608, or 654 or 659 or equiv. recommended or concur.
Laboratory work on organisms discussed in Microbiol. 636. Weiler, Kinlay and Assistant.

638 Physiology of Bacteria

UG 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.

641 Medical Microbiology

UG 3

Sp. 3 cl., 8 lab. hrs.
Prereq.: Med. 1st yr. standing.

642 Medical Microbiology

UG 3

A. 4 cl., 4 lab. hrs.
Prereq.: Med. 2ndy. standing, 641.
Continuation of Microbiol. 641, including a consideration of the pathogenic fungi and the viruses. Weiser and Assistants.

649 Viruses

UG 3

W. 3 cl.
Prereq.: 622 and 623, and 654 or 659, or equiv.
The nature and action of viruses as ultra-microscopic parasites of man, animals, and plants. Randles, Kreier.

652 General and Pathogenic Microbiology for Dental Students

UG 6

W. 4 cl., 3 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. Weiser and Assistants.

654 Pathogenic Bacteriology

UG 5

A. Sp. 3 cl., 3 2-hr. lab.
Prereq.: 607 and 622.
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. Rheims and Assistants.
659 Pathogenic Bacteriology U G 5
Su. W. 3 cl., 3 2-hr. lab.
Prereq.: 082.
A study of the mycobacteria, Corynebacteria, oblastococci, Pasteurella, and spirochetes causing diseases of man with epidemiologic and immunologic relations. Rhesus and assistant.

701 Minor Investigations U G 1-5
Su. A. W., Sp.
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 U G 3 Fields
Sp. (Lectures, cons., and library work.)
Prereq.: Microbiol. advanced 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.: 633, 654, 659, 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. Kreier and assistants.

722 Immunology G 3
Sp.
Prereq.: 622, 623, 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. Randall, Boyd.

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 808.

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

898 Interdepartmental Seminar in Nutrition G 1 and Food Technology
Sp.
(See under Interdepartmental Seminars)
A-160

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 VAUGHN and STAFF.

BASIC MILITARY SCIENCE (FRESHMEN 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.
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.
Prereq.: 402, 403.
Application of basic principles of map reading, emphasizing terrain, evaluation, including map symbols, military grid system, and elementary aerial photograph reading. Military drill and command.

502 U.S. Army and National Security U 2
W. 1 2-hr. cl., 1 drill hr.
Prereq.: 491, 492, 493.

503 Introduction to Operations and Basic Tactics U 2
Su, Sp. 1 2-hr. cl., 1 drill hr.
Prereq.: 402, 403.
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.
Mineralogy

Office: 149 Lord Hall, 124 West 17th Avenue.

PROFESSOR FOSTER (Chairman); ASSOCIATE PROFESSORS LEHLERS and WENDEN; ASSISTANT PROFESSOR TSCHIMMORTOR.

506 Principles of Mineralogy
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, Tetenhorst.

511 Crystallography and Descriptive Mineralogy
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 identification of about 100 of the most important minerals. Emphasis on crystalchemical principles. Tetenhorst, Wenden.

512 Crystallography and Descriptive Mineralogy
W. 3 cl., 2 2-hr. lab.
Prereq.: 511.
Continuation of 511.

601 Advanced Crystallography
A. 3 cl., 2 2-hr. lab.
Prereq.: 506, 511, or eqv.


605 Thermochemical Mineralogy
A. (4 cr. hrs.), Sp., (5 cr. hrs.), 4 or 5 cl.
Prereq.: Chem. 683 or eqv., 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
Sp. 3 2-hr. lab.
Prereq.: 506 or 512, 621.

Application of the petrographic microscope to the study of opaque minerals and ores, their identification, textures, and paragenesis. Polished section preparation, etch tests, and micro-chemical tests. Wenden.

621 Microscopic Mineralogy
A, W. 2 cl., 3 2-hr. lab.
Prereq.: 506 or 512, and Physics 412 or eqv. A, Geol. graduates; W, Cer. E. majors.
Not open to students with credit for 625.

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<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
<th>Description</th>
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<tr>
<td>701</td>
<td>Mineralogical Investigations</td>
<td>U G 3-5</td>
<td>A, W, Sp. 6-19 hr. lab. and conf. 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. Wendell, Ehlers, Foster, Tettenhorst.</td>
</tr>
<tr>
<td>706</td>
<td>Advanced Thermochemical Mineralogy</td>
<td>U G 3</td>
<td>W. 3 cl. Derivation and interpretation of phase diagrams of ternary and quaternary systems of importance in petrology and technology. Foster.</td>
</tr>
<tr>
<td>725</td>
<td>Advanced Optical Mineralogy</td>
<td>U G 3</td>
<td>A. 3 2-hr. lab. Theory and determination of optical constants and directional features using Universal Stage. Includes determination of optic angles, feldspar compositions, double variation technique and petrofabric analysis. Ehlers.</td>
</tr>
<tr>
<td>730</td>
<td>Clay Mineralogy</td>
<td>U G 3</td>
<td>Sp. 3 cl., conf. Prereq.: 754 and Chem. 683, 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. Wendell.</td>
</tr>
<tr>
<td>755</td>
<td>Crystallochemical Mineralogy</td>
<td>U G 3</td>
<td>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. Wendell.</td>
</tr>
<tr>
<td>801</td>
<td>Seminar in Mineralogy</td>
<td>G 1-3</td>
<td>A, W, Sp. 2-6 hr. conf. Repeatable to a maximum of 9 cr. hrs. Conference and reports on the developments in mineralogical research and their application to the problems of mineralogy and mineral technology.</td>
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**Mining Engineering**

Office: 212 Lord Hall, 124 West 17th Avenue. ASSOCIATE PROFESSOR FRANZ.

<table>
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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>431</td>
<td>Industrial Work</td>
<td>U 5</td>
<td>A. Ten weeks of approved summer work in the mining industries. A written report on the operation and design of the plant, including flow sheet and drawings, is required by November 1. Employer evaluation letter is required. Frantz.</td>
</tr>
<tr>
<td>504</td>
<td>Introduction to Mining Engineering</td>
<td>U 3</td>
<td>Sp. 3 cl. Prereq.: Prof. Div. 1st yr. standing. Frantz.</td>
</tr>
<tr>
<td>602</td>
<td>Explosives and Rock Work</td>
<td>U G 3</td>
<td>Sp. 3 cl. Prereq.: Chem. 406, Geol. 416 or 435. Not for graduate credit to students majoring in Min. E. Explosives and the principles of application to mining. Vernier.</td>
</tr>
<tr>
<td>632</td>
<td>Inspection Trip</td>
<td>U 2</td>
<td>A. Prereq.: Min. E. Prof. Div. 3rd yr. standing. A trip to coal, metallic, and non-metallic mines plus mineral processing and preparation plants. A written report is required by November 1.</td>
</tr>
</tbody>
</table>
704 Mine Gases and Ventilation  U G 3
A. 3 cl.
Prereq.: 603, Civil E. 611, Chem. 681.
The principal mine gases including poisonous and explosive gases. Principles of fluid mechanics as they apply to ventilation of mines. Verner.

707 Mining Plant Engineering  U G 4
A. 3 cl., I 3-hr. lab.
Principles of mining haulage, hoisting, pumping, and energy transmission systems. Applications to mining problems. Frantz, Verner.

708 Mining Plant Engineering  U G 3
W. 3 cl.
Prereq.: 707.
Continuation of 707. Frantz, Verner.

709 Mining Plant Engineering  U G 3
Sp. 3 cl.
Prereq.: 708.
Continuation of 708. Frantz, Verner.

750 Mining Investigations  U G 2-10
Prereq.: Prof. Div. 2nd yr. standing or permission of instructor. Repeatable to a maximum of 12 cr. hrs.
Frantz, Verner.

801 Mine Planning and Design  G 3-10
Prereq.: Satisfactory background in mining engineering, mineral beneficiation, and the earth sciences, and permission of instructor.
Engineering analysis and design of a mining property. Frantz and Staff.

950 Research in Mining Engineering  G Arr.
Research for thesis purposes only.

Music

Preceding the class sections of Mus 401 and Mus 408 A, B, C, D, E, 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.) Student 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  U 0
(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.

400A Piano

400B Voice

400C Strings

400D Woodwinds

400E Brass

400G Percussion

400 Introduction to Music  U 1
2 cl. for 3 qtrs. (400 K, L, M) section meetings, or concert attendance each week for all freshmen. Attendance at twenty-seven concerts or recitals for 3 qtrs. (400 N, P, R) on a cumulative basis for all sophomores. A final grade for credit will be given at the end of the 6th qtr.
(Include letter with number on schedule card.)
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. Mooney.

<table>
<thead>
<tr>
<th>Orientation</th>
<th>Concert Attendance</th>
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</thead>
<tbody>
<tr>
<td>400K</td>
<td>400N</td>
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<tr>
<td>400L</td>
<td>400P</td>
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<tr>
<td>400M</td>
<td>400R</td>
</tr>
</tbody>
</table>

Concerts and recitals approved for attendance credit include all Meshon Auditorium and Hughes Hall events.

400X+ Review of the Fundamentals of Music  U 0
Theory
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.: Passing of Placement Tests or 400X.
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.

A-163
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
trichords. Theory Staff.

404 Introduction to Music  U 3
Su., A, W, Sp. 3 cl.
Prereq.: Not for credit to Mus. majors. A musical back-
ground is not required.
A consideration of the materials of music and important styles,
forms, and composers from the Baroque to the present. Mann,
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, or G. Concur: 400 K, L, or M. Required of students
in all Music Curricula to a minimum of 6 qtr. hrs.
Instruction in Applied Music for the purpose of developing mu-
sicanship, performance, and a wide reading knowledge of music
literature. A brief survey of the history of the instrument and
its literature will be made.
Instruction is given in individual lessons for 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 in-
utsional 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, Sorel.

408B Voice
Su. (either term) (1 cr. hr.), A, W, Sp. (2 cr. hrs.) Gilliland, Staiger, Muschick, Diercks, Dibble, Reims.

408C Strings

408D Woodwinds

408E Brass
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 cl.
Prereq.: 404.
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
W, Sp. 3 cl.
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, F, or R.
Instruction in Applied Music for the purpose of developing musi-
canship, 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 instruc-
tional 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, Sorel.

508B Voice
Su. (either term) (1 cr. hr.), A, W, Sp. (2 cr. hrs.) Gilliland, Staiger, Muschick, Diercks, Dibble, Reims.

508C Strings

508D Woodwinds

508E Brass
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. Concur: 400 N, F, or R. Performance in applied music at the professional
level.
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 instruc-
tional facilities by permission of the Director of the School of
Music.

509A Piano

509B Voice

509C Strings

509D Woodwinds

509E Brass
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  
Su. (either term) (1 cr. hr.), 4 cl., A, W, Sp.  
(1 or 2 cr. hrs.), 2 or 4 cl. Anawalt.

511B Voice  
Su. (either term) (1 cr. hr.), 4 cl., A, W, Sp.  
(1 or 2 cr. hrs.), 2 or 4 cl. Gilliland, Manley.

511C Strings  

511D Woodwinds  
Su. (1st term), (1 cr. hr.), Sp. (2 cr. hrs.), 4 cl. Wilson.

511E Brass  
W. (2 cr. hrs.), 4 cl. Evans, Suddendorf, Kears.

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.

514 Music for Group Recreation  
U 2  
Sp. 3 hrs.  
Prereq.: 511.

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. Seaton.

515 Fundamentals of Opera  
U 2  
A, W. 4 lab. 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 lab. hrs.  
Prereq.: 403.

Sight-singing, dictation, and keyboard harmony.

518 Ear-Training II  
U 2  
W. 4 lab. hrs.  
Prereq.: 517 and 537.

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 materials and teaching procedures for this level. Thomas, Ramsey.

523 Music for Children  
U 3  
W. 3 cl.  
Prereq.: 522.

Not open to students with credit for 623.

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  
Sp. 4 cl.  
Prereq.: 523.

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. Barr, Ramsey.

527 Harmony I  
U 3  
A. 3 cl.  
Prereq.: 403.

Seventh chords, common-chord modulation, borrowed tones and borrowed chords.

528 Harmony II  
U 3  
W. 3 cl.  
Prereq.: 527.

Secondary dominants, modulation to remote keys and elementary instrumentation.

529 Harmony III  
U 3  
Sp. 3 cl.  
Prereq.: 528.

Chromatic chord forms, chromatic modulation, composition.

530 Form and Analysis  
U 3  
Su. A. 3 cl.  
Prereq.: 529.

Introduction to the study of the formal structure of music. Kuehlewska, McClure, Vedder.

532 Instrumentation  
U 3  
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  
U 3  
A, W. 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  U  4
W.  4 cl.
Prereq.: 522.
The function of instrumental music in the junior and senior high school and the introduction to music materials and teaching procedures for this level. Reiner, Wilson.

546 Survey and Appreciation of Music  U  2
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  U  3
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 Staff.

548 Music Education  U  3
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  U  3
A.  4 cl., 1 lab. hr.
Prereq.: 403.
The development of music from the earliest times through the sixteenth century. Davie.

552 Music History  U  3
W.  4 cl., 1 lab. hr.
Prereq.: 551.
The development of music in the seventeenth and eighteenth centuries. Davie.

553 Music History  U  3
Sp.  4 cl., 1 lab. hr.
Prereq.: 552.
The development of music in the nineteenth and twentieth centuries. Davie.

562 Counterpoint  U  3
A.  3 cl.
Prereq.: 529.
A fundamental course in counterpoint including species counterpoint, double counterpoint, imitation, and two-voice canon. Barnes.

576 Field Experience in Church Music  U  2
Prereq.: 540 and 671, or concur. 671.
Repeatable to a maximum of 6 cr. hrs.
Supervised experience in the actual church situation. Held.

581 Composition  U  3
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. Livingston.

602 The Opera  U  G  3
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. Reims.

603 Modern Music  U  G  3
Su.  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
Su, A.  3 cl.
Prereq.: 530 or 552 and 553.
Vocal and instrumental music of the middle and late eighteenth century. Davie.

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. Kuechfuehs.

610* Piano Literature  U  G  3
Su (1st term), Sp.  3 cl.
Prereq.: 530 or 562 and 553.
A study of the piano sonata and other characteristic forms from the pre-piano period to the present time. Huddaf, Sorel.

611 The Baroque Era  U  G  3
Sp.  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. Hoppin.

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.
The Literature of Chamber Music  U G 3
Sp.  3 cl.
Prereq.: 530 or 569 and 553.
A survey of chamber music of the Classic and Romantic periods. Livingston.

Symphonic Literature  U G 3
W.  3 cl.
Prereq.: 530 or 569 and 553.
A survey of orchestral music from the classic period to the present.  Muster.

Individual Composers: Their Lives and Works  U G 3
Sp.  3 cl.
Prereq.: 530 or 569 and 553.
A comprehensive study of the works of an individual composer. Topic varies from year to year. 1964-65: Beethoven. History Staff.

Introduction to Bibliographic Method  U G 3
Su, A.  3 cl.
Prereq.: 530 or 582 and 553.
The collection, examination and documentation of information about music. Including general as well as music library materials. Muster.

Basic Concepts in Music Education  G 3
Su (1st term), A.  3 cl.
Prereq.: Ed. 530 or 536.
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.

Music Education in the Elementary School I  G 3
A.  3 cl.
The role of the general vocal music program in elementary schools including the relationship of music to the total learning program. Ramsey.

Music Education in the Elementary School II  G 3
Su (1st term).  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.

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.

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.

General Music I  G 3
Su (1st term).  5 cl.
Prereq.: Graduate standing or permission of instructor.
Designed to prepare teachers of general music courses in junior and senior high schools. Ramsey.

General Music II  G 3
Su (1st 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. Barr.

Form and Analysis  G 3
Su, W.  3 cl.
Prereq.: 530 and 553.
An analytical study of larger compositions from the Classic and Romantic literature. Barnes.

Orchestration  U G 3
Su, A.  3 cl.
Prereq.: 532.
Scoring for the concert band. Barnes.

Orchestration  U G 3
Su, A.  3 cl.
Prereq.: 532.
Scoring for the orchestra. Barnes.

Principles and Practices in Instrumental Music Education  G 3
Su (2nd term), W.  5 cl.
The role of instrumental music in the public schools; relationship to society, and the total music program, historical development, evaluation, and future trends. Benson, Wilson.

The Study and Use of Literature for Instrumental Music Education  G 3
W.  3 cl.

Advanced Conducting (Instrumental)  U G 3
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.

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.

Minor Problems  U G 1-5
Prereq.: Permission of instructor.
Investigation of minor problems in the field of music. Graduate Staff.

Research Techniques  U G 2
Su (1st term), A.  3 cl.
Bennier.

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 (2nd term), W. 3 cl.
An analysis of the factors in learning to appreciate and perform music in early childhood and through adult life. Schneider.

662 Counterpoint U G 3
Su (2nd term), W. 3 cl.
Prereq.: 562.
Counterpoint based on the contrapuntal practices of the eighteenth century. Writing of two part inventions. Some work in three-part counterpoint. Barnes, Walker.

663 Fugue U G 3
Sp. 3 cl.
Prereq.: 562.
Detailed study of the fugue; writing of three-voice and four-voice fugues. Walker.

667† Advanced Keyboard Harmony U G 3
W. 3 cl.
Prereq.: 559.
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. Held.

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. Held.

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.

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 concurs.
A study of neums, the development of staff and square notation, primitive systems, rhythmic modes, Franco-Norman notation, and the innovations of Petru de Cruez. Hoppin.

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. Hoppin.

704 Notation of the Late Fifteenth and Sixteenth Centuries G 5
Sp. 3 cl.
Prereq.: 703.
The study of proportions, keyboard notation, and late tablatures. Master.

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. Master.

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 and Bruinema.
Instruction is given in individual lessons of two one-half hour periods each week or the equivalent.

709A Piano
Su. (other term) (2 cr. hrs.), Su. (6 cr. hrs.), A, Sp. (4 cr. hrs.), Haddad, Jones, Mooney, Moore, Sorel.

709B Voice
Su. (other term) (2 cr. hrs.), Su. (4 cr. hrs.) Gilliland, Diercks, Steiger, Reins.

709C Strings

709D Woodwinds

709E Brass

709F Organ

709G Percussion

712 Supervision of Music in the Elementary Schools U G 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 U G 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 U G 3
Su. (2nd term) 5 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 U G 3
Su. (1st term) 5 cl.
Prereq.: Mus. 4th yr. standing.
The teaching of music theory in colleges and secondary schools. Walker.
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<td>Piano Pedagogy</td>
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<td>Vocal Pedagogy</td>
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<td>String Instrument Pedagogy</td>
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<td>Woodwind Instrument Pedagogy</td>
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<td>Advanced Analysis</td>
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<tr>
<td>Problems in Vocal Music</td>
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<td>Problems in Choral Music</td>
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<td>Problems in Instrumental Music</td>
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<tr>
<td>Development of Music Theory I</td>
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<td>Development of Music Theory II</td>
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<td>Composition</td>
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<td>Studies in Medieval Music</td>
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<td>Studies in Renaissance Music</td>
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<td>Studies in Baroque Music</td>
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<td>Studies in Classic Music</td>
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<td>Studies in Romantic Music</td>
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<td>Studies in Modern Music</td>
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<tr>
<td>Advanced Studies in Music</td>
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<tr>
<td>Supervision and Administration of School Music</td>
<td>3</td>
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<tr>
<td>The Instrumental Program in the Public Schools—Elementary Grades</td>
<td>3</td>
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</tbody>
</table>

- Prereq.: Mus. grad. standing.
- Prereq.: Mus. grad. standing and minimum of 6 cr. hrs. of applied study in piano.
- Prereq.: Mus. grad. standing and minimum of 6 cr. hrs. of applied study in vocal music.
- Prereq.: Mus. grad. standing and minimum of 6 cr. hrs. of applied study in string instruments.
- Prereq.: Mus. grad. standing and minimum of 6 cr. hrs. of applied study in brass instruments.
- Prereq.: Mus. grad. standing and minimum of 6 cr. hrs. of applied study in woodwind instruments.
- Prereq.: Permission of instructor.
- Prereq.: Permission of instructor.
- Prereq.: Permission of instructor.
- Prereq.: Permission of instructor.
- Prereq.: Permission of instructor.

- A study of the principal treatises on music theory before 1400. Phelps.
- A study of music theory construction and experimental verification of contemporary theories of music. Poland.
- Creative writing. Analysis, discussion, and employment of devices used in contemporary music. Barnes, Walker.
- Problems and research in music before 1400. Hoppin.
- Problems and research in music between 1400 and 1600. Metter.
- Problems and research in music of the late eighteenth century. Davis.
- Problems and research in music of the nineteenth century. Hoppin.
- Problems and research in music of the twentieth century. Main.

- A study of the principal treatises on music theory before 1400. Phelps.
### Courses of Instruction

**Music**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites/Notes</th>
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<tbody>
<tr>
<td>S50F</td>
<td>The Instrumental Program in the Public Schools—Secondary Grades. Su. (2nd term) (3 cr. hrs.) Schneider.</td>
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<tr>
<td>S30N</td>
<td>Contrapuntal Techniques. A. (3 cr. hrs.) Prereq.: 630 and 633 or permission of instructor. Contrapuntal techniques in the works of twentieth-century composers. Walker.</td>
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<tr>
<td>S80</td>
<td>Seminar in Music G 3 Su, A, W, Sp. 3 cl. Prereq.: Repeatable to a maximum of 15 cr. hrs.</td>
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<tr>
<td>S80C</td>
<td>Music Education. McBride, Schneider.</td>
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</tbody>
</table>

**Campus Music Organizations**

University Campus Music Organizations are open to all students in the University who may receive full credit according to regulations 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 | Su. (1st term) A, W, Sp. Prereq.: Admission by audition only. Oratorio and large choral works are studied and performed. Diercks. |         |                     |

**B. University Orchestras**

1 (1 cr. hr.) Prereq.: Admission by audition and permission of the director. Three or more hrs. rehearsal each week.

| B1 University Symphony Orchestra | Su. (1st term) A, W, Sp. 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. Hardisty. |         |                     |


**C. University Marching Bands**

1 (1 cr. hr.) Prereq.: Admission by audition and permission of the director. Open to men students. Three or more hrs. rehearsal each week.

| C1 University Football Marching Band | A. 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. |         |                     |


**D. University Bands**

1 (1 cr. hr.) Three or more hrs. of rehearsal each week.
D1 The University Concert Band
Su. (1st term).
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.

D2 The University Buckeye Band
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. Keesen, Wilson.

F. Small Ensembles
(1 cr. hr.)
Prereq.: Admission by audition and permission of the director.
Two or more hours of rehearsal each week.

F1 Opera Ensembles

F2 Vocal Ensembles

F3j Radio Ensembles
A, Sp.

F4 String Ensembles

F5 Woodwind Ensembles

F6 Brass Ensembles

F7 Miscellaneous Ensembles

J. Choral Music
Sp. 2 cr.
A choral music laboratory designed to provide experience in teaching music through practice in the selection and presentation of literature and the critique of teaching performance. Barr.

K. Instrumental Music
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. Bena, Burkhalter.

National Security Policy Studies

Office: 112 Low Bldg., 1659 North High Street.
PROFESSOR: FURNISS.

701 Minor Problems in National Security Policy
UG 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
UG 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; study of literature in field; identification of major problem areas. Sherman and Staff.

703 Problems in National Security
UG 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 of social science analytical techniques. Barber.

801 Seminar in National Security Research
UG 3-5
Sp. 1 cr.
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, 543.

Third Year:
Line candidates—641, 642, 643.
Marine candidates—651, 653.
Supply candidates—661, 663, 665.

Fourth Year:
Line candidates—741, 742, 743.
Marine candidates—751, 752, 753.
Supply candidates—761, 762, 765.

A-171
### COURSES OF INSTRUCTION

#### NAVAL SCIENCE

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Hours</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>441</td>
<td>Naval Orientation</td>
<td>U 3</td>
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<tr>
<td></td>
<td>A. 3 cl., 1 2-hr. lab.</td>
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<tr>
<td></td>
<td>The basic study of naval lore, covering organization, customs, discipline, vessels of the U.S. Navy, introduction to seamanship, leadership, and tactics.</td>
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<tr>
<td>442</td>
<td>Naval History, Part I</td>
<td>U 3</td>
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<td></td>
<td>W. 3 cl., 1 2-hr. lab.</td>
<td></td>
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<td>Prereq.: 441</td>
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<tr>
<td></td>
<td>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.</td>
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<tr>
<td>443</td>
<td>Naval History, Part II</td>
<td>U 3</td>
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<td></td>
<td>Sp. 3 cl., 1 2-hr. lab.</td>
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<td>Prereq.: 442</td>
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<tr>
<td></td>
<td>The continued study of Naval History from the beginning of World War I to the present time.</td>
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<td>541</td>
<td>Naval Weapons, Part I</td>
<td>U 3</td>
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<td></td>
<td>A. 3 cl., 1 2-hr. lab.</td>
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<td></td>
<td>A broad basic study of naval gunnery, including the fire control problem. An introduction to anti-submarine warfare.</td>
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<tr>
<td>543</td>
<td>Naval Weapons, Part II</td>
<td>U 3</td>
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<td></td>
<td>Sp. 3 cl., 1 2-hr. lab.</td>
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<td>Prereq.: 541</td>
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<tr>
<td></td>
<td>More advanced study of Naval Weapons and their employment, including guided missiles and nuclear weapons, and a basic study of the technology of space.</td>
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<tr>
<td>641</td>
<td>Naval Operations</td>
<td>U 3</td>
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<td></td>
<td>A. 3 cl., 1 2-hr. lab.</td>
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<tr>
<td></td>
<td>A study of fleet operations, including tactics, tactical communications, meteorology. Rules of the Nautical Road, and the principles of relative motion.</td>
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<tr>
<td>642</td>
<td>Naval Operations and Introduction To Navigation</td>
<td>U 3</td>
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<td></td>
<td>W. 3 cl., 1 2-hr. lab.</td>
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<tr>
<td></td>
<td>A study of the Naval Communications system, shipboard organization, administration and the electronic and dead reckoning methods of marine navigation.</td>
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<tr>
<td>643</td>
<td>Celestial Navigation</td>
<td>U 3</td>
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<td></td>
<td>Sp. 3 cl., 1 2-hr. lab.</td>
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<tr>
<td></td>
<td>The determination of position by celestial methods of navigation.</td>
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<tr>
<td>651</td>
<td>Evolution of the Art of War, Part I</td>
<td>U 3</td>
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<td></td>
<td>A. 3 cl., 1 2-hr. lab.</td>
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<tr>
<td></td>
<td>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.</td>
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<tr>
<td>652</td>
<td>Evolution of the Art of War, Part II</td>
<td>U 3</td>
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<td></td>
<td>W. 3 cl., 1 2-hr. lab.</td>
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<tr>
<td></td>
<td>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.</td>
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<tr>
<td>653</td>
<td>Modern Basic Military Strategy and Tactics</td>
<td>U 3</td>
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<td></td>
<td>Sp. 3 cl., 1 2-hr. lab.</td>
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<td></td>
<td>A survey of modern strategical and tactical principles, and current military developments.</td>
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<tr>
<td>661</td>
<td>The Navy Supply System and Supply Management Afloat, Part I</td>
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<td></td>
<td>A. 3 cl., 1 2-hr. lab.</td>
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<td></td>
<td>A study of the system of procurement, control and distribution of materials required by the Navy; introduction to Supply Management procedures afloat.</td>
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<tr>
<td>662</td>
<td>Supply Management Afloat, Part II</td>
<td>U 3</td>
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<td></td>
<td>W. 3 cl., 1 2-hr. lab.</td>
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<td></td>
<td>A continuation of supply management afloat, including the procedures for receipt and storage of stock and the naval accounting system afloat.</td>
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<tr>
<td>663</td>
<td>Supply Management Afloat, Part III</td>
<td>U 3</td>
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<td></td>
<td>Sp. 3 cl., 1 2-hr. lab.</td>
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<tr>
<td></td>
<td>A continuation of the study of supply management afloat, including the expenditure and control of material and financial management afloat.</td>
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<tr>
<td>741</td>
<td>Naval Engineering</td>
<td>U 3</td>
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<td></td>
<td>A. 3 cl., 1 2-hr. lab.</td>
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<td></td>
<td>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.</td>
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<td>742</td>
<td>Naval Engineering and Introduction to Naval Administration</td>
<td>U 3</td>
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<td>W. 3 cl., 1 2-hr. lab.</td>
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<td></td>
<td>A study of electricity, naval auxiliary systems and shipboard organization and administration.</td>
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<td>743</td>
<td>Naval Administration</td>
<td>U 3</td>
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<td></td>
<td>Sp. 3 cl., 1 2-hr. lab.</td>
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<td></td>
<td>Uniform Code of Military Justice. The psychology of human relations and the techniques of leadership; career planning.</td>
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<td>751</td>
<td>Amphibious Warfare, Part I</td>
<td>U 3</td>
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<td></td>
<td>A. 3 cl., 1 2-hr. lab.</td>
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<tr>
<td></td>
<td>The history of amphibious warfare and its development from Gallipoli through Korea.</td>
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<tr>
<td>752</td>
<td>Amphibious Warfare, Part II</td>
<td>U 3</td>
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<td></td>
<td>W. 3 cl., 1 2-hr. lab.</td>
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<td></td>
<td>A familiarization with the doctrinal techniques and present concepts of amphibious warfare including the planning phase.</td>
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<tr>
<td>753</td>
<td>Leadership and the Uniform Code of Military Justice</td>
<td>U 3</td>
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<tr>
<td></td>
<td>Sp. 3 cl., 1 2-hr. lab.</td>
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<td></td>
<td>Survey of the UCMJ and a study of the psychology of human relationships and techniques of leadership as applied by Marines.</td>
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<tr>
<td>761</td>
<td>Retail Sales</td>
<td>U 3</td>
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<td></td>
<td>A. 3 cl., 1 2-hr. lab.</td>
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<td></td>
<td>A study of the clothing and small stores afloat organization, accounting procedures and related reports; introduction to Ship's Store Afloat.</td>
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<tr>
<td>762</td>
<td>Advanced Retail Sales and Naval Administration</td>
<td>U 3</td>
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<td></td>
<td>W. 3 cl., 1 2-hr. lab.</td>
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<tr>
<td></td>
<td>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.</td>
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</tbody>
</table>
NURSING

Office: School of Nursing, B-201 Starling Loving Hall, 320 West 10th Avenue.

PROFESSOR NEWTON (Director); ASSOCIATE PROFESSORS PEASE, I. SHRICK, I. CHAMBERS, DORSCH, HARRY, LEAZENBEE, LEWIS, IMCDOWELL, IPRIER; ASSISTANT PROFESSORS BALLARD, BELLAM, BUCKERIDGE, CLARK, COLVER, CURRHY, DILLEY, GEIDER, H. JOHNSTON, KRUMAN, KRUSE, MARTIN, MILLER, POLZYN, ROLLER, SCHWARTZ, SHAW, THOMAS, WALLACE, WITTMEYER, and YAUER.

Open only to students registered in the School of Nursing.

421 Nursing Survey U 1
Prereq.: Admission to Gen. Nurs. curriculum.
A course designed to orient the new advanced transfer student to the University, the Health Center, and the School of Nursing.

424 Problems Solving Methods in Nursing U 2
A, W, Sp. 2 cl.
Prereq. or concur.: 421.
Guided use of problem solving methods as a means of meeting patient's 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 (ward 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 (ward 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 gastrointestinal conditions; or diabetes mellitus.

548 Surgical Nursing I U 8
W, Sp. 4 cl. and average of 16 hrs. clinical study per week (ward 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.

591 Basic Clinical Nursing U 4-16
Prereq.: Supervised experience in basic clinical nursing.
This course is designed to meet the needs of graduate nurses in various clinical areas.

591A Obstetric Nursing U 4
Prereq.: Microbiol. 510.

591B Communicable Disease Nursing. U 4

591C Medical Surgical Nursing. U 4

591D Psychiatric Nursing.
Prereq.: 539.

592 Tuberculosis Nursing U 5
Consideration of the total program of medical and nursing care of adult patients with tuberculosis.

602 Public Health Nursing U 5
Su, A, W, Sp. 5 cl.
Prereq. or concur.: 423, Soc. Work 491 and Psychol. 404.
Study of basic concepts underlying public health nursing practice and an introduction to public health organization and services.

610 Management and Supervision in the U G 3
Nursing Unit
W. 2 cl.
Prereq.: 615, Psychol. 401, 404, or 407, and Soc. 401.
Study of the principles of management and supervision used by the head nurse. Students have opportunity to solve management problems of interest to them. Chambers.

611 Analysis and Evaluations of U G 3
Nursing Procedures
Sp. 1 to 2 hr. cl., lab. arr.
Emphasis is on the application of the scientific method of study to the development of sound nursing procedures. Work simplification methods are included. Price.

613 Maternity Nursing U 8
Su, A, W, Sp. 4 cl., and average of 16 hrs. clinical study (ward 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.

614 Pediatric Nursing U 8
Su, A, W, Sp. 4 cl. and average of 16 hrs. clinical study (ward 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.
<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>617</td>
<td>Public Health Nursing</td>
<td>U 5</td>
<td>Su, A, W, Sp. 5 cl.</td>
<td>Prereq.: 591 or eqv., 613, 614, 647, and 848. Not open to students with credit for 602 and 639. A study of the development and trends of public health nursing and the basic principles underlying its practice.</td>
</tr>
<tr>
<td>620</td>
<td>Foundations of Nursing Education</td>
<td>U 3</td>
<td>A, Sp. 3 cl.</td>
<td>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.</td>
</tr>
<tr>
<td>638</td>
<td>Surgical Nursing</td>
<td>U 7</td>
<td>Su. 3 cl. and 30 hrs. clinical experience.</td>
<td>Prereq.: 570, 571, 573, 573 Participation in planning and executing nursing care of patients before, during, and after surgery.</td>
</tr>
<tr>
<td>639</td>
<td>Public Health Nursing</td>
<td>U 7</td>
<td>Su, A, W, Sp. 3 cl., 30 hrs. clinical experience.</td>
<td>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.</td>
</tr>
<tr>
<td>646</td>
<td>Nursing in the Social Order</td>
<td>U 5</td>
<td>A, W, Sp. 5 cl.</td>
<td>Effect of religious, military, secular, and educational influences on the development of nursing; growth of specialized fields; responsibilities and responsibilities in present day practice.</td>
</tr>
<tr>
<td>647</td>
<td>Medical Nursing II</td>
<td>U 8</td>
<td>Su, A, W, Sp. 4 cl. and average of 16 hrs. clinical study (ward 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.</td>
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<tr>
<td>648</td>
<td>Surgical Nursing II</td>
<td>U 8</td>
<td>Su, A, W, Sp. 4 cl. and average of 16 hrs. clinical study (ward 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 genitourinary problems in the setting of the operating room, recovery room, and patient’s units.</td>
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<tr>
<td>663</td>
<td>Nursing Study of The Psychiatric Patient</td>
<td>U G 8</td>
<td>Su, A, W, S. 4 cl. and average of 16 hrs. cl. study.</td>
<td>Prereq.: 613, 614, 647, 648 Nursing study of the psychiatric patient as an interpersonal, problem-solving process. (Conferences, discussions, clinical practice.)</td>
</tr>
<tr>
<td>667</td>
<td>Leadership and Management in Nursing</td>
<td>U G 8</td>
<td>Su, A, W, S. 3 cl. and 20-24 hrs. cl. study per week. Prereq.: 613, 614, 947, 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.)</td>
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<tr>
<td>677</td>
<td>Occupational Orientation to Nursing</td>
<td>U G 10</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>701</td>
<td>Minor Problems in Nursing</td>
<td>U G 1-5</td>
<td>Su, A, W, Sp.</td>
<td>Prereq.: 4 cr. hrs. of 745 and permission of instructor. Reading, conferences, and minor investigations by individual arrangement for qualified students who desire to study a particular nursing problem intensively.</td>
</tr>
<tr>
<td>736</td>
<td>Interpersonal Aspects of Nursing</td>
<td>U G 3</td>
<td>W. 3 cl.</td>
<td>Prereq.: 736. Continuation of 735.</td>
</tr>
<tr>
<td>746</td>
<td>Field Instruction</td>
<td>U G 4-15</td>
<td>A, W, Sp. 2 cl., 4 hrs. clinical experience per cr. hr. Prereq.: Permission of advisor. 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, Pease.</td>
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<tr>
<td>751</td>
<td>Supervision of Nursing Services</td>
<td>U G 5</td>
<td>Sp. 4 cl. and 3 hr. planned observations. Prereq. and concurs.: Grad. standing in nursing service administration curriculum, 730 and Bus. Org. 680. Exploration of major problems of nursing administration at the supervisory level. Includes observation of clinical situations, conferences, field trips, and written reports. Dorach.</td>
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</tbody>
</table>
732 Administration of Nursing Services  U  G  5
Su.  4 cl. and 3 hr. planned observations.
Prereq. or concour.; Grad. standing in nursing service administration curriculum, 751.
Exploration of major problems of nursing administration at the top administrative levels. Includes observations of administrative situations, conferences, field trips, and written reports. Dotsch.

796 Methods of Teaching Nursing  U  C  4
Sp.  4 cl.
Prereq. or concour.; Ed. 607, Nurs. 810 recommended.
Instructional planning for courses in clinical nursing with opportunities to develop teaching-learning units and tools to assess learning outcomes. Pease, Anderson.

802 Research Development in Nursing  G  3
A, Sp.  3 cl.
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, Shank.

810 Curriculum Development  G  5
W.  5 cl.
Prereq.: 646 or equiv. and 4 cr. hrs. of 746.
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.

950 Research in Nursing  G  Arr.
Research for thesis purposes only.

Obstetrics and Gynecology

Office: N-635 University Hospital, 440 West 10th Avenue.
PROFESSORS JULLERY (Chairman), SHOLLENBECK, and MEILING. ASSOCIATE PROFESSORS COPELAND, COX, DALY, HOLZAEFFEL, HUGENBERGER, FAVEY, and WILLIAMS; ASSISTANT PROFESSORS BARRY, BRESCH, BOUTSELIS, deNEEF, EZELL, HAPKE, JACOBY, KEYS, PETTERSON, RUPPERSBERG, SCOTT, SILBEERNAGEL, VOCHER, and ZARTMAN.

736 Clinical Obstetrics and Gynecology  P  16
Prereq.: Med. 4th yr. standing.
Obstetrics. The students will attend the ante-partum clinics in the Out-patient Department where they will perform the obstetric clinical and physical examinations and laboratory tests on all the pre-natal patients. They will assist and receive instruction in the regular work of the clinic including both the normal and pathologic ante-partum patient. In addition, the students are assigned to the obstetric floor of the University Hospital where they follow patients in labor and conduct deliveries. The students are required to keep case records of the labor, delivery, and puerperium of the patients assigned to them. During this time, the students are also assigned in rotation to the nurseries of the maternity division for instruction in the care of the newborn. In addition, the students also make post-partum home calls on those patients to whom they have been assigned during their delivery room service. Daily lectures, conferences, and demonstrations are given to illustrate the various aspects of Obstetrics, both normal and abnormal.

Gynecology. The students will be assigned to clinical work in the Gynecologic Out-Patient Department. The care and management of the ambulatory gynecologic patient, infertility, gynecologic endocrinology, and pelvic malignancies will be stressed. In addition, clinical instruction is received on the gynecologic service of the University Hospital. Students are assigned to patients on admission, obtain and record the histories, perform the physical and pelvic examinations, and make routine laboratory examinations. These cases are presented by the students for discussion during the teaching ward rounds. Daily lectures, conferences, and demonstrations will be given to illustrate the various aspects of Gynecology, both normal and pathologic.

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

780 Minor Problems  P  C  2-5
Prereq.: Adequate preclinical training and permission of instructor.
Clinical, laboratory, conference, and library work in Obstetrics and/or Gynecology.

900 Obstetric and Gynecologic Pathology  G  2-5
Prereq.: Permission of instructor.
Laboratory, conference, and library work. Study of current pathologic specimens with emphasis upon special investigation. Ullery, Meiling, Holtenbeck, Holzaeffel, Williams, Boutsells, Beich.

950 Research in Obstetrics and Gynecology  G  Arr.
Research for thesis purposes only.
COURSES OF INSTRUCTION

OCCUPATIONAL THERAPY

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, pediatric, visual, and auditory disabilities. Locher, visiting 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, visiting neurologist, and orthopedists.

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 616.

617 Occupational Therapy Seminar  U 1
A.  1 cl.
Prereq.: 618.
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 cl. hrs.
A practical experience in application of the principles and functions of occupational therapy in selected hospitals, rehabilitation centers, clinics, curative workshops, and convalescent facilities.

Ophthalmology

Office: University Hospital, Room N-350, 410 West 10th Avenue.
PROFESSORS IMAKLEY (Chairman), BLACKWELL, HAVENER, and IPERRY; ASSOCIATE PROFESSORS ANDREW, BATTLES, LIPETZ, MOSES, QUINN, and ISUE; ASSISTANT PROFESSORS BITONTE, BARTON, BONTLEY, BREDEMEYER, COOK, 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 Minor Problems in Ophthalmology  F G 1-5
Prereq.: Med. 4th yr. standing.
Library, conference, clinic, and laboratory work. Makley and Staff.

800 Seminar in Ophthalmology  G 3-5
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.
Optometry

Office: 111 Optometry Bldg., 338 West 10th Avenue.
PROFESSORS IFRY (Director) and ELLERBROCK; ASSOCIATE PROFESSOR HEIBBARD; ASSISTANT PROFESSOR MOTE and WILD.
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, skiametry, objective and subjective tests of refraction, accommodation, and functions of the extra-ocular muscles. Hubbard.

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 inefficiency. Corrective procedures and prescription writing. Hubbard.

516 Practical Optometry  P 4
Sp. 3 cl., 1 3-hr. lab.
Prereq.: 515.

531 Mechanical Optics  P 4
A. 3 cl., 1 2-hr. lab.
Prereq.: Optom. 4th yr. standing, Physics 412 and, Math. 439.
Classification of ophthalmic lenses; properties of optical elements, manufacture, and testing of optical glass and lenses; system of distribution and stocking; grinding and polishing; measuring refracting power. Esbridge.

532 Mechanical Optics  P 4
W. 3 cl., 1 2-hr. lab.
Prereq.: 531.
Classification, description, manufacture, and distribution of frames and mountings. Laboratory practice in grinding, polishing, and repairing and reconstructing frames and mountings. Esbridge.

533 Mechanical Optics  P 4
Sp. 3 cl., 1 2-hr. lab.
Prereq.: 532.
History and basic theory of ophthalmic lenses, facial measurements; writing specifications for lenses and frames to be assembled. Esbridge.

541 Clinical Practice in Optometry  P 5
Su, A, W, Sp. 2 cl., 3 3-hr. lab.
Prereq.: 516.
Clinical practice in examining eyes and carrying out corrective procedures. The conference periods are devoted to the discussion of problems encountered during the clinic periods. Wild, Hebbard, Esbridge, and Staff.

542 Clinical Practice in Optometry  P 5
Su, A, W, Sp. 2 cl., 3 3-hr. lab.
Prereq.: 541.
Continuation of 541. Wild, Hebbard, Esbridge, and Staff.

543 Clinical Practice in Optometry  P 5
Su, A, W, Sp. 2 cl., 3 3-hr. lab.
Prereq.: 542.
Continuation of 542. Wild, Hebbard, Esbridge, and Staff.

545 Special Clinical Practice  P 3-5
Su, A, W, Sp. 1 cl., 3-4 3-hr. lab.
Prereq.: 516, concurs. 541 and permission of instructor. Repeatable to a maximum of 15 cr. hrs.
Clinical experience in specialized phases of optometric practice, (a) subnormal vision, (b) strabismus, (c) vision in schools and industry, (d) orthotics, (e) contact lenses. Hebbard, Wild, Esbridge and Staff.

555 Applied Pathology of the Eye  P 4
Sp. 3 cl., 1 2-hr. lab.
Prereq.: 516 and Anat. 608.
Advanced ophthalmoscopy, slit lamp microscopy, tonometry, and other methods of detecting pathological conditions. Systematic study of ocular diseases: artificial eyes and other prosthetic devices. Ellerbrock.

556 Applied Pathology of the Eye  P 4
A. 3 cl., 1 2-hr. lab.
Prereq.: 555.
Motor disturbances of eyes, paralytic strabismus, peripheral fixation anomalies, nystagmus, ptosis, ptosis cruribus, anabulau accommodation and pupillary reflexes. Ellerbrock.

557 Applied Pathology of the Eye  P 4
W. 3 cl., 1 2-hr. lab.
Prereq.: 556.
Visual fields: scotometry; subnormal central vision involving pathology; telescopic lenses and aids of subnormal aids for subnormal vision; theory and practice in the use of contact lenses. Ellerbrock.

561 Optometric Economics and Jurisprudence  P 2
W. 2 cl.
Prereq.: 516.
Historical background; legal status; practice building techniques; office accounting and general practice management; representative organization in optometry; professional ethics. Hubbard.

562 Visual Problems in Schools, Industries, etc.  P 2
A. 2 cl.
Prereq.: 516.
Visual screening, tests and survey methods for motorists, school children, industrial workers, etc. visual and vocational efficiency; visual aspects of job analysis and design. Wild.

563 Civic and National Problems in Eye Care  P 2
Sp. 2 cl.
Prereq.: 555.
Number, distribution, supply interrelationships, and roles of the various ophthalmic groups, prevalence of visual anomalies; problems and care of the blind and near blind. Hubbard.

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COURSES OF INSTRUCTION

OPTOMETRY

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 603.
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. Elferbrock.

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. Elferbrock.

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 crotches and other prosthetic devices. Elferbrock.

736 Dispensary Clinics in Otolaryngology
Prereq.: Med. 4th yr. standing.
Students are assigned to clinical work in the Out-Patient Department of University Hospital.

Pathology

Office: M-112 Sterling Living Hall, 320 West 10th Avenue.
PROFESSORS: Von HAAM (Chairman), COLE, DAVIDSON, FRAJOLA, and MAGHERSON; ASSOCIATE PROFESSORS: NIKOLAUS, ILLES, NEWTON, IOLD, PRATT, J. W. RIDDLE, and SCARPPELLI; ASSISTANT PROFESSORS: ADAMSON, BUERGER, CAMPA, CEILEN, DAVIS, IGREIDER, IBUEMER, HURD, KACHMAANN, LOWY, McMillan, MILLER, MURTHY, REINER, SARMINA, SMITH, STEVENSON, and van der HOEVEN.

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. Maepherson, Stevenson.

604 Clinical Pathology
Sp. 2 cl., 1 3-hr. lab.
Prereq.: 603.
Continuation of 603.

624 General and Special Pathology
A. 3 cl., 3 2-hr. lab.
Prereq.: Med. 2nd yr. standing.
Degenerative, circulatory, inflammatory and neoplastic lesions; reactions to injury; pathology of infectious diseases; special study of these changes as they apply to the human organ systems. Von Haam, Scarpelli, and Staff.

625 General and Special Pathology
W. 3 cl., 3 2-hr. lab.
Prereq.: 624.
Continuation of 624.

626 General and Special Pathology
Sp. 3 cl., 3 2-hr. lab.
Prereq.: 625.

630 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.

631 Medical Technology
U 3
A. 3 cl.
Prereq.: Med. Tech.: 4th yr. standing.
Clinical microbiology, serology, parasitology, and mycology. Macpherson and Staff.

Otolaryngology

Office: N-820 University Hospital, 410 West 10th Avenue
PROFESSOR W. H. SAUNDERS (Chairman); ASSOCIATE PROFESSORS: ARTHUR, BIRCK, DEISHLEY, GERSTEN, KRECH, ROTH, SAWYER, SMITH and WEHR.

670 Introduction to Otolaryngology
Sp. 1 cl.
Prereq.: Med. 2nd yr. standing.
A basic course in otolaryngology emphasizing diagnosis and treatment. Motion pictures and color slides are used during each lecture. Saunders.

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<table>
<thead>
<tr>
<th>632</th>
<th>Medical Technology</th>
<th>U 3</th>
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<tbody>
<tr>
<td>Sp.</td>
<td>3 cl.</td>
<td></td>
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<tr>
<td>Prereq.: Med. Tech.; 4th yr. standing.</td>
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<tr>
<td>Clinical blood and tissue chemistry, and modes of investigating diseases by biochemical methods. Grueber and Staff.</td>
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<tr>
<th>633</th>
<th>Medical Technology</th>
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<tbody>
<tr>
<td>W.</td>
<td>3 cl.</td>
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<tr>
<td>Prereq.: Med. Tech.; 4th yr. standing.</td>
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<tr>
<td>Preparation of tissue for histologic examination by frozen and permanent sections; special stain techniques. Macpherson.</td>
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<tr>
<th>636</th>
<th>Medical Technology</th>
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<tbody>
<tr>
<td>W.</td>
<td>2 cl.</td>
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<tr>
<td>Prereq.: Med. Tech.; 4th yr. standing.</td>
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<tr>
<td>The use and interpretation of laboratory tests in medicine. Macpherson and Staff.</td>
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<tr>
<th>637</th>
<th>Medical Technology</th>
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<tr>
<td>Sp.</td>
<td>2 cl.</td>
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<tr>
<td>Prereq.: 636.</td>
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<tr>
<td>Continuation of 636.</td>
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<th>640</th>
<th>Medical Technology Laboratory</th>
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<tr>
<td>Su.</td>
<td>12 lab. hrs.</td>
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<tr>
<td>Prereq.: Med. Tech.; 4th yr. standing.</td>
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<tr>
<td>Laboratory demonstrations and practice in hematologic techniques and clinical microscopy. Stevenson, Watkins.</td>
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<tr>
<th>641</th>
<th>Medical Technology Laboratory</th>
<th>U 9</th>
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<tr>
<td>A.</td>
<td>27 lab. hrs.</td>
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<tr>
<td>Prereq.: Med. Tech.; 4th yr. standing.</td>
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<tr>
<td>Applied techniques and demonstrations in microbiology, immunology, mycology, and parasitology. Macpherson, Sutton.</td>
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<tr>
<th>642</th>
<th>Medical Technology Laboratory</th>
<th>U 9</th>
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<tr>
<td>Sp.</td>
<td>27 lab. hrs.</td>
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<tr>
<td>Prereq.: Med. Tech.; 4th yr. standing.</td>
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<tr>
<td>Demonstrations and applied techniques in the quantitative chemistry of blood and other body fluids. Grueber, Earp.</td>
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<tr>
<th>643</th>
<th>Medical Technology Laboratory</th>
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<tr>
<td>W.</td>
<td>27 lab. hrs.</td>
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<tr>
<td>Prereq.: Med. Tech.; 4th yr. standing.</td>
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<tr>
<td>Tissue technique; mycology and parasitology. Macpherson, Sutton.</td>
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<tr>
<th>644</th>
<th>Medical Technology Laboratory</th>
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<tr>
<td>Su.</td>
<td>15 lab. hrs.</td>
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<tr>
<td>Prereq.: Med. Tech.; 4th yr. standing.</td>
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<tr>
<td>Laboratory demonstrations and practice in blood bank and immunohematologic techniques. Macpherson, Watkins.</td>
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<tr>
<th>645</th>
<th>Fundamentals of Disease</th>
<th>U 3</th>
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<tr>
<td>A.</td>
<td>3 cl.</td>
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<tr>
<td>Prereq.: Med. Tech.; 4th yr. standing.</td>
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<tr>
<td>The nature of disease, mechanisms involved in the disease process, and use of the laboratory in defining the mechanism of disease. Macpherson and Staff.</td>
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<tr>
<th>650</th>
<th>Pathology</th>
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<tr>
<td>A.</td>
<td>3 cl.; 6 lab. hrs.</td>
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<tr>
<td>Prereq.: Optom.; 4th yr. standing; Chem., 551-552; Physiol. 601-602; Anat. 607-608.</td>
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<tr>
<td>General pathology including the etiology of infectious disease, disturbances of nutrition, inflammation, and neoplasia, with special reference to the influence upon ophthalmic pathology; selected chapters of Special Pathology; histologic and gross demonstrations.</td>
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<tr>
<th>651</th>
<th>Ophthalmic Pathology</th>
<th>U 5</th>
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<tr>
<td>W.</td>
<td>3 cl.; 6 lab. hrs.</td>
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<tr>
<td>Prereq.: Optom.; 4th yr. standing, 650.</td>
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<tr>
<td>Gross and microscopic pathology of the eye, including diseases of the conjunctiva, orbital cavity and pertinent pathology of the central nervous system.</td>
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<tr>
<th>653</th>
<th>Clinical Pathology</th>
<th>G 3</th>
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<tbody>
<tr>
<td>W.</td>
<td>2 cl.; 1 3-hr. lab.</td>
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<tr>
<td>Prereq.: Microbiol. 654, 659, Chem. 558 and permission of instructor.</td>
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<tr>
<td>The changes in the blood, urine, feces, sputum, spinal fluid and gastric contents brought about by disease. Macpherson, Stevenson, and Staff.</td>
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<tr>
<th>654</th>
<th>Clinical Pathology</th>
<th>G 3</th>
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<tbody>
<tr>
<td>Sp.</td>
<td>2 cl.; 1 3-hr. lab.</td>
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<tr>
<td>Prereq.: 653.</td>
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<tr>
<td>Continuation of 653.</td>
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<tr>
<th>655</th>
<th>General Pathology</th>
<th>P 5</th>
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<tbody>
<tr>
<td>Sp.</td>
<td>3 cl.; 2 3-hr. lab.</td>
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<tr>
<td>Prereq.: Dent. 2nd yr. standing, Anat. 640 or 634-635.</td>
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<tr>
<td>General pathology, including the etiology of diseases, disturbances of nutrition, inflammation, regeneration, and tumors. Buerger and Staff.</td>
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<tr>
<th>661</th>
<th>General Pathology</th>
<th>G 5</th>
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<tbody>
<tr>
<td>A.</td>
<td>3 cl.; 3 2-hr. lab.</td>
<td></td>
</tr>
<tr>
<td>Prereq.: Permission of instructor.</td>
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<tr>
<td>A detailed study of degenerative, circulatory, inflammatory, and neoplastic lesions; reaction to injury; pathology of infectious diseases. von Haam and Staff.</td>
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<table>
<thead>
<tr>
<th>662</th>
<th>Special Pathology</th>
<th>G 5</th>
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<tbody>
<tr>
<td>W.</td>
<td>3 cl.; 3 2-hr. lab.</td>
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<tr>
<td>Prereq.: 661.</td>
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<tr>
<td>Pathology of the circulatory, respiratory, hematopoietic, gastrointestinal, urogenital, reproductive, endocrine, skeletal and nervous systems. von Haam and Staff.</td>
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<thead>
<tr>
<th>663</th>
<th>Special Pathology</th>
<th>G 5</th>
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<tbody>
<tr>
<td>Sp.</td>
<td>3 cl.; 3 2-hr. lab.</td>
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<tr>
<td>Prereq.: 662.</td>
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<tr>
<td>Continuation of 662.</td>
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<tr>
<th>700</th>
<th>Autopsy Technique</th>
<th>P 1</th>
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<tbody>
<tr>
<td>Su.</td>
<td>A, W, Sp. 1 cl. or 3 lab. hrs.</td>
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<tr>
<td>Prereq.: Med. 3rd yr. standing.</td>
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<tr>
<td>Clinico-pathological conferences held in conjunction with an autopsy or fresh tissue demonstration. Buerger and Staff.</td>
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<tr>
<th>730</th>
<th>Clinico-pathological Conferences</th>
<th>P 1</th>
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<tbody>
<tr>
<td>Prereq.: Med. 4th yr. standing.</td>
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<tr>
<td>A clinico-pathological conference correlating the symptomatology of the most important internal and surgical diseases with organ pathology. von Haam and Staff.</td>
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<tr>
<th>731</th>
<th>Oncology Seminar</th>
<th>P 1</th>
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<tbody>
<tr>
<td>A.</td>
<td>W. 1 cl.</td>
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<tr>
<td>Prereq.: Med. 4th yr. standing.</td>
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<tr>
<td>A clinico-pathological conference correlating the important symptomatology, diagnosis, management, and pathology of the various forms of human cancer. Old and Clinical Staff.</td>
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COURSES OF INSTRUCTION
PATHOLOGY

740 Clinico-pathological Conference G 1
Prereq.: M.D. degree.
Repeatable to a maximum of 8 cr. hrs.
A clinico-pathological conference correlating the symptomatology of the most important internal and surgical diseases with organ pathology. von Haam and Staff.

741 Oncology Seminar G 1
A, W. 1 cl.
Prereq.: M.D. degree.
Repeatable to a maximum of 2 cr. hrs.
A clinico-pathological conference correlating the important symptomatology, diagnosis, management, and pathology of the various forms of human cancer. Old and Clinical Staff.

750 Minor Problems G 2-5
Prereq.: Permission of instructor.
Repeatable to a maximum of 20 cr. hrs.
Minor problems in all fields of pathology and clinical pathology. von Haam and Graduate Teaching Staff.

751 Medico-legal Pathology P G 1
Prereq.: Med. 3rd or 4th yr. standing or M.D. degree.
The pathology of trauma, homicide, sex offenses, and intoxications with special reference to the medico-legal aspects.

756 Biopsy Diagnosis P G 1
Prereq.: Med. 3rd or 4th yr. standing or M.D. degree.
The methods of rapid tissue diagnosis including frozen section, punch biopsy, and aspiration biopsy. Old.

758 Pathology of Tropical Diseases P G 1
Prereq.: Med. 3rd or 4th yr. standing or M.D. degree.
The pathology of diseases encountered in tropical and sub-tropical countries. MacPherson.

759 Geriatrics P G 1
Prereq.: Med. 3rd or 4th yr. standing or M.D. degree.
The pathologic conditions found commonly in old age. von Haam.

861 Pediatric Pathology P G 1
Prereq.: Med. 3rd or 4th yr. standing or M.D. degree.
Study of the lesions most commonly found in early childhood. Newton.

750 Minor Problems P G 3-5
Prereq.: Med. 2nd, 3rd, or 4th yr. standing and permission of instructor.
Minor problems in clinical or special pathology.

800 Seminar in Pathology and Clinical Pathology G 2
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 G Arr.
Research for thesis or dissertation purposes only.

A-180

Pediatrics

Office: Children's Hospital, 561 South 17th Street.
PROFESSORS GRAHAM (Chairman), KNOBLOCH, and H. SHAF- FER, ASSOCIATE PROFESSORS T.AMBUER, FALKENSTEIN, HOSIER, HOSTERMAN, HOWARD, KASMERSKY, McCLAYE, MISSILDINE, NEWTON, SEYMOUR, SOTON, and TURNER; ASSISTANT PROFESSORS AINSWORTH, ANDERSON, APLIN, BALDOCK, BASS, BATTEN, DONALDSON, EBERLY, FERNALD, FILER, FRYE, GOVE, HALE, KONTRAS, McCALL, MEITES, MILLER, RIEFENHOFF, ROBBINS, RUERGER, SCHEIF, SERBAND, SIVON, SYLVESTER, and STITEZ.

670 Pediatrics, Didactic P 2
Sp.
Prereq.: Med. 2nd yr. standing.
Anatomical and physiological characteristics of the normal infant and child, of the newborn and the premature; normal growth and development patterns of infancy and childhood; fundamentals of infant nutrition and feeding. Graham.

713 Basic Science Conferences P 1
Su, A, W, Sp. 1 2-hr. cl.
Prereq.: Med. 3rd yr. standing.
Offered in cooperation with the basic science departments.
The correlation of the basic disciplines of anatomy, biochemistry, physiology, pathology, etc., to the problems of clinical pediatrics. Graham.

715 Ward Clinics in Pediatrics P 16
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.

750 Advanced Pediatrics P G 2
Prereq.: Permission of instructor.
Advanced work in pediatrics including infant feeding, communicable diseases or special problems. Graham.

750 Minor Problems P G 1-5
Prereq.: Med. 4th yr. standing and permission of instructor.
Library, conference, clinic and laboratory work. Graham.

900 Seminar in Pediatrics G 3-5
Prereq.: Permission of instructor.

950 Research in Pediatrics G Arr.
Research for thesis purposes only.
Petroleum Engineering

Office: 335 Chemical Engineering Bldg., 140 West 19th Avenue.
PROFESSOR O'BOURKE (Emeritus), ASSOCIATE PROFESSOR C. SLIDER.

602 Petroleum Geophysical and Drilling Methods
A. 3 cl.
Prereq.: Physics 553 or 413 and Math. 557 or 542 or equiv.
The engineering aspects of the geophysical exploration and drilling for gas and oil. Emphasis is placed on rotary drilling. Slider.

713 Drilling Fluids
U G 3
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. Slider.

723 Physical Analysis of Petroleum Reservoirs
U G 2
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. Slider.

735 Reservoir Engineering—Hydrocarbon Phase Behavior
U G 3
Sp. 2 cl., 2 3-hr. lab.
Prereq.: Chem. E. 754.
Quantitative study of the physical nature and phase behavior of subsurface reservoir fluids. Slider.

736 Reservoir Engineering—Fluid Flow
U G 3
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. Slider.

737 Oil and Gas Well Completions
U G 3
Sp. 3 cl.
Prereq.: 713, 736.
Design of well completion methods emphasizing reservoir damage and evaluation of reservoir conditions, casing design, cementing, logging, acidizing, and hydraulic fracturing. Slider.

750 Petroleum Investigations
U G 3-10
A, W, Sp. Library, conf., and lab. work.
Prereq.: 736.
750C Engineering problems of petroleum and natural gas exploration, production and transportation. Slider.
750D Design or planning of petroleum field development. Slider.

765 Advanced Petroleum Engineering Technology
U G 2
Sp. 2 cl.
Prereq.: 736 and 723.
Library research and seminar discussions of the most recent technical developments in petroleum engineering. Slider.

802 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.

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

Pharmacology

Office: 214 Hamilton Hall, 1645 Neil Avenue.
PROFESSOR T. MARCH (Acting Chairman); ASSOCIATE PROFESSORS T. BARGIDIER, J. DAVARBAHRIAN, T. DANIELIS, J. ENGELMAN, T. GOLDMAN, and T. LEVEQUE.

618 Toxicology and Legal Medicine
U G 2 or 4
A. 2 cl., 2 3-hr. lab.
Prereq.: Chem. 521, 522, 647, 648, 649, 650 or equiv.
The effects and detection of poisons and their applications to legal medicine. Currus, Engelman.

670 Pharmacology
P G 3
A. 3 cl.
Prereq.: Med. 2nd yr. standing.
General principles of pharmacology. Drugs used for diagnosis, prevention or eradication of the cause of disease, including endocrine products and chemotherapeutic agents.

671 Pharmacology
P G 4
Sp. 3 cl., 1 3-hr. lab.
Prereq.: Med. 2nd yr. standing.
Pharmacology of drugs which affect special tissues, organs, or systems; cardiovascular, renal, gastrointestinal, and hematopoietic. Letoce and Assistants.

672 Pharmacology
P G 2
W. 2 cl.
Prereq.: Med. 2nd yr. standing.
Pharmacology of drugs which affect special tissues, organs, or systems with emphasis on neuropharmacology.

675 Introduction to Pharmacology
U G 3
W. 2 cl., 1 3-hr. lab.
Prereq.: Chem. 547, 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. Letoce.

676 Minor Problems in Pharmacology
U G 2-15
Ss, A, W, Sp.
Prereq.: 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.

A-181
750 Seminar in Pharmacology
Prereq.: Permission of instructor.
Repeatable to a maximum of 16 cr. hrs.
Conferences on selected topics in pharmacology.

850 Experimental Pharmacodynamics
G 5
A. 3 cl., 2 3-hr. lab.
Prereq.: 671 or 703.
The action of drugs on the normal physiological processes, apart
from therapeutics, and the theories which seek to explain these
actions. Works.

950 Research in Pharmacology
G Arr.

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, Gutt-
man, Notari.

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, Guttman, Notari.

504 Pharmaceutical Technique
P 3
Sp. 3 cl., 2 2-hr. lab.
Prereq.: 502.
A continuation of 502 with emphasis on the semi-solid dosage
forms. Guth, Guttman, Notari.

505 Pharmacy for Nurses
P 4
Sp. 4 cl.
Prereq.: Chem. 408 or 411.
Open only to students registered in School of Nursing.
A survey of the important drugs used in medicine and a con-
sideration of their therapeutic applications. Some time is also

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
W. 2 cl., 1 3-hr. lab.
Prereq.: 509.
A study of fundamental problems associated with planning, or-
organizing, and controlling a retail pharmacy emphasizing case
problems to illustrate the practical application of management
principles. Knapp.

513 Pharmacy Management
Sp. 3 cl., 1 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 appreci-
ation of the background of pharmacy and its development through
the years. Tye.

521 Pharmacognosy
P 5
Su, A. 4 cl., 1 3-hr. lab.
Prereq.: Chem. 551 or equiv.
A study of the history, source, identification, constituents, and
medicinal preparations of some of the more important drugs of
biological origin. Beal, Daskatch.

522 Pharmacognosy
P 4
W. 4 cl.
Prereq.: Chem. 551 or equiv.
A continuation of 521. Beal, Daskatch.

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 pro-
fession of pharmacy and the many fields of interest and speciali-
zation 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.: Physiol. 587 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
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, Nelson, Wolf.
602 Biological Products P G 3
W. 3 cl.
Prereq.: Microbiol. 607.

604 Organic Pharmaceutical Chemistry P 4
Su. 1st term, A. 4 cl.
Prereq.: Chem. 552 or equiv.
A study of the chemistry of organic pharmaceutical and medicinal agents. LaFidus, Bope.

605 Organic Pharmaceutical Chemistry P G 4
Su. 2nd term, W. 4 cl.
Prereq.: 604 or equiv.
A continuation of 604. LaFidus, Bope.

606 Organic Pharmaceutical Chemistry P G 3
Sp. 3 cl.
Prereq.: 605 or equiv.
A continuation of 605. LaFidus, Bope.

607 Pharmacology P 5
A. 5 cl.
Prereq.: Physiol. 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, Tyg, Wolf.

610 Drug Assay P 4
A. 2 cl., 2 3-hr. lab.
Prereq.: 605 or equiv.
The qualitative and quantitative examination of drugs and drug formulations. Kier, Olson.

613 New and Non-Official Drugs P 3
Sp. 3 cl.
Prereq.: Senior standing.
The pharmacy of the more commonly used new and non-official medicinals. Guth.

614 Bio-Pharmacy P 5
Su, Sp. 4 cl., 1 3-hr. lab.
Prereq.: Chem. 553 or equiv.
A study of pharmaceutical agents important in biochemical processes. Bope, Tyg.

615 Professional Orientation P 1
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 P 3
A. 3 cl.
Prereq.: 709 or permission of instructor.
Fundamentals of toxicology, including a discussion of the general classes of poisons, their physiological action, methods of treatment and detection with special emphasis on doses. Tyg, Nelson, Wolf.

620 Cosmetic and Toilet Preparations P 3
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 P 3
A. 1 cl., 2 3-hr. lab.
Prereq.: 504.
Course dealing with the formulation and mechanical fabrication of a wide variety of pharmaceutical dosage forms. Anderson, Guth.

622 Manufacturing Pharmacy P 3
W. 1 cl., 2 3-hr. lab.
Prereq.: 504.

623 Manufacturing Pharmacy P 3
Sp. 1 cl., 2 3-hr. lab.
Prereq.: 504.

624 Physical Pharmacy P 3
W. 2 cl., 1 3-hr. lab.
Prereq.: 624 or equiv.
The application of physical chemical principles and laws to the preparation and study of pharmaceutical dosage forms. Gutman.

625 Physical Pharmacy P G 3
W. 2 cl., 1 3-hr. lab.
Prereq.: 625.
A continuation of 624. Gutman.

626 Physical Pharmacy P G 3
Sp. 2 cl., 1 3-hr. lab.
Prereq.: 625.
A continuation of 624. Gutman.

632 Special Problems P 1-3
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 P 4
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. Guth, Notari.

641 Dispensing P 4
W. 3 cl., 2 2-hr. lab.
Prereq.: 640.

642 Dispensing P 3
Sp. 2 cl., 2 2-hr. lab.
Prereq.: 641.

643 Hospital Pharmacy P 3
A, W. Sp. 1 cl., 2 3-hr. lab.
Prereq.: 504.
Repeatable to a maximum of 9 cr. hrs.
Introduction to and clinical experience in hospital pharmacy under the supervision of a registered pharmacist in University Hospital, Mt. Carmel Hospital, or Grant Hospital. Latulipe, Sister Florence, Kleinmann.
645 Pharmacy Seminar P 2
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 technicians, and the laity.

647 The Pharmacy of Metabolic Agents P 3
Sp. 3 cl.
Prereq.: Senior standing.
A study of the pharmacy of medicinal products used in the
treatment of deficiency diseases, malnutrition, and convalescence.
Guth.

650 Pharmaceutical Jurisprudence P 3
Sp. 3 cl.
Prereq.: 513 or concurs.
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 P G 5
W. 4 cl., 1 3-hr. lab.
Prereq.: 607 or equino.
Fundamental Materia Medica including a discussion of the more
commonly used drugs and preparations along with their pharma-

709 Pharmacology P G 5
Sp. 4 cl., 1 3-hr. lab.
Prereq.: 708 or equino.

711 Drug Assay P G 3
W. 2 cl., 1 3-hr. lab.
Prereq.: 610 or equino.
A continuation of 610. Kier, Olson.

712 Pharmaceutical Analysis P G 5
Sp. 3 cl., 2 3-hr. lab.
Prereq.: 711 or equino.
The use of specialized instruments in the assay and control
methods of drugs and drug preparations. Kier, Olson.

714 Pharmacology of Newer Products P G 3
W. 3 cl.
Prereq.: 709.
A course covering the pharmacology of the more recent drugs
and preparations and their therapeutic application. Nelson, Tyer,
Wolf.

715 * Sterile Products P G 3
W. 3 cl., 1 3-hr. lab.
Prereq.: 626 or equino.
A course dealing with the formulation, preparation, and testing
of sterile products including injections, bulk solutions, and nasal
and ophthalmic preparations. Latioitis, Guth, Anderson.

717 Microscopical Pharmacognosy P G 3
Sp. 3 3-hr. lab.
Prereq.: 522 or equino.
A course embodying the principles of the microscope and the ap-
plication of microchemical and specialized techniques in the
detection, separation, and identification of drugs. Beal, Deskoth.

718 Microscopical Pharmacognosy P G 3
Su, W. 1 cl., 2 2-hr. lab.
Prereq.: 717 or equino.
Pharmaceutical applications of specialized microscopic instruments.
Beal.

725 Hospital Pharmacy and the Hospital P G 3
Organisation
A. 3 cl.
Prereq.: Senior standing, 643 or equino., and permission
of instructor.
A course dealing with the hospital organization and the relation-
ship of the departmental components to the pharmacy. Latioitis.

730 Research Techniques and P G 3
Instruments
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. Deskoth.

805 Technology G 3
W. 1 cl., 2 3-hr. lab.
Prereq.: 656 or equino.
Principles and practice in processing pharmaceutical dosage forms
by the use of machines. Emphasis is on fundamentals of unit
processes in pharmaceutical manufacture. Guth.

8061 Advanced Technology G 2-3
Sp. 6-9 hrs. lab.
Prereq.: 805.
Repeatable to a maximum of 9 cr. hrs.
A laboratory course designed to permit study of a variety of
problems in pharmaceutical production, with the ultimate aim
of pilot plant scale production. Guth.

807 Principles of Hospital Pharmacy G 3
W. 3 cl.
Prereq.: 725.
A course dealing with the administrative and professional prin-
ciples and concepts of, and trends affecting, hospital pharmacy.
Latioitis.

808 Principles of Hospital Pharmacy G 3
Sp. 3 cl.
Prereq.: 807.
A continuation of 807. Latioitis.

809 Product Development G 3
Su. 1 cl., 2 3-hr. lab.
Prereq.: 626 or equino.
Study of problems involved in formulation of suitable dosage
forms and the relationship of physical, chemical, therapeutic,
and organoleptic properties of medicaments to principles of
formulation. 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.
Gutman.

812 Advanced Pharmacy G 3
Su. 3 cl.
Prereq.: Chem. 682 or 670.
A study of the methods used to predict, determine, and improve
the stability characteristics of medicinal agents in dosage form.
Gutman.

8251 Advanced Drug Marketing G 3
W. 3 cl.
Prereq.: 509, Bus. Org. 709 or equino.
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. Beal, Doskotch.

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. Hope, Kier, Lapidas.

836 Advanced Pharmaceutical Chemistry G 3
W. 3 cl.
Prereq.: 605 or equiv.

845 Advanced Pharmaceutical Chemistry G 3
W. 3 cl.
Prereq.: Chem. 842.
A study of the methods used in structure determination and synthesis of alkaloids. Lapidas.

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. Lapidas.

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. Beal.

852 * Medicinal Plant Propagation and Cultivation 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. Beal.

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. Beal.

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, Tyce.

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, Tyce, Wall.

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 pharmaceutical instruments. Tyce, 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, Tyce.

881 Advanced Topics in Pharmacology G 3
W. 3 cl.
Prereq.: 871 and permission of instructor.

890 Special Problems G 1-5
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.
COURSES OF INSTRUCTION

PHILOSOPHY

Philosophy

Office: 10 University Hall, 216 North Oval Drive.
PROFESSORS: INELSON (Chairman), BARKER, EVANS, FOX, THINSHAW, and WEITZ; ASSOCIATE PROFESSORS INEMETZ and REITHER (Emeritus); ASSISTANT PROFESSORS ANDERSON, KIELKOPF, GOLDENQUIST, OLSCAMP, ROSEN, and SEVERENS.

400 Types of Philosophy
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. Evans.

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.

515 Esthetics
U 5
W, Sp.
Prereq.: One course in Philos. or 15 cr. hrs. in Fine Arts or Mus.
 Principal systems of esthetics; interpretation of the creative activity of the artist, the work of art, and the contemplation and criticism of art objects. Weitz, Brown.

551 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.

552 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 NUMERATED

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 5
A.
Not open to students with credit for 401.
Not for graduate credit to students majoring in Philos.
Special attention is given to the Pre-Socratics, Plato, Aristotle, Stoicism, Epicureanism, Neo-Platonism. Nemets.

602 History of Philosophy from Augustine to Hume
U 5
Su, W.
Not open to students with credit for 503.
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. Kielkopf, Anderson.

603 History of Philosophy from Kant through the Nineteenth Century
U 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 3
A.
Prereq.: 10 cr. hrs. of Philos.
Special attention is given to idealism, realism, and analytic philosophy. Weitz.

605 Philosophy Since 1900 II
U 3
W.
Prereq.: 10 cr. hrs. of Philos.
Special attention is given to pragmatism, phenomenology, and existentialism. Brown.

6071* American Philosophy
U 3
Sp.
Prereq.: 401 or 402, and 5 additional cr. hrs. in Philos.

6091* Medieval Philosophy
U 5
Sp.
Prereq.: 10 cr. hrs. of Philos. including 601, or 638
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 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, Proust and Tolstoy. Weitz.

6301* Philosophy of Augustine
U 3
A.
Prereq.: 10 cr. hrs. of Philos. including 601.
Nemets.
631 ° Philosophy of Aquinas
   Sp.
   Prereq.: 10 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 med-
  ieval controversies. Nemets.

633† Philosophy of Locke and Berkeley
A
   Prereq.: 10 cr. hrs. of Philos. including 602.

634 ° Philosophy of Hume
   A
   Prereq.: 10 cr. hrs. of Philos. including 602.

635 ° Philosophy of Descartes
   A
   Prereq.: 10 cr. hrs. of Philos. including 602.

636 ° Philosophy of Spinoza
   W
   Prereq.: 10 cr. hrs. of Philos. including 602.
   Sevoren.

637 ° Philosophy of Leibniz
   Sp.
   Prereq.: 10 cr. hrs. of Philos. including 602.
   Kielkopf.

638 † Philosophy of Plato
   A
   Prereq.: 10 cr. hrs. of Philos. including 601.

639 † Philosophy of Aristotle
   W
   Prereq.: 10 cr. hrs. of Philos. including 601.
   Nemets.

640 ° Post-Kantian German Idealism
   Sp.
   Prereq.: 10 cr. hrs. of Philos. including 603.
   German philosophy as presented in writings of such thinkers as
   Fichte, Schelling, Hegel, and Schopenhauer. Harbert.

642 ° Philosophy of James and Dewey
   Su.
   Prereq.: 10 cr. hrs. of Philos.
   Barker.

646 ° Kant: Critique of Pure Reason
   W
   Prereq.: 603.
   Not open to students with credit for 702.

647 ° Kant: Critique of Practical Reason and Critique of Judgment
   Sp.
   Prereq.: 646.
   Not open to students with credit for 703.

649 ° Symbolic Logic I
   U
   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. Barker.

650 ° Symbolic Logic II
   W
   Prereq.: 649 or permission of instructor.
   Axiomatic development of the predicate calculus of first-order
   through proofs of consistency and completeness. Equality, re-
   stricted quantification, and descriptions. Barker.

652 Philosophy of Science
   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. Sevoren.

653 Philosophy of Religion
   Su, 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.
   Evans.

657 † Philosophy of Mind
   W. 3 cl.
   Classical and contemporary approaches to problems such as
   nature of mind, mind-body; other minds, intentionality, mental
   acts, reductionism.

661 Theory of Knowledge
   A
   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
   A
   Prereq.: 402 and 601, 662, or permission of instructor.
   Philosophic methods and nature of metaphysics; categories;
   substance and process; causality and law. Nelson.

664 Problems of Metaphysics II
   W
   Prereq.: 663 or permission of instructor.
   Metaphysical presuppositions of knowledge; problems of universal-
   isms; motion and plurality; space and time. Nelson.

665 ° Philosophy of History
   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
   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. Garner.

671 Advanced Ethical Theory
   U
   Prereq.: 10 cr. hrs. of Philos. including 405.
   Oldenquist.

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### COURSES OF INSTRUCTION

#### PHILOSOPHY

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Type</th>
<th>Credits</th>
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<tbody>
<tr>
<td>701</td>
<td>Minor Problems</td>
<td>U</td>
<td>G 2-10</td>
</tr>
</tbody>
</table>

Students ordinarily earn from 2 to 5 cr. hrs., but honor students may earn up to 10 cr. hrs.

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<tr>
<th>Course Code</th>
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<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>720</td>
<td>Advanced Studies in Philosophy</td>
<td>U</td>
<td>G 3-5</td>
</tr>
</tbody>
</table>


#### GENERAL PREREQUISITES FOR COURSES NUMBERED 800 AND 900

Unless otherwise indicated the prerequisites for 800 and 900 courses are acceptable foundation courses either in psychology, logic and ethics, or history of philosophy, and in some cases in all these subjects.

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Type</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>807†</td>
<td>Seminar in the Philosophy of Religion</td>
<td>G</td>
<td>3</td>
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<tr>
<th>Course Code</th>
<th>Title</th>
<th>Type</th>
<th>Credits</th>
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<tbody>
<tr>
<td>821</td>
<td>Seminar in Logic</td>
<td>G</td>
<td>3</td>
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<th>Course Code</th>
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<tbody>
<tr>
<td>822</td>
<td>Seminar in Metaphysics</td>
<td>G</td>
<td>3</td>
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Sp.<br>Nelson.<br>

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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>823</td>
<td>Seminar in Theory of Knowledge</td>
<td>G</td>
<td>3</td>
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W.<br>Hinshaw.<br>

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<th>Course Code</th>
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<tbody>
<tr>
<td>824</td>
<td>Seminar in Ethics and Theory of Value</td>
<td>G</td>
<td>3</td>
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<tr>
<th>Course Code</th>
<th>Title</th>
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<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>825†</td>
<td>Seminar in the History of Philosophy</td>
<td>G</td>
<td>3</td>
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</table>

Sp.<br>Fox.<br>

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<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Type</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>826</td>
<td>Seminar in Philosophical Analysis</td>
<td>G</td>
<td>3</td>
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<th>Course Code</th>
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<tbody>
<tr>
<td>827</td>
<td>Seminar in Aesthetics</td>
<td>G</td>
<td>3</td>
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Sp.<br>Prereq.: 515 or equiv. or permission of instructor.<br>Wettz.<br>

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<th>Course Code</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>828</td>
<td>Seminar in Philosophy of Mathematics</td>
<td>G</td>
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<tr>
<th>Course Code</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>950</td>
<td>Research in Philosophy</td>
<td>G</td>
<td>Arr.</td>
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</table>

Research for thesis or dissertation purposes only.<br>

#### Photography

Office: 12 Brown Hall, 190 West 17th Avenue.<br>Professors Davis (Chairman) and Wagner; Associate Professor Binau; Assistant Professors Ball and Drake; and Instructors.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Type</th>
<th>Credits</th>
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<tbody>
<tr>
<td>511</td>
<td>Photography</td>
<td>U</td>
<td>3</td>
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A, Sp. 2 cl., 2 2-hr. labs.<br>Fundamentals of photography, including cameras, emulsion characteristics, processing, filters, chemistry, and optics. Binau.<br>

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<tr>
<th>Course Code</th>
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<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>603</td>
<td>Photography in Education and Communication</td>
<td>U</td>
<td>G 3</td>
</tr>
</tbody>
</table>

Sp. 2, 2-hr. cl.<br>Prereq.: Graduate or 4th yr. standing and permission of instructor.<br>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. Wagner.<br>

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<tr>
<th>Course Code</th>
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<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>605</td>
<td>Theory of Photography and the Moving Image</td>
<td>U</td>
<td>G 3</td>
</tr>
</tbody>
</table>

A 2 2-hr. cl.<br>Prereq.: Graduate or 4th yr. standing and permission of instructor.<br>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. Wagner.<br>

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<th>Course Code</th>
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</thead>
<tbody>
<tr>
<td>610</td>
<td>Application of Photographic Processes to Television</td>
<td>U</td>
<td>G 3</td>
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</table>

W. 2 cl., 2 lab hrs.<br>Motion picture production for use in television. Film production planning, continuity, and photographic processes. Special problems in telecasting and relationship of film units to other station activities. Wagner.<br>

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<th>Course Code</th>
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<th>Type</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>615</td>
<td>Motion Picture Photography</td>
<td>U</td>
<td>G 3</td>
</tr>
</tbody>
</table>

Sp. 2 cl., 2 lab hrs.<br>Prereq.: 510 or 511 or 625 or permission of instructor.<br>Motion picture production in the 16 mm. field. Principles of motion picture cameras, photography, processing, scripting, editing, sound recording, and production planning. Wagner, Drake.<br>

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<th>Course Code</th>
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<th>Type</th>
<th>Credits</th>
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<tbody>
<tr>
<td>625</td>
<td>Scientific Photography</td>
<td>U</td>
<td>G 3</td>
</tr>
</tbody>
</table>

A, W. 2 cl., 2 2-hr. lab.<br>Prereq.: Chem. 404, 405, 408 or equiv., 20 cr. hrs. in a science major.<br>Not open to students with credit for 511.<br>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.<br>

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<th>Course Code</th>
<th>Title</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>650</td>
<td>Advanced Photography</td>
<td>U</td>
<td>G 3</td>
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</tbody>
</table>

W. 2 cl., 2 2-hr. lab.<br>Prereq.: 511 or 625.<br>Continuation of Photog. 511 or 625. Binau.<br>

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Type</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>699</td>
<td>Minor Problems in Photography</td>
<td>U</td>
<td>G 3-5</td>
</tr>
</tbody>
</table>

A, W. Sp. 4 to 8 lab hrs.<br>Prereq.: Graduate standing, 6 cr. hrs. in Photog., and permission of instructor.<br>Repeatable to a maximum of 15 cr. hrs.<br>Use of departmental facilities for adding to the student's knowledge of a specially selected photographic problem pertaining to his major field. Davis, Wagner, Binau.
### Physical Education

**Offices:** Men's: 124 Physical Education Bldg., 337 West 17th Avenue.

PROFESSORS LARKINS, IHESS, IASHBROOK, IRENE, ICUSHMAN, HAYES, HIXSON, IMATHIEU, MOONEY, ITOBERTEUFFEN, and IEPPE (Emeritus); ASSOCIATE PROFESSORS ITHENDRIX, IHEWELETT, IMAVO, IMONARO, and ICIERBICHI; ASSISTANT PROFESSORS IARTES, IFREDERICKS, and IKLINNAM; INSTRUCTORS IBEDERCIK, IBOK, IBRENER, ICAVALL, ICOSTI, ICLEST, IBRIN, IBARTOM, IOBHRE, IOLSON, IMSIONR, and ISING; and ASSISTANTS.

**Women's:** 201 Pomona Hall, 1760 Neil Avenue.

PROFESSORS IMORDY, IALLENAUGH, IALFIRE, IGILMAN (Emeritus), IIOIGHT, ISTEIN, IWATSON (Emeritus), and IYOST; ASSOCIATE PROFESSORS IBAILEY, IBEYER, ICOFT, IFUGLE, IRUPERT, and ISCHREIDER; ASSISTANT PROFESSORS IGAZETTE, IHASKINS, IBAYS, IULL, ILOGDON, INOLI, ISOMPED, IWEELED, and IWOOTEN; INSTRUCTORS IBLANE, IHOOSE, IUKILL, ILLY, IOVEN, IMSITH, ITANDY, and IWHITE; and ASSISTANTS.

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Credits</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>403</td>
<td>Physical Education (Men)</td>
<td>U 1</td>
<td>Su, A, W, Sp. 2 cl. Continuation of 403.</td>
</tr>
<tr>
<td>411</td>
<td>Physical Education Activities</td>
<td>U 2</td>
<td>A. 5 2-hr. lab. Requirements 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.</td>
</tr>
<tr>
<td>412</td>
<td>Physical Education Activities</td>
<td>U 2</td>
<td>W. 5 2-hr. lab. See requirements for 411. Continuation of 411.</td>
</tr>
<tr>
<td>413</td>
<td>Physical Education Activities</td>
<td>U 2</td>
<td>Sp. 5 2-hr. lab. See requirements for 411. Continuation of 412.</td>
</tr>
<tr>
<td>414</td>
<td>Physical Education Activities</td>
<td>U C 2</td>
<td>A. 5 2-hr. lab. Read. of majors in Phys. Ed. Open to women in place of 435, 436, or 427 by permission of chairman. Dance Majors should schedule D Sections. Repeatable without credit. Continuation of 413.</td>
</tr>
<tr>
<td>415</td>
<td>Physical Education Activities</td>
<td>U 2</td>
<td>W. 5 2-hr. lab. See requirements for 414. Continuation of 414.</td>
</tr>
<tr>
<td>416</td>
<td>Physical Education Activities</td>
<td>U 2</td>
<td>Sp. 5 2-hr. lab. See requirements for 416. Continuation of 415.</td>
</tr>
<tr>
<td>421</td>
<td>Physical Education (Women)</td>
<td>U 1</td>
<td>Su, A. 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.</td>
</tr>
<tr>
<td>422</td>
<td>Physical Education (Women)</td>
<td>U 1</td>
<td>Su, W. 2 cl. Continuation of 421.</td>
</tr>
<tr>
<td>423</td>
<td>Physical Education (Women)</td>
<td>U 1</td>
<td>Su, Sp. 2 cl. Continuation of 422.</td>
</tr>
<tr>
<td>482</td>
<td>Supervision of Playground and Community Recreation Activities</td>
<td>U 2</td>
<td>Sp. 2 2-hr. lab. Programming of recreational activities relative to community conditions. Overview of activities desirable for a broad, comprehensive program. White.</td>
</tr>
<tr>
<td>519</td>
<td>The Teaching of Basketball</td>
<td>U 3</td>
<td>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.</td>
</tr>
</tbody>
</table>
COURSES OF INSTRUCTION

PHYSICAL EDUCATION

520 Sports Officials-Football  U  2
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 as officials in 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. Honest.

521 Sports Officials-Basketball  U  2
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. Beekman.

538 Dance Notation I  U  2
A. 2 cl., 2 1-hr. lab.
Prereq.: 411D or permission of instructor.
Fundamentals and principles of Labanotation. Alkire.

539 Dance Notation II  U  2
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  U  3
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. Allenbaugh.

542 Physical Education for the Elementary School Child  U  4
W. 4 1-hr. lec., 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, Asbrook, Breiner. For women, Allenbaugh.

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. Not open to students with credit for 443.
Study in the theory, methods and mechanics of coaching track and field. Snyder.

546 The Teaching of Football  U  3
W. 2 cl., 3-lab. hrs.
Prereq.: Men. 416 or satisfactory evidence of skill in playing football.
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.: 413 or satisfactory evidence of playing experience in baseball.
Study in the theory, strategy, and mechanics of coaching baseball, including batting, baserunning, and the playing of all positions. Karow.

548 Theory and Practice of Dance Education  U  2
Sp. 1 cl., 3 lab. hrs.
Prereq.: 2 qtr. of Modern Dance or equiv.
Foundations for teaching and organizing courses in study in modern dance in high school programs of physical education. Laboratory problems, lectures, and readings. Alkire.

549 The Teaching of Swimming  U  2
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. Boreis, Lilly.

550 Theory and Practice of Dance Education  U  2
Sp. 1 cl., 4 lab. hrs.
Prereq.: 548 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.

560 Camp Counseling  U  3
A. 2 cl., 7-day 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.

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, 548.
Theory of physical activities as a medium for creative, self-expression. Exploration of rhythmical, individual and group activities and their relation to development of children. Allenbaugh.

601 Principles of Football Coaching and Management  G  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 teaching and controlling players and special problems of management. Hayes.
615 Problems in Intramural Sports U G 2
Su, 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. Beckman.

616 The Administration of Interschool Athletics U 2
A, Sp. 2 cl.
Not open to students with credit for 540.
An introductory course in athletic administration, including scheduling contests, records, eligibility, contest management, facilities and equipment, budgets and finance, public relations, and awards. Hixson.

621 Principles of Physical Education U G 5
Su, A, Sp. 5 cl.
Prereq.: Junior or minor in Phys. Ed. or permission of instructor.
Origins and nature of modern physical education as developmental experience and medium of education. Contributions to organic growth, personal resources, and growth in social relationships. Obersteifer.

625 Evaluation in Physical Education U G 3
Su, W. 2 cl., 1 2-hr. lab.
A critical study of methods in evaluating biological, social, and psychological outcomes for physical education. Mathews.

630 Adapted Physical Education U G 3-5
Su, 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 experience in sports, swimming or exercise therapy for prevalent types of disabilities. Women—Wheeler; Men—Ashbrook.

631 Theory and Practice of Modern Dance U G 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. Alfieri.

632 Dance Composition U G 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.

633 Dance Production U 5
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. Alfieri.

640 History of Physical and Health Education Su, W. 3 cl.
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.

647 Physical Education for Secondary School Youth U G 3
A. Men—2 2-hr. cl., Women—3 2-hr. cl.
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.

648 Physical Education for Senior High School Youth U G 3
Su, Sp. Men—2 cl., 3 lab.; Women—3 2-hr. cl.
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, Hixson.

649 Outdoor Education and Camp Administration U G 3
Sp. 3 cl.
Prereq.: 560 or permission of instructor.
Introduction to the principles, status and administration of outdoor education and camping. Mand.

650 Advanced Dance Composition U G 4
A. 2-3 hr. cl., 1 2-hr. lab.
Prereq.: 539, 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 Labanotation. Blaine.

655 Public Recreation: Its Organization U G 3
and Administration Sp. 3 cl.
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. Mand.

657 History of Dance I U G 3
A. 3 cl.
Prereq.: Anthro. 501 or 503 or equiv.
Dance motivation from sympathetic magic in tribal societies; in mythic ritual and dance-drama. Wimmer.

658 History of Dance II U G 3
W. 3 cl.
Survey of dance from the early Christian church through the Baroque period. Wimmer.

659 History of Dance III U G 3
Sp. 3 cl.
Development of Western dance in the nineteenth and twentieth centuries with emphasis on ballet and modern dance. Wimmer.

682 Organization and Administration of Physical Education U G 5
W. 5 cl.
Prereq.: 632 or equiv.
Study of policies and procedures in the organization and administration of the physical education program. Mordy, Hess.

685 First Aid and Care of Injuries U G 4
A, Sp. 5 cl.
Prereq.: 10 qtr. 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.

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COURSES OF INSTRUCTION

PHYSICAL EDUCATION

691 Kinesiology
A. W.  Men—4 cl., W.  Women 4 cl.
Prereq.: Anat. 504 or equiv.
The science of bodily movement. Stein, Mand, Bartels.

701 Minor Problems in Physical Education and Dance Education
Prereq.: Grad. or senior standing and permission of adviser.
Not open to students with credit for 651.
a. Physical Education.
b. Dance Education.
Investigation of selected professional problems.

799 Physical Education Workshop
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. Crafts.

802 Seminar in Physical Education
W.  2 cl.

803 Seminar in Recreation
Sp.  2 cl.
Mand.

805 Physical Education in School and College
Su, A.  3 cl.
Obertaeuer.

810 Survey of Research in Physical Education
Su, W.  3 cl.
Prereq.: 825 or equiv.
Mathews.

814 Seminar in the Role of Sports in Society
Su, Sp.  3 cl.
Prereq.: Soc. 645 or equiv.
Study of the significance of sports in society; and examination of the extent to which sports contribute to human welfare. Mordy.

816 Problems in Interscholastic and Intercollegiate Athletics
Su, W.  3 cl.
The relation of athletics to education; problems of athletic organization; eligibility; finance, current trends, and developments in management and purpose; public relations. Husson.

820 Problems in Physical Education
Advanced problems in physical education, individual or group participation.
820A Recreation.
Su.

820B Adapted Physical Education
W.

820C Curriculum in Physical Education
W.

820D Physical Education in Higher Education
A.

820E Physical Education in Secondary Education
Su, Sp.

820F Physical Education in Elementary Education
Su.

820G Dance Education
Sp.

820H School Evaluation
W.

820I Administration
Su.

823 Organic Science as Applied to Physical Education and Health Education
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
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. Matheux.

826 Supervision of Physical and School Health Education
A.  3 cl.
A study of the responsibilities and functions of the supervisor in city, county, and state school systems. Scott.

846 Professional Preparation of Teachers in Physical and Health Education
Su, 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. Heuss.

950 Research in Physical Education
Research for thesis or dissertation purposes only.
Physical Medicine

Office: Dodd Hall, 473 West 8th Avenue.
PROFESSOR JOHNSON (Chairman); ASSOCIATE PROFESSORS BURK and STOW; ASSISTANT PROFESSORS GUYTON 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: asceptis, bandaging, body mechanics. Introduction to the application of physical therapy in medical problems. Perry.

502 Massage U 2
A. 1 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. Woods.

503 Muscle Function Measurements and Tests U 2
W. 1 cl., 2 3-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, arthrology, 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., 2 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.

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, gynecology, neurology, psychiatry, gynecology, obstetrics, dermatology, and roentgenology. Johnson.

605 Therapeutic Exercises U 4
Sp. 2 cl., 3 2-hr. lab. demon. 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. demonstr. and field trips.
Prereq.: Admission to Phys. Ther.
Theory, technique, 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 3-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.

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### COURSES OF INSTRUCTION

#### PHYSICAL MEDICINE

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>615</td>
<td>Agents Used in Physical Therapy</td>
<td>3</td>
<td>Heat, cold, light, water, electricity, sound, and exercise as used in the diagnosis and treatment of disease. Not open to students with credit for 601.</td>
</tr>
<tr>
<td>616</td>
<td>Effects of Agents Used in Physical Therapy</td>
<td>U 3</td>
<td>Physiological effects of heat, cold, light, water, electricity, sound, and exercise, as used in the diagnosis and treatment of disease. Burk.</td>
</tr>
</tbody>
</table>

#### Physics


<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<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. Heerhal.</td>
</tr>
<tr>
<td>402</td>
<td>Nature of the Physical World</td>
<td>U 5</td>
<td>Continuation of 401. Heerhal.</td>
</tr>
<tr>
<td>411</td>
<td>General Physics: Mechanics and Heat</td>
<td>U 5</td>
<td>Not open to students with credit for Gen. S. 431.</td>
</tr>
<tr>
<td>412</td>
<td>General Physics: Electricity, Magnetism, and Light</td>
<td>U 5</td>
<td>Prereq.: 411.</td>
</tr>
<tr>
<td>413</td>
<td>General Physics: Modern Physics</td>
<td>U 5</td>
<td>Prereq.: 412.</td>
</tr>
</tbody>
</table>

**420** Descriptive Meteorology U 5 A. 4 cl., 1 2-hr. lab. Descriptive treatment of local weather phenomena and commonly observed weather changes; laboratory includes instrumental observations, use of meteorological data, study of weather maps. Shaw.

**505** Intermediate Geometrical Optics U 3 W. 3 cl. Not open to students with credit for 605. Ray optics of thick lenses, mirrors, prisms, and their combination; apertures and aberrations. Nielsen.

**506** Intermediate Physical Optics U 3 Sp. 3 cl. Not open to students with credit for 606. Wave theory of optical phenomena; applications. Nielsen.

**531** General Physics for Engineers and Physical Scientists: Mechanics A, W, Sp. 4 cl., 1 2-hr. lab. Not open to students with credit for 431.

**532** General Physics for Engineers and Physical Scientists: Heat, Sound, Light A, W, Sp. 4 cl., 1 2-hr. lab. Not open to students with credit for 432.

**533** General Physics for Engineers and Physical Scientists: Electricity, Magnetism Su, A, W, Sp. 4 cl., 1 2-hr. lab. Not open to students with credit for 433.

**535** Geometrical Optics Laboratory U 2 W. 4-hr. lab. Not open to students with credit for 635. Selected experiments in geometrical optics. Zumstein.

**536** Physical Optics Laboratory U 2 Sp. 4-hr. lab. Not open to students with credit for 636. Selected experiments in physical optics. Zumstein.

**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 Math 543 or 536 and Physics 411-413, 415, or 531-532.

**601** Intermediate Physical Mechanics U G 3 Su, A, W, Sp. 3 cl. Not open for graduate credit to Physics majors.

Analytical treatment of vectors; kinematics and dynamics of particles; force fields; simple harmonic oscillator and modifications; emphasis on analytical methods used in other physics courses. Shaffer.

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PHYSICS

602 Concepts and Methods of Modern Physics
W, Sp. 5 cl.
Prereq: 532-533 and Math. 538 or 543.
Not open to Physics majors.
Introductory analytical treatment of concepts and methods of modern Physics including topics from nuclear, atomic, molecular or solid state Physics; quantum-mechanical concepts. Heer.

603 Intermediate Heat
Su, A, Sp. 3 cl.
Not open for graduate credit to Physics majors.
Introduction to theory of heat with applications. Erickson.

605 Geometrical Optics
A. 3 cl.
Advanced theory of geometrical optics including thick lenses, types of mirrors, combinations of lenses and mirrors, apertures and aberrations in optical systems. Zumstein.

606 Introductory Physical Optics
W, Sp. 3 cl.
Introduction to diffraction; interference; and polarization phenomena. Applications in design and performance of optical instruments. Zumstein.

608 Intermediate Electricity and Magnetism
W, Sp. 3 cl.
Prereq.: 601.
Not open for graduate credit to Physics majors.
Intermediate mathematical treatment of electric and magnetic fields; problem solving emphasized. Dickey.

610 Electron Physics
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
Su, 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
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
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
Su, A, W, Sp. 2 3-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. Joseph, C. Shae.

634 Fundamentals of Radioactivity and Instrumentation
Su, A. 3 loc. and 1 3-hr. lab.
Prereq.: 2 yrs. 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. Fook.

637 Physics Seminar for In-Service Science Teachers
A., 1 3-hr. cl.
Prereq.: 15 cr. hrs. of Physics and teaching experience; permission of instructor.
A course to deepen teachers’ understanding of basic physical concepts and methods of treatment of selected problems. Presentation will include lectures, discussions, demonstrations, and problem solving. Riley.

638 Physics Seminar for In-Service Science Teachers
W. 1 3-hr. cl.
Prereq.: 637.
Continuation of 637. Riley.

639 Physics Seminar for In-Service Science Teachers
Sp. 1 3-hr. cl.
Prereq.: 638.
Continuation of 638. Riley.

641 Basic Principles and Recent Advances in Physics
Su, 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
W. 3 cl.
Prereq.: 15 cr. hrs. of natural science including one of following: Agron. 501, Bot. 402, Geog. 405, Geol. 402, Physics 412 or 532, Zool. 402.
Not open to students with credit for 510.
Study of atmospheric phenomena. Individual observation and prediction of weather events. J. Shae.

645 Descriptive Acoustics
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. Shae, Shaffer.

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COURSES OF INSTRUCTION

PHYSICS

648 * 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 ionosphere, ozonosphere, 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. Dautant.

703 Thermodynamics U G 3
A. 3 cl.
Prereq.: 603 and Math. 601 and 611.
Not open to students with credit for 603-604.
Modern treatment of topics in physical thermodynamics including entropy, specific heats, third law, phase, and lattice changes, surface phenomena, applications to low temperature phenomena. Dautant.

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. Shue.

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.
Prereq.: 601, 608, Math. 661.

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. 2 cl.
Prereq.: 610.
Fundamental properties of solids with emphasis on conduction in metals and semiconductors. C. Shue.

718 Modern Atomic Spectroscopy U G 3
Su, A. 3 cl.
Prereq.: 601, 614.

719 Spectra and Structure of Molecules U G 3
Sp. 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. Shue, Jossem.

721 Fundamentals of Nuclear Physics U G 3
Su, 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. Jastram.

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. Foul.

726 Methods of Theoretical Physics U G 3
Su, A. 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, W. 3 cl.
Prereq.: 601, 614, and 726, or equiv.
Introduction to Schrödinger 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
A. Sp. 2-3 hr. lab.
Prereq.: 615 and permission of instructor.
Not open to students with credit for 633.
Repeatable to a maximum of 6 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. Pool.

734 Nuclear Reactor Laboratory
W. 2 3-hr. labs.
Prereq.: 733, 723 and permission of instructor.
Repeatable to a maximum of 6 cr. hrs.
Neutron diffusion, neutron shielding, radioactivity production, pile
oscillation, reactor control, bucking and other pile parameters;
critical reactor will be operated by student. Pool.

740 Introduction to Theoretical Physics
A. 3 cr.
Prereq.: 601 and Math. 601.
Fundamentals of classical mechanics including transformation of
reference frames; dynamics of particles and collections; rigid
rotators; Hamilton's principle; Lagrange's equations; vibration
theory; special relativity; elasticity; fluid dynamics; wave motion.
Shafer.

741 Introduction to Theoretical Physics
W. 3 cr.
Prereq.: 740.
Continuation of 740. Shafer.

742 Introduction to Theoretical Physics
Sp. 3 cr.
Prereq.: 741.
Continuation of 741. Shafer.

805 Electromagnetic Field Theory
W. 3 cr.
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
Sp. 3 cr.
Prereq.: 805.
Continuation of 805. Prebus.

813 Line Spectra and Atomic Structure
A. 3 cr.
Prereq.: 718, 727 or 818.
Advanced treatment of theory and interpretation of atomic spectra
including contemporary problems. Hesser.

817 Quantum Mechanics
A. 3 cr.
Prereq.: 718, Math. 601 and 611, Physics 727 and 740
recommended.
Advanced fundamental course including: physical bases; Schrödinger,
matrix and operational formulations; approximate methods;
transformation theory; relativistic modifications; hole theory, etc.
Kerrings.

818 Quantum Mechanics
W. 3 cr.
Prereq.: 817.
Continuation of 817. Kerrings.

819 Quantum Mechanics
Sp. 3 cr.
Prereq.: 818.
Continuation of 818. Kerrings.

820 Theoretical Nuclear Physics
A. 3 cr.
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. Sepior.

821 Theoretical Nuclear Physics
W. 3 cr.
Prereq.: 830.
Continuation of 820. Sepior.

822 Theoretical Nuclear Physics
Sp. 3 cr.
Prereq.: 821.
Continuation of 821. Sepior.

823 Nuclear Spectroscopy
Sp. 3 cr.
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 cr.
Prereq.: 702, 727 or 818, and 740.
Advanced treatment of fundamentals of classical and quantum
statistical mechanics with application to contemporary problems.
Kerrings.

825 Statistical Mechanics
Sp. 3 cr.
Prereq.: 824.
Continuation of 824.

831 Theory of the Solid State
W. 3 cr.
Prereq.: 716, 728, 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. Duant.

834 Theory of the Solid State
Sp. 3 cr.
Prereq.: 833.
Continuation of 833.

840 Advanced Dynamics
A. 3 cr.
Prereq.: 742 and Math. 661.
Starts with Lagrange's equation and includes variational theorems,
Hamilton's canonical equations, general transformation theory.
Mills.

841 Advanced Dynamics
Sp. 3 cr.
Prereq.: 840.
Continuation of 840. Selected topics in advanced dynamics. Mills.

843 Theory of Quantized Fields
A. 3 cr.
Prereq.: 819 and 840.
The concepts and methods of quantum field theory, both as a
fundamental description of physical interactions and as a method

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COURSES OF INSTRUCTION

PHYSICS

844  * Theory of Quantized Fields  G 3  W. 3 cl.
Prereq.: 843.
Continuation of 843.

8461  * Physics of Elementary Particles  G 3  A. 3 cl.
Prereq.: 721 and 817.
Properties of elementary particles; theory of strong and weak interactions. Milns.

8471  * Physics of Elementary Particles  G 3  W. 3 cl.
Prereq.: 846.
Continuation of 846.

851  * Advanced Molecular Spectra  G 3  A. 3 cl.
Prereq.: 718, 719, and 728.
Advanced treatment of topics in theory and interpretation of electronic, vibration, rotational aspects of molecular spectra; emphasis on details of rotation-vibration spectra of poly atomic molecules. H. Nielsen.

852  * Advanced Molecular Spectra  G 3  W. 3 cl.
Prereq.: 851.
Continuation of 851. H. Nielsen.

860  Advanced Topics in Physics  G 3  Su, A. 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  G 3  W. 3 cl.
Prereq.: 860.
Continuation of 860.

862  Advanced Topics in Physics  G 3  Sp. 3 cl.
Prereq.: 861.
Continuation of 861.

881  Seminar in Physics  G 1  Su, A. 1 2-hr. cl.
Prereq.: Acceptable specialized courses and permission of instructor.
Repeatable.
Seminars will be conducted by various members of the staff on topics of current interest in their fields of specialization. Students will participate in the presentation and discussion of material.

882  Seminar in Physics  G 1  W. 1 2-hr. cl.
Prereq.: 881.
Continuation of 881.

883  Seminar in Physics  G 1  Sp. 1 2-hr. cl.
Prereq.: 882.
Continuation of 882.

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

Physiological Chemistry

Office: 214 Hamilton Hall, 1645 Neil Avenue.

Professors: Brown (Chairman), Cornwell, Frajola, and Johnson; Associate Professors Devor, Kruger, Richardson, and Wikoff; Assistant Professors Alben, Endahl, Fischer, Ito, Kreischer, Maynard, McCluer, Nuenke, and Passananti.

For related courses see Biology.

511  Physiological Chemistry  U 4  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. Devor, Nuenke.

512  Physiological Chemistry  U 4  W. 3 cl., 1 3-hr. lab.
Prereq.: 511.
A continuation of 511.

601  Physiological Chemistry  P 4  A. 4 cl.
Prereq.: Med. 1st yr. standing, Chem. 521, 522, 647, 648, 649, 650 or equi., reqd. 609 concur.
Chemistry of carbohydrates, lipids, proteins, and biochemistry of digestion, metabolism, and excretion. Alben, Brown, Cornwell, Endahl, Kruger, McCluer, Nuenke, Richardson.

602  Physiological Chemistry  P 4  W. 4 cl.
Prereq.: 601. Reqd. 610 concur.
A continuation of 601.

609  Physiological Chemistry  P 2  A. 2 3-hr. lab.
Prereq.: Med. 1st yr. standing, reqd. 601 concur.

610  Physiological Chemistry  P 2  W. 2 3-hr. lab.
Prereq.: 609. Reqd. 602 concur.
A continuation of 609.

611  Physiological Chemistry  U G 5  A. 3 cl., 2 3-hr. lab.
Prereq.: Chem. 521, 522, 647, 648, 649, 650, or 655, 656, 657, 658, 659, 660, or equi.
Chemistry of carbohydrates, lipids, and proteins. Wikoff, Devor, and Staff.

612  Physiological Chemistry  U G 5  W. 3 cl., 2 3-hr. lab.
Prereq.: 611.
Biochemistry of digestion, metabolism, and excretion. Wikoff, Devor, and Staff.

613  Quantitative Methods of Blood Analysis  U G 3  Sp. 1 cl., 2 3-hr. lab.
Prereq.: 602 or 612.
Determination of important constituents of the blood. Wikoff and Assistants.
614 Biochemical Methods of Analysis U G 5
(Food Analysis)
W. 2 cl., 3 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 Minor Problems in Physiological U G 2-15
Chemistry
Prereq.: 602, 612, or equiv.
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, 552.
Chemistry of the carbohydrates, lipids, and proteins. Biochemistry of digestion, absorption, metabolism, and excretion. The tissues. Alben, Decor, Cornelius, McCluer, Nuenke, Richardson, and Assistants.

633 Physiological Chemistry (Human P 2
Nutrition)
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

715 Biochemical Biography U G 1
Sp. 1 cl.
Prereq.: 612.
Witcof.

812 Seminar in Physiological Chemistry G 2
W. 2 cl.
Prereq.: 602 or 612 or equiv.
Topic to be announced.

813 Seminar in Physiological Chemistry G 2
Sp. 2 cl.
Prereq.: 602 or 612 or equiv.
Topic to be announced.

815 Seminar G 1
Prereq. or concur.: 601 or 611 or equiv.
Repeatable to a maximum of 9 cr. hrs.
Required of all graduate students majoring in Physiol.
Chem.

821 Advanced Physiological Chemistry G 3
A. 3 cl.
Prereq.: 602 or 612 or equiv., Chem. 841, 842, 843
or permission of instructor.
An advanced treatment of the chemistry of the carbohydrates, proteins, and steroids. Kruger and Staff.

822 Advanced Physiological Chemistry G 3
W. 3 cl.
Prereq.: 602 or 612 or equiv., Chem. 841, 842, 843
or permission of instructor.
An advanced treatment of the chemistry of the lipids and intermediary metabolism. Cornelius and Staff.

823 Advanced Physiological Chemistry G 3
Sp. 3 cl.
Prereq.: 602 or 612 or equiv., Chem. 841, 842, 843
continuation of the biochemistry of intermediary metabolism.
Richardson and Staff.

825 Biochemical Preparations and G 3
Techniques
A. 9 hrs. conf. and lab.
Prereq.: 821, 823 or concur.
Advanced course in biological preparations and laboratory techniques. Isolation of carbohydrates, lipids, proteins, enzymes, and hormones.

826 Biochemical Preparations and G 3
Techniques
W. 9 hrs. conf. and lab.
Prereq.: 825.
A continuation of 825.

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

950 Research in Physiological Chemistry G Arr.
Research for thesis or dissertation purposes only. To be conducted under the guidance of Alben, Brown, Cornelius, Decor, Doehi, Fischer, Freida, Johnson, Kruecher, Kruger, McCluer, Nuenke, Pazzanesti, Richardson, Witcof.

Physiological Optics
Office: 111 Optometry Bldg., 338 West 10th Avenue.
PROFESSORS BRY, BBLACKWELL, and JELLERBROOK;
ASSOCIATE PROFESSORS HIBBEARD and M MCCONNELL;
ASSISTANT PROFESSOR WILD.
See also courses in Optometry.

611 Introduction to Physiological Optics U G 5
Sp. 4 cl., 1 2-hr. lab.
Prereq.: Physics 505 and Anat. 608.
Not for grad. credit to students majoring in Physiol.
Opt.
The eye as an optical instrument; the refracting mechanism; the mechanism of accommodation and pupillary contraction; blur of the retinal image; stray light in the eye. Wild.

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.
The motility of the eye; the structure and innervation of the extraocular muscles, the center of rotation and analysis and description of eye movements. Wild.
Courses of Instruction

Physiological Optics

613 Intermediate Physiological Optics U G 5
W. 4 cl., 2-3 hr. lab.
Prereq.: 612.
Monocular sensory mechanisms of vision; analysis and specification of visual stimuli; photoreception and retino-cortical transmission; adaptation of photoreceptors; flicker, brightness discrimination, and color vision. Wild.

614 Intermediate Physiological Optics U G 3
Sp. 3 cl.
Prereq.: 612.
Circulation and metabolism of the eye; intraocular pressure; lacrimal system; movements and functions of the eyelids. Ellerbrook.

615 Intermediate Physiological Optics U G 5
Sp. 4 cl., 1 2-3 hr. lab.
Prereq.: 613.
Binocular integration of hue and brightness; retinal correspondence; visual perception of figure-ground relations, light, color, illumination, size, shape, direction, distance, and motion. Fry.

620 Measurement and Specification of Visual Stimuli P G 4
W. 3 cl., 1 2 hr. lab.
Prereq.: Optom. 2nd yr. standing and 611.
Not for grad. credit to students majoring in Physiol. Opt.
Light sources; diffusely transmitting and reflecting surfaces and scattering of light by a medium; principles of photometry and colorimetry as applied to visual stimuli. Wild.

701 Minor Problems in Physiological Optics U G 1-15
Prereq.: Permission of department chairman.
Repeatable.
A properly qualified student may perform a minor investigation or add to his knowledge and technique. Fry, Ellerbrook, Hebbard, Wild.

715 Intermediate Physiological Optics P G 5
Sp. 3 cl., 1-2 hr. lab.
Prereq.: Optom. 3rd yr. standing and 732.
Visual perception of color, illumination, figure-ground relations, size, shape, direction, distance, motion, time and complex pattern. Fry.

716 Principles of Lighting P G 5
A. 4 cl., 1 2-3 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. Fry.

730 Vision in Industry P G 5
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. Fry.

731. Vision in Schools P G 5
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. Fry.

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732 Intermediate Physiological Optics P G 5
A. 4 cl., 1 2-3 hr. lab.
Prereq.: Optom. 2nd yr. standing and 613.
Projection of visual impressions; the horopter, retinal correspondence; binocular integration of hue and brilliance. Fry.

801 Advanced Physiological Optics G 5
A. 3 cl., 2 2-3 hr. lab.
Prereq.: 801.
The ocular image-forming mechanism; accommodation and pupil contraction, aberrations, stray light; entoptic phenomena; shape, size, distortion; retinal illuminance and blur.

802 Advanced Physiological Optics G 5
W. 3 cl., 2 2-3 hr. lab.
Prereq.: 801.
Binocular integration of hue and brilliance, fusional movements, retinal correspondence, visual perception of figure-ground relations, light, color, illumination, size, shape, direction, distance, and motion. Fry.

950 Research in Physiological Optics G Arr.
Research for thesis or dissertation purposes only.

Physiology

Office: 312 Hamilton Hall, 1645 Neil Avenue.
PROFESSORS: GRUBBS (Acting Chairman), LANGERER, BOZLER, HATT, LESSLER, SMYERS, and SAPFERSTEIN; ASSOCIATE PROFESSORS HEMAN, BROWNELL, CAL- HOON, ICOLSTER, ILIFETZ, INISHIKAWARA, SPIERER, ISTOW, and SWEISS; ASSISTANT PROFESSORS ALLISON, BILLINGS, ILIFSKY, BRETZLAFF, and TOMASHEFSKI.

For related courses see Biology.

421 Introduction to Physiology U 5
A, Sp. 4 cl., 1 lab.
Not open to students with credit for 506 and 507.
The structural organization of the body and the properties of living matter; the structure and the function of the muscular, nervous (including sense organs), and digestive systems (including energy and food metabolism).

422 Introduction to Physiology U 5
Su., W. 4 cl., 1 lab.
Prereq.: 421.
Not open to students with credit for 506 and 507.
Continuation of 421. The structures and functions involved in a study of blood and other body fluids, the renal system, respiration, control of body temperature, and the integrative action of the endocrine organs.
506 Intermediate Physiology U 5
A. 4 cl., 1 lab.
Not open to students with credit for 421 and 422.
The concepts and principles involved in the activities of muscles and nerves; central and peripheral nervous system including sense organs; secretion, digestion and mobility of digestive tract; and energy and food metabolism.

507 Intermediate Physiology U 5
W. 4 cl., 1 lab.
Prereq.: 506 or equiv.
Not open to students with credit for 421 and 422.
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.

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 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.: Dent. 2nd yr. standing.
The cardiovascular system including blood, neuromuscular system, body fluids and excretion. Lessler, Lipsky and Staff.

605 Advanced Physiology P G 6
W. 5 cl., 1 lab.
Prereq.: Dent. 2nd yr. standing and 604 or equiv.
The central nervous system and special senses, respiration, digestion, metabolism, the endocrines, and reproduction. Lessler, 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. Lessler, Angerer and Staff.

624 Human Physiology P G 3
Sp. 2 cl., 1 lab.
Prereq.: Med. 1st yr. standing.
Neuromuscular system and heart. Baker 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, Lesler 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, Nishikawa and Staff.

635 Human Physiology P G 6
A. 4 cl., 2 lab.
Prereq.: Med. 2nd yr. standing.
Cardiovascular system, body fluids, excretion, respiration, and metabolism. Grubbs, Coulter and Staff.

636 Human Physiology P G 6
W. 4 cl., 2 lab.
Prereq.: Med. 2nd yr. standing.
Digestion, endocrine system, sense organs, and central nervous system. Grubbs, Coulter and Staff.

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 hr. lab.
Prereq.: Academic Year Science Institute students only. 15 hrs. Biol. Sc., 15 hrs. Chem. and/or Physics, or 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 1-15
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.
COURSES OF INSTRUCTION

PHYSIOLOGY

715 Seminar in Physiology G 1 or 2
Su.
Prereq.: Permission of department chairman or graduate adviser.
A seminar course in physiology involving joint participation by
students and staff.

724 Advanced Human Physiology G 3
Sp. 2 cl., 1 lab.
Prereq.: Permission of department chairman.
An advanced study of the muscular, peripheral nervous system
and heart. Bosler and Staff.

725 Advanced Human Physiology G 6
A. 4 cl., 2 lab.
Prereq.: Permission of department chairman.
Continuation of 724. An advanced study of the cardiovascular
system, body fluids, excretion, respiration, and metabolism. Grubbs
and Staff.

726 Advanced Human Physiology G 6
W. 4 cl., 2 lab.
Prereq.: Permission of department chairman.
Continuation of 725. An advanced study of digestion, endocrine
system, sense organs, and central nervous system. Grubbs
and Staff.

740 Environmental Physiology G 3
A., W., Sp. 3 cl.
Prereq.: M.D., degree or graduate standing and 724, 725,
and 726, or the equivalent.
Repeatable to a maximum of 9 cr. hrs.
Study of the effects of man on stress factors in the gaseous,
neurochemical and electromagnetic environments and a consideration
of the physiological aspects of protection against environmental
stresses. Billings, Hiatt, 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. Hiatt.
d. Digestion and Metabolism. Grubbs, Beman.
e. Physico-Chemical (General) Physiology. Angerer,
Lender.
g. Endocrinology. Nishikawa, Broussell.
h. A. Sensory Electrophysiology. Lipets.
i. A. Physiological Control Systems. Couiter.

815 Seminar in Physiology A. 2
Prereq.: Permission of department chairman.

816 Seminar in Physiology G 2
W.
Prereq.: 815.
Continuation of 815.

817 Seminar in Physiology G 2
Sp.
Prereq.: 816.
Continuation of 816.

950 Research in Physiology G
Su., A., W., Sp.
Research for thesis or dissertation purposes only.

Polish

Office: 316 University Hall, 216 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 com-
positions.

606 † Intermediate Polish U 3
Sp. 3 cl.
Prereq.: 605 or permission of instructor.
Reading from modern Polish literature, practice in writing and
speaking.

620* Polish Literature in English U G 5
Translation
W. 3 cl.
Polish literature from the Medieval Period to 1864. The Medieval
period, renaissance, baroque, classicism, romanticism. Emphasis
on Kozianozewski, Mickiewics, Slowacki, Krasinski, Norwid.

621 † Polish Literature in English U G 5
Translation
Sp. 3 cl.
Modern Polish literature from 1864 to the present. Emphasis on
Positivism, realism, and symbolism. Novels of Prus, Slowkiewics,
Zeromski, and Reymont.
Political Science

Office: 100 University Hall, 210 North Oval Drive.

PROFESSORS: HERSON (Chairman), J. AUMANN, J. FURNISS (Mershon Professor), HEIMBERGER, J. HELMS, J. JAFFA, J. MANSFIELD, SPENCER (Emeritus), E. SPITZ, AND WALKER; ASSOCIATE PROFESSORS: CHRISTOPH AND NEMZER; ASSISTANT PROFESSORS: I. HALLE, K. KETTLER, AND J. LOTTE; LECTURER VOROS.

401 American National Government U 5
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 U 5
Su, A, W, Sp. 5 cl.
Prereq.: Hist. 423.
Not open to students with credit for 401.
A study of political ideas, institutions, processes and problems, presenting comparatively the leading types of government in the modern world. Hale and Staff.

508 Government of the United States U 5
A, W, Sp. 5 cl.
Prereq.: 1 course in Pol. Sc.
Not open to students with credit for 401.
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 U 5
A, W, Sp. 5 cl.
Prereq.: 1 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.

510 American State Government U 5
Su, A, W, Sp. 5 cl.
Prereq.: 1 course in Pol. Sc.

530 International Tensions U 3
A, W, Sp. 3 cl.
Prereq.: 2nd jr. 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 U 3
Sp. 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. Heron and Staff.

599 Introduction to Political Science U 5
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.

GENERAL PREREQUISITES FOR COURSES NUMBERED 600 AND 700

Unless otherwise indicated the prerequisites for 600 and 700 courses are two courses in Political Science, or a declared major in another social science, or the consent of the instructor, or the history and social science requirements of the B.A. curriculum.

600 Contemporary Political Problems U G 5
Topics for 1964-65:
A. The American Voter. An examination of the process of voter decision-making; the social bases of voter preference, the roles of political issues and leaders.

601 Introduction to Political Theory U G 5
A. 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. Spitz.

605 Principles of Public Administration I U G 5
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 U G 5
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 U G 5
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, Aumann.

609 Government of Ohio U G 3
W. 3 cl.
Constitution, structure, and functions: the electoral system; finance and personnel; judiciary and law enforcement; organization and conduct of administrative programs; state relations with local governments. Walker, Aumann.

611 Introduction to Jurisprudence U G 5
A. 5 cl.
A study of the concepts which legal systems develop and of the interests which law protects. Ideas of various schools of juristic thought examined. Aumann.

612 International Law U G 5
Sp. 5 cl.

613 Contemporary International Politics U G 5
Su, A. 5 cl.
Political relations among states; methods and goals of diplomacy; current problems in major areas of tension; tendencies toward administrative, judicial, and legislative world-organization. Furniss.

614 Public Personnel Administration U G 3
Sp. 3 cl.
Prereq.: 605.
The organization, purposes and activities of civil service agencies; and the conduct of public personnel policies and processes. Walker.

A-203
<table>
<thead>
<tr>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Administration of Justice</td>
<td>5</td>
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<tr>
<td>Sp. 5 cl.</td>
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<tr>
<td>A study of the nature, purposes, and limitations of law as administered</td>
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<tr>
<td>through courts. The development, organization, and procedures of our judicial</td>
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<td>system. Recent trends in legal thinking.</td>
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<tr>
<td>Aumann.</td>
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<tr>
<td>American Constitutional Law</td>
<td>5</td>
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<tr>
<td>W. 5 cl.</td>
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<tr>
<td>A study of leading constitutional principles in the United States as</td>
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<td>interpreted by the courts. Aumann.</td>
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<tr>
<td>The National Government and the National Economy</td>
<td>3</td>
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<tr>
<td>Sp. 3 cl.</td>
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<td>Prereq.: 401 or 507 and 10 cr. hrs. in Econ.</td>
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<tr>
<td>A study of the interaction of economic and political powers illustrated in</td>
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<td>major contemporary issues of national affairs. Manusfield, Haile.</td>
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<td>History of Political Theory: I, The Socratic Method</td>
<td>5</td>
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<td>A. 3 cl.</td>
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<td>The Socratic revolution in western political philosophy. Its consequences</td>
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<td>for human thought about man, the state, law, justice, property, power,</td>
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<td>happiness. Jaffa.</td>
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<td>History of Political Theory: II, From Machiavelli to Hegel</td>
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<td>W. 5 cl.</td>
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<td>A study of representative works by major modern thinkers—Hobbes, Montesquieu,</td>
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<td>Rousseau, Kant and Hegel—with reference to historical context. Kettler.</td>
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<td>History of Political Thought: III, Contemporary Political Thought</td>
<td>5</td>
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<td>Sp. 3 cl.</td>
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<tr>
<td>An examination of the more important contemporary ideas on the nature of</td>
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<td>the state: anarchism, syndicalism, communism, fascism, socialism, and</td>
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<td>democracy. Spitz, Kettler.</td>
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<tr>
<td>American Political Ideas</td>
<td>3</td>
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<td>W. 3 cl.</td>
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<td>An analysis of American ideas on law and government, authority and liberty,</td>
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<td>oligarchy, and democracy, from the Puritans to the present day. Spitz, Hale.</td>
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<tr>
<td>British Government and Politics</td>
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<td>Su. W. 5 cl.</td>
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<tr>
<td>An analysis of the nature of politics and the conduct of government in</td>
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<td>contemporary Britain, including the making of foreign policy. Christopher.</td>
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<td>Latin American Government and Politics</td>
<td>5</td>
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<td>Sp. 5 cl.</td>
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<td>A study of political processes, institutions, and groups in Latin America,</td>
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<td>with emphasis on constitutional, geographical, social, and economic</td>
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<td>environment in which they operate. Lott, Walker.</td>
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<td>Government of Western Europe</td>
<td>5</td>
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<tr>
<td>Su. A. 5 cl.</td>
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<td>A study of the political institutions of West Germany and France, and as</td>
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<td>time permits, one or more of the small states of Western Europe. Christopher.</td>
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<tr>
<td>Legislation</td>
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<td>W. 3 cl.</td>
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<tr>
<td>The processes of law-making in the United States, constitutions, statutes,</td>
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<tr>
<td>executive ordinances, popular law-making, legislative drafting. Walker.</td>
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<tr>
<td>Public Opinion and Political Processes</td>
<td>5</td>
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<td>W. 5 cl.</td>
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<tr>
<td>The formation, organization, and effects of public opinion and propaganda</td>
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<td>in the modern state. Emphasis on the role of groups in political behavior.</td>
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<td>Chrestoph.</td>
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<td>American Political Parties and Pressure Groups</td>
<td>5</td>
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<td>A, Sp. 5 cl.</td>
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<tr>
<td>The organization, programs, and campaign methods of political parties and</td>
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<td>pressure groups. Methods of nomination, suffrage, qualifications, campaign</td>
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<tr>
<td>finance, and the conduct of elections. Helms.</td>
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<tr>
<td>The Soviet Union</td>
<td>5</td>
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<td>A. 5 cl.</td>
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<tr>
<td>A general study of the Soviet Union; governmental and party institutions;</td>
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<td>ideology and methods; problems of communist dictatorship. Nemser.</td>
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<tr>
<td>Soviet Foreign Policy</td>
<td>5</td>
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<td>W. 5 cl.</td>
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<tr>
<td>Basic concepts about and choices in Soviet foreign policy; development and</td>
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<td>present patterns of Soviet relations with key nations; major problems in</td>
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<td>future relationships. Nemser.</td>
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<tr>
<td>The United States in World Affairs</td>
<td>5</td>
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<td>Sp. 5 cl.</td>
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<tr>
<td>Domestic factors and agencies influencing American foreign policy; basic</td>
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<td>patterns of recent American relations, especially with the Soviet bloc,</td>
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<tr>
<td>Western Europe, and the Middle East. Manusfield, Nemser.</td>
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<tr>
<td>International Relations of the Far East</td>
<td>5</td>
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<td>Sp. 5 cl.</td>
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<tr>
<td>The Far East in contemporary world politics; factors underlying the foreign</td>
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<td>policies of the nations concerned with this region.</td>
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<td>The Government and Politics of the Far East</td>
<td>5</td>
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<td>W. 5 cl.</td>
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<td>Government institutions of China, imperial, republican, and communist</td>
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<td>Constitutionalism vs. militarism, occupation reforms, and contemporary</td>
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<td>politics in Japan. The governments of the nearby east Asian countries.</td>
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<td>Southeast Asia</td>
<td>5</td>
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<td>A. 5 cl.</td>
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<td>Governments and politics of the Philippines, Indonesia, Indo-China, Malay</td>
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<td>and Burma; contemporary problems of this region in relation to world</td>
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<td>politics.</td>
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<td>Regional Patterns in International Politics</td>
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<td>A, W. 3 cl.</td>
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<td>Repealable to a maximum of 15 cr. hrs.</td>
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<td>Basic power concepts, political institutions, and international relations</td>
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<td>of the following major areas, in turn:</td>
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<td>The Far East</td>
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<td>The Middle East</td>
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<td>Central Europe</td>
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<td>Latin America</td>
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<td>Africa</td>
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<td>The Soviet Union</td>
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<tr>
<td>Lott, Furniss, Nemser.</td>
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</tbody>
</table>
POLITICAL SCIENCE

035 Presidential Leadership and the Presidency U G 3-5
Sp. 3 cr.
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
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 overall 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 W 3-5
See prereq. for 705.

707 Honors Courses Sp. 3-5
See prereq. for 705.

714 International Organization and Administration W. 1 2-hr. cl., 1 hr. arr.
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 W 1 2-hr. cl.
Prereq.: 605, 606, 616 or equiv.

731 Methods of Governmental Research A 1 2-hr. cl., 1 1-hr. cl. arr.
Prereq.: 4th yr. standing and 15 cr. hrs. in Pol. Sc.
The materials of political science; history of procedure in political science research; research technique; presentation of results of research. Herson.

734 Comparative Political Parties U G 3 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. Christophers.

735 Contemporary Political Problems U G 3-5
A, W, Sp. 2-3 cr. hrs.
Prereq.: Senior standing and 15 cr. hrs. in Pol. Sc.
Topics for 1964-65:
W. Theories and Schools of International Politics. Furniss.

736 The Policy Process U G 5
W. 5 cr. 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. Case studies in the policy process. Hale.

737 Problems in Soviet Politics U G 3
Sp. 3 cl.
Prereq.: 636 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. Nemzer.

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.: Previous 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, Spitz; Winter Quarter, Jaffa; Spring Quarter, Kettler.

806 Comparative Government G 3-5
Su, A. 1 2-hr. cl.
Prereq.: 628 and either 625 or 627 or 636 or 650 or equiv.
Seminar in the governments of foreign countries. Niemzer, Christophers.

807 Political Parties and Pressure Groups G 3-5
W, Sp. 1 2-hr. cl.
Prereq.: 2 courses in Pol. Sc. at 600 level or above, including 635.
Seminar in American political parties and pressure groups. Herson.

808 Public Administration G 3-5
W. 1 2-hr. cl.
Prereq.: Any 2 of: 605, 606, 614, 618, 720, or equiv.
Seminar in staff and line activities of national, state, and local governments. Mansfield, Walker, Hale.

809 Municipal Government G 3-5
Sp. 1 2-hr. cl.
Prereq.: 605, 606, 607, or equiv.
Seminar in the municipal governments of the United States and Europe. Walker, Herson.

810 International Relations G 3-5
Sp. 1 2-hr. cl.
Prereq.: 714 or 640 or 649.
Seminar in international relations. Nemzer, Furniss.

A-205
COURSES OF INSTRUCTION

POLITICAL SCIENCE

811 Public Law
Sp. 1 2-hr. cl.
Prereq.: 615 and 616.
Seminars in the field of public law, including special problems in the fields of constitutional law or judicial administration. Aumann.

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

950 Research in Political Science
G Arr.
Research for thesis or dissertation purposes only.

Portuguese

Office: 118 Derby Hall, 154 North Oval Drive.
PROFESSORS IRWIN COOK (Chairman) and SCHUTZ (Emeritus); ASSOCIATE PROFESSOR 1 GRIFFIN.

701 Minor Problems in Portuguese
U 1-5
Prereq.: Permission of instructor.
Griffin.

Poultry Science

Office: Poultry Administration Bldg., 674 West Lane Avenue.
PROFESSORS J WINTER (Chairman), Z BAKER, ROY J CRAY, DAKAN (Emeritus), D MARSH, D McCARTNEY, and D NABER; ASSOCIATE PROFESSORS D BROWN, D CLAYTON, MARSH, and D MOUNTNEY; ASSISTANT PROFESSORS CHAMBERLIN and TOUCHBURN.

401 Poultry Production
U 5
A, W, Sp. 3 cl., 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 cl.
Prereq.: 401 or Zoöl. 401 or equivo.
Broiler, turkey and waterfowl meat production. Stock rearing, feeding, management and marketing.

503 Market and Hatching Egg Production
U 3
W. 3 cl.
Prereq.: 401 or Zoöl. 401 or equivo.
Production, hatching, management and marketing of pullets and laying hens. Egg care, packaging, pricing and marketing.

Principles of Animal Improvement
(See Dairy Science 550.)
(Offered in cooperation with the Departments of Animal Sc. and Poul. 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 Poul. Sc.)

613* Prevention and Control of Diseases of Poultry
U 5
W. 3 cl., 2 2-hr. lab.
Prereq.: 401 or Zoöl. 401 and Microbiol. 607 or equivo.
Not open to students with credit for 513.
Recognition of diseases of poultry and game birds, prevention and control measures. Marsh.

618 Poultry Products Technology
U 3
A. 1 cl., 2 2-hr. lab.
Prereq.: 15 hr. Chem., Zoöl. 401 or equivo., Microbiol. 607 or equivo.

Poultry Marketing
(See Agricultural Economics 621.)
(Offered in cooperation with the Department of Poul. Sc.)

Nutrition and Feeding of Monogastric Animals
(See Animal Science 630.)
(Offered in cooperation with the Department of Poul. Sc.)

701 Special Problems in Poultry Science
U 2-5
Prereq.: Permission of instructor.
The work must comprise some original research. A written report is required.

Genetics of Animal Populations
(See Dairy Science 790.)
(Offered in cooperation with the Departments of Animal Sc. and Poul. Sc.)

750 Seminar in Poultry Science
U 1
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.)
Preventive Medicine

Office: E-Wing, Sterling Loving Hall, 320 West 10th Avenue.
PROFESSORS: ASHE (Chairman), FANCHER, I.E. LEWIS, IMELING, PACHAN, QUASHNOCK, RASHER, and SHILLITO; ASSOCIATE PROFESSORS: LINN, SPRAJOLA, SRELL, T. W. RIDDLE, and von GIERKE; ASSISTANT PROFESSORS: BILLINGS, CASBREU, COULTER, HALL, EVANS, GOODLOE, HARDING, HUBBARD, HYDE, JONES, KAUFMAN, LENTZ, LEUCHTER, LIEB, LOVELESS, PARKER, SCHREIDER, SCHOBIE, SCHWARTZENBERG, SHARP, TOLMASHEFSKI, WENBERG, and WINTERFELDT.

501 Introduction to Medical Dietetics U 1
A, Sp. 2 cl.
Basic knowledge and experience in functional and sociological aspects of responsibilities of the Medical Dietitian. Lewis and Staff.

510 Introduction to Patient Food Service U 6
Su. 3 cl., 12-hr. clinical study.
Prereq.: Home Ec. 440 or 548.
Principles and practice in food service and dietary care of the hospital patient. Mc Conkey.

515 Quantity Food Preparation and Service U 6
A. 2 cl., 3 4-hr. lab.
Prereq.: Home Ec. 549.
Application of basic principles of food preparation and service in selected types of quantity food service operations. Casberge.

516 Menu Planning and Food Procurement U 6
W. 3 cl., 3 3-hr. lab.
Prereq.: 515.
Basic principles of menu planning and food procurement applied to selected types of quantity food service operations. Casberge.

517 Organization and Management in Quantity Food Service U 4
Su. 2 cl., 8-hr. clinical study.
Prereq.: 516, Bus. Org. 680 or concur.
Principles and theories of personnel, production and financial management related to quantity food service. Hubbard.

595 Epidemiology U 3
A, W, Sp. 2 cl.
Prereq.: Microbiol. 510.

601 Nutrition in Disease U 6
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 U 6
Su. 5 cl., 4-hr. clinical study.
Prereq.: 601.
A continuation of 601.

618 Introduction to Public Health U 3
A, W, Sp. 2 cl.
Prereq.: Nurs. 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.

620 Dietetics Administration U 12
Su., 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 U 12
Su., 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. 2-4 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.

625 Environmental Medicine P 3
Sp. 3 lec., lab.
Prereq.: Med. 2nd yr. standing.
A basic study of man in his environment and the effects of the physical, chemical, biological, psychological and sociological hazzards of the environment upon health and disease. Asha 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 dietitian. Wenberg.

627 Community Nutrition U 3
A, W, Sp. 2 cl., 4 hr. clinical study.
Prereq.: 602 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. Schobie and Keller.

628 Pediatric Nutrition U G 2
Su. 2 cl.
Prereq.: Graduate or senior standing in Medical Dietetics and permission of instructor.
The nutrition of children. The influences 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.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Requirements</th>
<th>Description</th>
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<tbody>
<tr>
<td>718</td>
<td>Applied Nutrition</td>
<td>P 1</td>
<td>Prereq.: Med. 4th yr. standing</td>
<td>A conference and demonstration course. Lewis and Staff.</td>
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<tr>
<td>739</td>
<td>Community Aspects of Medicine</td>
<td>P 2</td>
<td>Prereq.: Med. 4th yr. standing</td>
<td>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.</td>
</tr>
<tr>
<td>750</td>
<td>Epidemiologic Methods</td>
<td>G P 3</td>
<td>Prereq.: Permission of instructor</td>
<td>Principles of epidemiology with special emphasis on methods employed in current epidemiologic studies of chronic diseases. Keller and Staff.</td>
</tr>
<tr>
<td>753</td>
<td>Principles of Public Health Administration</td>
<td>P 2-5</td>
<td>Prereq.: Med. 3rd yr. standing</td>
<td>Administration, organization, and function of Public Health agencies. Principles of sanitation, food inspection, immunization, and school health. Goodloe and Staff.</td>
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<tr>
<td>755</td>
<td>Seminar in Preventive Medicine</td>
<td>P G 1-3</td>
<td>Prereq.: Med. 3rd yr. standing</td>
<td>a. Selected topics in Occupational and Aviation Medicine. Ashe and Staff. b. Selected topics in advanced nutrition. Lewis and Medical Staff.</td>
</tr>
<tr>
<td>760</td>
<td>Nutrition in Systemic Disease</td>
<td>P G 3</td>
<td>Prereq.: Med. senior standing or grad. standing in Nutrition or Medical Dietetics</td>
<td>The physiopathological background of systemic disease and the rationale of specific diets in their prevention and treatment. Lewis and Medical Staff.</td>
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<tr>
<td>761</td>
<td>Community Nutrition</td>
<td>P G 3</td>
<td>Prereq.: Med. senior standing or grad. standing in Nutrition</td>
<td>Methods of discovering problems in public health nutrition and practical application of nutrition information for improvement of nutritional status at various age levels. Scobie.</td>
</tr>
<tr>
<td>780</td>
<td>Minor Problems</td>
<td>P G 3-5</td>
<td>Prereq.: Med. 3rd yr. standing or grad. standing in Prev. Med.; permission of chairman of department</td>
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<tr>
<td>785</td>
<td>Minor Problems in Nutrition or Dietetics</td>
<td>U G 1-5</td>
<td>Prereq.: Graduate or senior standing in Medical Dietetics and permission of instructor</td>
<td>Problems in various phases of nutrition or Medical Dietetics not included in current course offerings. Lewis and Staff.</td>
</tr>
<tr>
<td>810</td>
<td>Occupational Health Principles</td>
<td>G 1</td>
<td>Prereq.: Resident standing in Aviation and Occupational Medicine</td>
<td>Functions of medicine in industry; its role, administrative design, intramural relationships, physical facilities, personnel, equipment, costs and benefits, preplacement and periodic examination of employees, health maintenance, and environmental control. Intramural and extramural relationships of the physician in industry. Lewis and Staff.</td>
</tr>
<tr>
<td>811</td>
<td>Occupational Health Principles</td>
<td>G 1</td>
<td>Prereq.: 810</td>
<td>A continuation of 810.</td>
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<tr>
<td>812</td>
<td>Occupational Health Principles</td>
<td>G 1</td>
<td>Prereq.: 811</td>
<td>A continuation of 811.</td>
</tr>
<tr>
<td>813</td>
<td>Occupational Health Principles</td>
<td>G 1</td>
<td>Prereq.: 812</td>
<td>A continuation of 812.</td>
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<tr>
<td>820</td>
<td>Applied Toxicology In Aviation and Occupational Medicine</td>
<td>G 3</td>
<td>Prereq.: Resident standing in Aviation and Occupational Medicine</td>
<td>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.</td>
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<tr>
<td>821</td>
<td>Applied Toxicology In Aviation and Occupational Medicine</td>
<td>G 3</td>
<td>Prereq.: 820</td>
<td>A continuation of 820.</td>
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<tr>
<td>822</td>
<td>Applied Toxicology In Aviation and Occupational Medicine</td>
<td>G 3</td>
<td>Prereq.: 821</td>
<td>A continuation of 821.</td>
</tr>
<tr>
<td>850</td>
<td>Advanced Preventive Medicine: Public Health</td>
<td>G P 3</td>
<td>Prereq.: 750 or equiv. and permission of instructor</td>
<td>Principles of public health, vital statistics, epidemiology, environmental sanitation, and communicable disease control on local, national and global bases. Keller and Staff.</td>
</tr>
<tr>
<td>851</td>
<td>Advanced Preventive Medicine: Industrial Hygiene</td>
<td>G 3</td>
<td>Prereq.: 850</td>
<td>Resident standing in Aviation and Occupational Medicine. Engineering appraisal of environmental health hazards, sampling techniques, instrumentation and analytical methods; the industrial hygiene survey. Diman, Roberts and Staff.</td>
</tr>
<tr>
<td>852</td>
<td>Advanced Preventive Medicine: Environmental Control</td>
<td>G 3</td>
<td>Prereq.: 850 and 831</td>
<td>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.</td>
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</table>
Psychiatry

Office: 071 Upham Hall, 473 West 12th Avenue.


624 Psychiatry  P3

A.
Prereq.: Med. 1st yr. standing.
The development, structure, and dynamics of personality. Adaptation patterns characteristic of man’s adjustment to the world in which he lives. Patterson and Staff.

651 Psychiatry  P2

A, W.
Prereq.: Med. 2nd yr. standing and 624.
Abnormal psychological responses to stress; pathological dynamics; psychosomatic reactions. Case study methods and interview techniques; organic brain disorders and major psychiatric syndromes. Patterson and Staff.

704 Electroencephalography  G2

A. 2 cl.
Prereq.: Basic training in Psychol. or in Psychiatry, and permission of instructor.
Interpretation and technique of obtaining recordings. Parker.

705 Electroencephalography  G2

W. 2 cl.
Prereq.: 704.
Continuation of 704.

736 Dispensary Clinics in Psychiatry  P2

Prereq.: Med. 4th yr. standing.
Students are assigned clinical work in the Mental Hygiene Clinic. Conferences and seminars held weekly. Correlation of psychiatry, psychological and social work. Patterson and Staff.

780 Minor Problems  P1-4

Prereq.: Med. 2nd yr. standing; permission of chairman.
Library and clinical work. Patterson.

800 Seminars in Psychiatry  G1-2

Prereq.: M.M., residency in Psychiatry, and permission of chairman.
b. Research Methodology. Pasamanick and Staff.
c. Psychotherapy. Patterson and Staff.
d. Psychiatric Literature. Patterson and Staff.

807 Clinical Psychiatry  G2

A. 2 cl.
Prereq.: M.D., and residency in Psychiatry.
Current diagnostic and treatment methods of dealing with major psychiatric disorders. Patterson and Staff.

808 Clinical Psychiatry  G2

W. 2 cl.
Prereq.: 807.
Continuation of 807.

809 Clinical Psychiatry  G2

Sp. 2 cl.
Prereq.: 808.
Continuation of 808.

810 Seminar in Child Psychiatry  G2

Prereq.: M.D., and residency in Psychiatry.
Theory and technique experience in the clinic with emphasis on the collaborative team approach represented by the discipline of psychiatry, social work and psychology. Gove, Missildine.

830 Special Problems in Biological Psychiatry  G1-2

Prereq.: M.D., residency in Psychiatry, and permission of chairman.
d. Neuropathology. Liss.
e. Neuropsychology. Rotblatt.
f. Psychosomatic Medicine. Patterson and Staff.
g. Physiological Psychiatry. Pasamanick and Staff.

840 Special Problems in Clinical Psychiatry  G1-2

Prereq.: M.D., residency in Psychiatry, and permission of chairman.
d. Epidemiology of Mental Illness. Pasamanick.
e. Hospital Group Psychotherapy. Gardner.
f. Mental Health Administration. Rotline.
Psychiatry

950 Psychiatric Research
Prereq.: M.D., and residency in Psychiatry. Research for thesis purposes only.

Psychology

Office: 321 Arps Hall, 1945 North High Street.

✓ 401 General Psychology
Su, A, W, Sp. 5 cl.
Introductory psychology, a prerequisite to advanced courses. The application of the scientific method to behavior. Topics include: Learning, Motivation, Perception, Personality, Physiological basis of behavior.

402 General Psychology
A, W, Sp. 5 cl.
Prereq.: 401.
Continuation of 401. Further emphasis on the development of a scientific attitude toward personal psychological problems in the fields of learning, thinking, intelligence, and personality.

403 Introductory Psychology
A, W, Sp. 5 cl.
Prereq.: Zool. 401-402 or Bot. 401-402 or 20 hrs. Natural Sc.
Not open to students with credit for 401.
An introduction to psychology for students with science background: topics covered similar to 401.

404 Educational Psychology for Medical Personnel
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.

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 concur. 508.
Subject matter and methods of psychology as a life science, with special reference to problems of sensory intensity, the sensory discrimination functions, and perceptual functions. Howell, Goldstein.

505 General Psychology: Motivation and Action
A, W. 3 cl.
Prereq.: 3rd yr. standing and/or concur. 508.
A behavioral presentation of experimental work on learning and motivation. Erickson.

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. Lawson, Johnston.

507 Genetic Psychology
A, W, Sp. 3 cl.
Prereq.: 401 or 403.
The facts of human development with some phylogenetic perspective. 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
A, W, Sp. 3 cl.
Prereq.: 401 or 403.
The influence of group processes, organizational variables, and culture upon the social modification of basic drives, attitudes and language. Kiesler.
541 Psychology of Abnormal Behavior U 3
Su, A, W, Sp. 3 cl. Observation clinics at State Hospital.
Prereq.: 10 cr. hrs. in Psychol.
A consideration of the symptomatology, etiologies and therapies of the major neuroses and psychoses with special emphasis on psychosomatic theories and methods. J. Sy, Musser.

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. Dunanoy, Adams.

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.

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.

608 Elementary Statistical Methods U G 4
Su, A, W, Sp. 2 cl., 2 2-hr. labs.
Prereq.: Math 417 or equivo., or permission of instructor.
Introduction to statistics and application to psychological and educational research. Rationale, computation, and interpretation. Lawson, Troops, Wherry, Naylor, Erickson, Furthingham.

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 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. Horrockes, Clark.

611 The Intellectual Deviate U G 3
Su, W. 3 cl.
Prereq.: 609 or permission of instructor.

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. Horrockes, Purss.

615 Psycho-Educational Diagnosis and Treatment U G 3
1 cl., 4 lab. hrs.
Prereq.: Permission of instructor. Sections A and B prerequisite to C, D and F.
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 interpreting and writing of psychological reports.

615B W. Wechsler. Intelligence Scales for Children and Adults. Theory, development and use of the Wechsler scales.


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. Horrockes.

623 Engineering Psychology U G 3
A. 3 cl.
Prereq.: 504 or 509 or equivo., and 15 cr. hrs. in Psychol. or 2 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. Briggs.

A-211
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Schedule</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>626</td>
<td>Psychology of Learning</td>
<td>4</td>
<td>A, 4 cr.</td>
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<td>Prereq.: 402 or equiv.</td>
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<td></td>
<td>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. Wikens.</td>
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<td>627</td>
<td>Performance Theory</td>
<td>3</td>
<td>W, 3 cr.</td>
<td>Prereq.: Permission of the instructor.</td>
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<td></td>
<td>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. Briggs.</td>
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<tr>
<td>628</td>
<td>Principles and Economy of Learning</td>
<td>3</td>
<td>A, 3 cr.</td>
<td>Prereq.: Grad. standing or 10 cr. hrs. in Psychol.</td>
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<td></td>
<td>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.</td>
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<td>629</td>
<td>Systematic Psychology</td>
<td>3</td>
<td>Sp, 3 cr.</td>
<td>Prereq.: 25 cr. hrs. in Psychol. including 504, 508, 601 and 606 or equiv.</td>
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<tr>
<td></td>
<td>Scientific method in psychology. A consideration of scales of measurement, the use of models and problems of psychophysics. Briggs.</td>
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<tr>
<td>631</td>
<td>Differential Psychology</td>
<td>3</td>
<td>Sp, 3 cr.</td>
<td>Prereq.: 508 or 608, or equiv. and permission of instructor.</td>
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<td></td>
<td>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.</td>
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<tr>
<td>632</td>
<td>The Psychology of Speech</td>
<td>3</td>
<td>W, 3 cr.</td>
<td>Prereq.: 10 cr. hrs. in Psychol. and 10 cr. hrs. in Speech.</td>
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<tr>
<td></td>
<td>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. Knutsen.</td>
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<tr>
<td>633</td>
<td>The Psychology of the Audience</td>
<td>2</td>
<td>Sp, 2 cr.</td>
<td>Prereq.: 679 and 10 cr. hrs. in Speech or permission of instructor.</td>
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<tr>
<td>635</td>
<td>Psychology of Advertising</td>
<td>3</td>
<td>Sp, 3 cr.</td>
<td>Prereq.: 10 cr. hrs. in Psychol.</td>
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<td></td>
<td>The psychological principles involved in effective advertising, notably attention, memory and action, with the contributory factors of association, feeling, instinct, suggestion, and reasoning.</td>
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<td>636</td>
<td>Educational Disability</td>
<td>3</td>
<td>A, 3 cr.</td>
<td>Prereq.: 609, 688, and permission of instructor.</td>
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<td></td>
<td>An overview of theory and practice including causes, diagnostic procedures, remediation, and instructional materials. Huelsman.</td>
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<tr>
<td>637</td>
<td>Industrial Psychology</td>
<td>3</td>
<td>A, 3 cr.</td>
<td>Prereq.: 10 cr. hrs. in Psychol.</td>
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<td></td>
<td>Industrial training; effective work methods; equipment design; environmental factors, fatigue, monotony and accidents; morale.</td>
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<tr>
<td>639</td>
<td>Psychology and Industrial Personnel</td>
<td>3</td>
<td>W, 3 cr.</td>
<td>Prereq.: 10 cr. hrs. in Psychol.</td>
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<td></td>
<td>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.</td>
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<tr>
<td>640</td>
<td>Educational and Vocational Guidance</td>
<td>3</td>
<td>Su, W, 3 cr.</td>
<td>Prereq.: 402 or 407.</td>
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<td></td>
<td>Theory and techniques of appraisal of individual characteristics as related to the formulation of future educational and vocational plans. Fletcher, Stenport.</td>
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<tr>
<td>644</td>
<td>Techniques of Human Motivation</td>
<td>3</td>
<td>W, 3 cr.</td>
<td>Prereq.: 10 cr. hrs. in Psychol.</td>
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<td></td>
<td>The techniques of optimizing human motivation. The incentive values of environmental patterns. Nagel, Toops.</td>
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<tr>
<td>646</td>
<td>Contemporary Viewpoints in Psychology</td>
<td>3</td>
<td>A, 3 cr.</td>
<td>Prereq.: 10 cr. hrs. in Psychol.</td>
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<tr>
<td></td>
<td>A consideration of the development of modern scientific psychology from its roots in the school of the nineteenth century to its contemporary status. Meyer.</td>
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<td></td>
<td>Social psychological theories of group conflict. Personality dynamics in prejudice. Approaches to the reduction of intergroup hostility.</td>
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<td></td>
<td>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.</td>
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<td></td>
<td>Investigation of minor problems in the various fields of psychology.</td>
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<tr>
<td>655</td>
<td>Comparative Psychology</td>
<td>3</td>
<td>A, 1 cr., 2 3-hr. lab.</td>
<td>Prereq.: 504, 505, 595, or 20 hrs. in Psychol, or Zool. including 605 or equiv. and permission of instructor.</td>
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<td></td>
<td>Principles of animal behavior, with emphasis upon the contributions of zoology and B. F. Skinner. Lawson.</td>
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<td>659</td>
<td>Counseling Psychology: An Introduction</td>
<td>3</td>
<td>Su, A, Sp, 3 cr.</td>
<td>Prereq.: 10 cr. hrs. in Psychol.</td>
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<td></td>
<td>A course designed for students who are interested in counseling and personnel work. Discussion of counseling psychology, counseling, and testing. Schmidt.</td>
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</table>
Psychology of Childhood
Su., A, W., Sp. 3 cl.
Prereq.: 402, 403, or 407.
Psychological development from birth to age 12; influence of
school, family, and other out-of-school activities. Provision for the
child's psychological needs. Thompson, Johnson.

Studying the Individual Child
A. Lab. hrs. 2-3
Prereq. or concur: 610 or 663; and permission of in-
structor, or 507 or Home Ec. 561.
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 varied
social situations (using tests when appropriate); coordination of
information obtained from records and interviews and a weekly
report. Thompson.

Psychology of Music
W. 3 cl.
Prereq.: Permission of instructor.
Psychological factors in musical learning, memorization, rhythm,
harmony, form, tone color, interpretation, dictation, and music
talent. Poland.

Psychological Problems of Adult Life
Sp. 3 cl.
A survey regarding changes in capacity for learning through
adolescence and old age in interest, emotions, psychological prob-
lems of work, adult education, leisure. Harrocks, Johnson.

Principles of Treatment the Problem Child
Su., A. 3 cl.
Prereq.: 13 cr. hrs. in Psychol. 609, or permission of in-
structor.
Methods used in dealing with behavior and personality problems

Psychological Study of Individuals and Groups
A., W. 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.

Advanced Educational Psychology
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.

Experimental Social Psychology
A., Sp. 2 cl., 4 lab. hrs.
Prereq.: 531 or equiv., 608 and permission of in-
structor.
Repeatable to a maximum of 12 cr. hrs.
Typical experiments in such social psychological areas as attitude
change, group processes, and group influences upon the indi-
vidual. Kiesler.

Psychology of Personality
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.
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Prerequisites</th>
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<tbody>
<tr>
<td>704</td>
<td>Tests and Measurements in Speech</td>
<td>U G 3</td>
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<td>Sp. 3 cl.</td>
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<td>Prereq.: 908</td>
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<tr>
<td>713</td>
<td>Laboratory in Psychological and Educational Measurement</td>
<td>U G 2</td>
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<td></td>
<td>A. 4 lab. hrs.</td>
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<td>Prereq.: 613 or 680 and permission of instructor.</td>
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<td></td>
<td>Repeatable to a maximum of 6 cr. hrs.</td>
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<td>718</td>
<td>The Psychology of Group Therapy</td>
<td>U G 2</td>
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<td>W, Sp. 2 cl.</td>
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<td>Prereq.: 671 or permission of instructor.</td>
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<tr>
<td>782</td>
<td>Laboratory in the Psychology of Campus Groups</td>
<td>U G 3</td>
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<td>788</td>
<td>Laboratory in Industrial Psychology</td>
<td>U G 3</td>
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<td></td>
<td>1 cl., 4 lab. hrs.</td>
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<td>Prereq.: 608 or 609, and permission of instructor. Repeatable in different sections to a maximum of 12 cr. hrs.</td>
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<tr>
<td>788A</td>
<td>Attitude and Morale Scales</td>
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<td>788B</td>
<td>Industrial Testing</td>
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<td>788C</td>
<td>Job Analysis and Evaluation</td>
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<td>788D</td>
<td>Merit Rating</td>
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<tr>
<td>802</td>
<td>Seminar in Experimental Psychology</td>
<td>G 2</td>
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<tr>
<td>803</td>
<td>Seminar in Educational Psychology</td>
<td>G 2</td>
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<tr>
<td>804</td>
<td>Seminar in Psychological Measurement</td>
<td>G 2</td>
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<tr>
<td>805</td>
<td>Contemporary Psychological Literature</td>
<td>G 1</td>
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<tr>
<td>806</td>
<td>Seminar in Clinical and Abnormal Psychology</td>
<td>G 2 or 4</td>
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<td></td>
<td>Su, A, W, Sp. 2 cl.</td>
<td></td>
<td>Prereq.: Permission of instructor. Two sections, A and B may be offered in any one qtr. Kelly, Barker.</td>
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<tr>
<td>807</td>
<td>Seminars in Industrial Psychology</td>
<td>G 2</td>
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<td></td>
<td>2 cl.</td>
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<td>Prereq.: Permission of instructor.</td>
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<tr>
<td></td>
<td>a. Consumer Behavior and Marketing Research</td>
<td></td>
<td>A. Neyer</td>
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<td></td>
<td>b. Criterion Development</td>
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<td>W. Wherry.</td>
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<td>c. Leadership and Organisational Values</td>
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<td>A. Shartle</td>
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<td></td>
<td>d. Motivation and Morale</td>
<td></td>
<td>f. Training Methods and Devices</td>
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<td></td>
<td>e. Selection and Placement Theory</td>
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<td>g. Current Practices and Trends</td>
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<tr>
<td>810</td>
<td>Psychological Problems in Higher Education</td>
<td>G 2</td>
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<td></td>
<td>W, Sp. 2 cl.</td>
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<tr>
<td>811</td>
<td>Advanced Theoretical Psychology</td>
<td>G 4</td>
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<td></td>
<td>Su, Sp. 4 cl.</td>
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<td>812</td>
<td>Advanced Social Psychology</td>
<td>G 3</td>
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<td></td>
<td>A. 3 cl.</td>
<td></td>
<td>Prereq.: 25 cr. hrs. in Psychol. including 521, and 624 or 626 or equiv.</td>
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<td>813</td>
<td>Seminar in Social Psychology</td>
<td>G 3</td>
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<td>3 cl.</td>
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<td>Prereq.: Permission of instructor.</td>
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<td></td>
<td>a. Contemporary Attitude Theory and Research W.</td>
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<td>A. Kiesler</td>
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<td>b. Social Structure and Personality</td>
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<td>F. Furst.</td>
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<td>c. Current Research Trends</td>
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<tr>
<td>Course</td>
<td>Credits</td>
<td>Description</td>
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</table>
| Intermediate Statistical Methods            | 4       | A. 2 cl., 2 2-hr. labs.  
Prereq.: 098 or equiv., or permission of instructor.  
Principles and techniques for deriving statistical equations; their modification to handle special cases. Clarifying assumptions and their application. **Toops.** |
| Seminars in Psychological Statistics        | 2       | 2 cl.  
Prereq.: Permission of instructor.  
a. Analysis of Variance  
W.  
Lawson.  
b. Experimental Design  
Sp.  
Napier.  
c. Factor Analysis  
A.  
Wherry.  
d. Mathematical Models and Theory  
Sp.  
Evrick.  
e. Non-Parametric Statistics  
A.  
Wherry.  
f. Prediction Statistics  
W.  
Napier.  
g. Current Practices and Trends |
| Correlational Analysis                      | 4       | 4 cl.  
Prereq.: 393 or permission of instructor.  
Techniques and rationale of using quantitative and qualitative data for prediction. Test and battery analysis and validation. **Napier.** |
| Theories of Personality                     | 3       | Su, W, Sp. 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, Roter, LitwRon.** |
| Machine Programming for Psychological Research | 3  | 2 cl., 1 lab.  
Prereq.: 816 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.** |
| Psychology of Counseling                    | 3       | Su, A, W. 3 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.** |
Prereq.: Permission of instructor.  
Peplinak, McMin, Fletcher, Dunaway. |
| Advanced Counseling Psychology              | 3       | Sp. 3 cl.  
Prereq.: 852.  
A survey and critical analysis of literature and research regarding effects of sequence of work activity, vocational exploration, and career development. **Peplinak, Fletcher.** |
| Psychological and Child Study Services in the Public Schools | 3     | Su, Sp. 3 cl.  
Prereq.: Permission of instructor.  
Professional problems in school psychology. **Cassidy, Smith, Huelman.** |
| Methodological Foundations of Experimental Psychology | 5 | W. 5 cl.  
Prereq.: 858A and permission of instructor.  
Problems of definition of psychological concepts, formulation and testing of hypotheses, theory, construction and formulation of empirical generalization with reference to design of psychological experiments. **Briggs, Lawson.** |
| Administrative Aspects of Student Personnel Work | 2 | Sp. 2 cl.  
Prereq.: 828A and permission of instructor.  
Advanced graduate students have the opportunity of relating principles and concepts of student personnel administration to operating procedures on the campus. **Fletcher, Robinson, Stewart.** |
| Intermediate Statistical Methods            | 3       | 3 cl.  
Principles and techniques for deriving statistical equations; their modification to handle special cases. Clarifying assumptions and their application. |
| Advanced Statistical Methods                | 3       | 3 cl.  
Techniques and rationale of using quantitative and qualitative data for prediction. Test and battery analysis and validation. |
| Advanced Experimental Laboratory            | G 3 to 15 | A, W, Sp.  
Prereq.: Permission of instructor.  
Repeatable to a maximum of 15 cr. hrs.  
Advanced training in the experimental and quantitative methods in the several areas of general experimental psychology and comparative psychology. **Meyer, Briggs, Lawson, Wicken.** |
| Beginning Practicum in Counseling           | 3       | Su, A, W, Sp. 2 cl., 4 lab. hrs.  
Prereq.: 821, 852, and permission of instructor.  
Repeatable to maximum of 6 cr. hrs. (Prior credit for 828A 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.** |
| Advanced Practicum in Counseling           | 3       | A, Sp. 1 cl., 4 lab. hrs.  
Prereq.: 823, 832, and permission of instructor.  
Repeatable to 9 cr. hrs. (Prior credit for 828B, 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, Peplinak, Robinson, Schmidt.** |

A-215
COURSES OF INSTRUCTION

PSYCHOLOGY

834 Counseling and Therapy as Social Institutions
A. 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. Popkin.

840 Theory of Human Development
G 3
Sp. 3 cl.
Critical consideration of human development. The meaning of development, the methods of investigation, and the units of measurement will be emphasized. Horrock.

841 Advanced Psychology of Motivation
G 3
W. 3 cl.
Prereq.: 30 cr. hrs. in Psych. including 505 or 626 or equi. 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 is taught. Meyer.

843 Psychophysiology of the Special Senses
G 3
Sp. 3 cl.
Prereq.: 606 or 687 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. Rosewall.

844 Advanced Comparative Psychology
G 3
Sp. 3 cl.
Prereq.: 655.
Contemporary literature in comparative psychology. Meyer, Miles.

845 Perception
G 3
A. 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.
a. Experimental Designs and research Strategies.
Thompson.
c. Development of Social Attitudes and Research Values.
d. Cultural Influences on Human Development.

852 Counseling Diagnostics
G 3-5
Su, 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 diagnostics in counseling and evaluation. Fletcher.

853 History and Systems of Psychology
G 3
A. 3 cl.
Prereq.: 10 cr. hrs. in Psych.
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.

854 Interaction of Developmental Learning Functions
G 2
W. 2 cl.
Prereq.: 653 and 626 or 628 or equi.
Relation of empirical data on imprinting, sensory and motor deprivation, and environmental extensions upon theoretical construction designed to integrate such data. Thompson.

855 Theory of Test Construction and Use
G 3
Sp. 3 cl.
Prereq.: 613 or 680 or equi.
Review of major approaches including traditional mental test theory, assessment theory, and decision theory in relation to constructing and use of various types of tests. Fuust.

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. Kelly.

862 Psychopathology
G 3 to 5
W. 3 cl., 2 optional lab.
Prereq.: Permission of instructor.
Personality disturbances and their clinical manifestations. Kelly.

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. (Repeates a maximum of 15 cr. hrs.)
Practicums: A, W, Sp. 3 cl. (Repeatable to a max. of 9 cr. hrs.)
Prereq.: Permission of instructor.
Student may not receive credits 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.

880 Supervised Field Experience in Psychology
G 1-15
Prereq.: Psychol. 2nd yr. standing and approval of local staff as one 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.
**RURAL SOCIOLOGY**

**822 Seminar in Romance Linguistics**

G 3-5

Sp.

Prereq.: Permission of instructor.

Griffin.

**847 Romance Linguistics I**

G 5

W. 5 cl.

Prereq.: Permission of instructor.

Not open to students with credit for 847.

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 cl.

Prereq.: 847 or permission of instructor.

Not open to students with credit for 848.

Topics and problems, both synchronic and diachronic. Special attention to the minor Romance languages. Griffin.

**Radiology**

Office: University Hospital, 410 W 10th Avenue.

PROFESSORS INELSON (Chairmen), MOLNAR, and IPOMEY-ROY; ASSOCIATE PROFESSORS CHRISTOFORIDIS and FREIMANIS; ASSISTANT PROFESSORS DUNBAR, HARRIS, SOPP, and STEVENS.

**750 Radiology, Advanced**

P 1-3


Prereq.: Med. 4th yr. standing and permission of department chairman.

Students will act as clinical clerks in the department of Radiology, University Hospital, and receive instruction in film reading and techniques.

**780 Minor Problems**

P 1-5


Prereq.: Med. 4th yr. standing and permission of department chairman.

Library, conference and laboratory work.

**950 Research in Radiology**

G Arr.


Research for thesis purposes only.

**Romance Linguistics**

Office: 116 Derby Hall, 154 North Oval Drive.

PROFESSORS ISABEY (Chairman), and SCHUTZ (Emeritus); ASSOCIATE PROFESSORS GRiffin and LEON.

**701 Minor Problems in Romance Linguistics**

U G 1-5

A. W. Sp.

Prereq.: Permission of instructor.

Griffin.

**405 Introduction to Rural Sociology**

U 5

A, W, Sp. 5 cl.

Not open to students with credit for 401, 507 or 511.

Principles of society, major social institutions and social change. Emphasizes social changes in rural life, rural organizations, population and family living. Mangus, Rogers, Mitchell and Assistants.

**506 Rural Leadership**

U 3

Sp. 1 2-hr. cl., 2-hr. lab.

Basic principles and practices in the development of effective leadership in organization programs. Mitchell.

**606 Advanced Rural Sociology**

U G 5

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. Mangus.
COURSES OF INSTRUCTION
RURAL SOCIOLOGY

609 Rural Social Organization U G 3
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.

630 The Rural Family U G 4
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. Mangus.

640 Diffusion of Information on Agricultural Technology U G 3
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 housemaker. Emphasis on the role of group influences, professional agricultural workers, and adoption leaders. Rogers.

660 Rural Sociology of Developing Societies W. 3 cl.
Prereq.: 3rd yr. standing and 10 cr. hrs. or Var. 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.

701 Special Problems U G 2-5
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.

901 Advanced Seminars in Rural Sociology U G 2-4
Prereq.: Permission of instructor.
The fields of study are as follows:
a. Population Problems
b. Rural Family
c. Rural Health
d. Rural Leadership
e. Rural Community and Institutions
f. Community Development
g. Diffusion of Technology
h. Research Methods in Rural Sociology
i. Social Organization and Administrative Problems
j. Sociology of Foreign Areas
k. Rural Church
l. Farmer Organizations

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

Russian

Office: 316 University Hall, 316 North Oval Drive.
PROFESSORS: F. W. SWAROG (Chairman) and H. KRAYDER, ASST.
ASSOCIATE PROFESSORS: F. E. MEMISTZ and S. L. BAJORIS; ASSISTANT
PROFESSORS: E. P. and J. T. KOZLOFF; LECTURER H. KRAYDER.

401 Elementary Russian U 5
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 Russian U 5
A, W, Sp. 5 cl.
Prereq.: 401.

403 Intermediate Russian U 5
A, W, Sp. 5 cl.
Prereq.: 402.
Reading of prose and poetry; oral and written practice; grammar review.

404 Intermediate Russian U 5
A, W, Sp. 5 cl.
Prereq.: 403 or 415.
407, 408 and 409 may be taken in lieu of 404.
Reading of prose and poetry; oral and written practice; vocabulary building.

407 Scientific Russian Reading U 2
A. 2 cl.
Prereq.: 403 or 415.
407, 408 and 409 may be taken in lieu of 404.
Concentration on material of general interest to all sciences.

408 Scientific Russian Reading U 2
W. 2 cl.
Prereq.: 407 or permission of instructor.
407, 408 and 409 may be taken in lieu of 404.
Reading of unedited texts from current Soviet publications.

409 Scientific Russian Reading U 2
Sp. 2 cl.
Prereq.: 408 or permission of instructor.
407, 408 and 409 may be taken in lieu of 404.
Specialized reading and translation of a major contribution in one of the sciences.

415 Intensive Russian U 15-10-5
Su., Sp. 15 cl. Full time req'd.
Prereq.: Permission of chairmen.
Students with no prior credit in Russian must register for 15 cr. hrs. Students with credit for 401-402 may register for 5 or 10 cr. hrs., although the course must be completed.
Not open to students with credit for 403.
Register before May 11.
Elementary and Intermediate Russian for students desiring comprehensive knowledge of Russian in the shortest possible time.

505 Russian Conversation U 3
W. Sp. 3 cl.
Prereq.: 404 or permission of instructor.
406 Russian Composition  U 2
W. Sp. 2 cl.
Prereq.: 404 or permission of instructor.

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.: 506 or permission of instructor.
Review of Russian grammar, composition on assigned topics,
practice in translation.

516 Intermediate Intensive Russian  U 5 or 10
Su. 10 cl.
Prereq.: 403, 415 or permission of chairman.
The equivalency 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. 15 cl., 1st term; 2nd term in USSR.
Prereq.: Minimum of 25 to maximum of 35 cr. hrs. of
Russian or equiv. and permission of department 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 leader.

575 Introduction to Russian Literature, The  U 3
Early Classics: Romanticism, the
Nature School, Early Realism
A. 3 cl.
Prereq.: 403, 415 or permission of instructor.
Conducted in Russian.
Readings from representative authors such as Pushkin, Lermontov,

576 Introduction to Russian Literature, The  U 3
The Russian Realists
W. 3 cl.
Prereq.: 403, 415 or permission of instructor.
Conducted in Russian.
Readings from representative authors such as Turgenev, Dostoevsky,

577 Introduction to Russian Literature,  U 3
Impressionism, Critical Realism,
Symbolism, Socialist Realism
Sp. 3 cl.
Prereq.: 403, 415 or permission of instructor.
Conducted in Russian.
Readings from representative authors such as Chekhov, Gorky,

609 Advanced Reading, Conversation, and  G 3
Composition
A. 3 cl.
Prereq.: 10 hrs. of 500 level courses 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. Epp.

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

611 Advanced Reading, Conversation, and  G 3
Composition
Sp. 3 cl.
Prereq.: 404 or permission of instructor.

620 Russian Literature in English  U G 5
Translation: From Pushkin to Turgenev
Sw. A. 4 cl.
Not open to students with credit for 613.
An introduction to the Russian novel, drama, and poetry. Major
collections of Pushkin, Lermontov, Gogol, Ostrovsky, Konsharov,
and Turgenev. Oulanoff.

621 Russian Literature in English  U G 5
Translation: From Dostoevsky to Blok
Sw. W. 4 cl.
Not open to students with credit for 614.
Reading and analysis of Crime and Punishment, War and Peace,
The Golosyev Family, as well as short stories and plays by
Chekhov, Gorky, Bunin, Bely, and Andreyev. Oulanoff.

622 Russian Literature in English  U G 5
Translation: Soviet Literature
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 Faddeyev, Leonov, Fedin,
Sholokhov, and Pasternak. Oulanoff.

650 Dostoevsky  U G 5
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.
Critical analysis of the major novels and shorter works. The
intellectual and literary development of Dostoevsky. Silbakitis.

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. Silbakitis.

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 1856 to present day. Ostrovsky,
Chekhov, Gorky, Andreyev, Blok, and Soviet writers Leonov and
Katsav.

A-219
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.

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 1830's and 1840's. Romantic Poets.

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 730-730 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.*

722 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.

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.

770 Russian Poetry from Tютчев to the Symbolists G 3
Sp. 3 cl.
Tютчев, Fet, Некрасов, and the Civic poets, Мережковский, Брион, Балмон, Бель, and Блок.

810 Old Church Slavonic G 5
A. 5 cl.
Study of the earliest recorded Slavonic language. Reading and linguistic interpretation of original documents.

811 * Readings in Old Russian G 5
W. 3 cl.
Reading of texts from the medieval period including 1st Old Church Slavonic texts and the later Old Russian texts. *Lehiste.*

840 Seminar in Russian Literature to 1917 G 3-5
W., Sp., Su. 2 cl.
*Twarog, Ososnoff, Silkolorius.*

850 Seminar in Soviet Literature G 3-5
A. 2 cl.
*Twarog.*

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**Serbo-Croatian**

Office: 316 University Hall 218 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 compositions.

606 Intermediate Serbo-Croatian U G 3
Sp. 3 cl.
Prereq.: 605 or permission of instructor.
Reading from modern Serbo-Croatian literature, practice in writing and speaking.
Slavic Languages and Literatures

Office: 316 University Hall, 216 North Guel Dr.

530 Slavic Languages and Cultures
A. 4 cl.
Tught in English.
Historical distribution contemporary situation language policies of Slavic nations; interaction of Slavic cultures and their neighbors; mutual impact of Slavic languages and cultures.
Kramer.

617° Slavic Literature in English
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. Twarog.

618° Slavic Literature in English
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, Remont, Franko, and Ukraiinska. Twarog.

701 Minor Problems in Slavic
Prereq.: Permission of the department chairman.
Klop, Silbajer, Twarog, Kramer, Lechiste.

730 An Introduction to the Slavic Languages
A. 3 cl.
A general survey of all the Slavic languages and their common features.

731 History of South Slavic Languages
A. 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. Lechiste.

732 History of the West Slavic Languages
W. 3 cl.
Prereq.: Good command of Russian and acquaintance with a second Slavic language or permission of instructor.
Polish, Czech, Slovak, Porabian, Kashub, and Sorbian, with special emphasis on Polish and its relation to the other West Slavic Languages. Lechiste.

820 Seminar in Slavic Linguistics
Sp. 5 cl.
Selected topics in Old Church Slavonic, Old Russian, Modern Russian, and Comparative Slavic Linguistics. Lechiste.

830 Seminar in Slavic Literature
W. 2 cl.
Selected topics from Medieval and Modern Literature.

Social Work

Office: 300 Stillman Hall, 1947 N. College Rd.

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: 300 Stillman Hall, 1947 N. College Rd.

511 Social Investigation and Social Statistics
Su, A, W, Sp. 3 cl. 2 2-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, Cymer.

599 Health and Welfare Needs and Resources
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
A, W, Sp. 3 cl.
Prereq.: 511 and 599.
Not open to students with credit for 668.
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
A, W, Sp. 3 cl.
Prereq.: 600 or equiv.
Not open to students with credit for 668.
Study of voluntary and governmental agencies and services involved in the orderly development, administration, financing, and coordination of health and welfare service. Kedlu, Baker.

A-221
621 Principles of Probation and Parole U G 3
W. 3 cl.
Prereq.: 600, Anthrop. 301, Soc. 625 or equiv.
Not for graduate credit to students in Social Work.
A study of how offenders are placed and supervised on probation and parole. Daykin.

627 Juvenile Delinquency and Its Treatment U G 5
A. Sp. 5 cl.
Prereq.: 600, Anthrop. 301, Soc. 625 or equiv.
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. Daykin.

637 Social Implications in Rehabilitation U G 3
A. Sp. 3 cl.
Prereq.: 601 and 10 cr. hrs. of Psych. or equiv.
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 application; rehabilitation as a process; current concepts. Hamilton.

647 Practice in Leading Group Recreation U G 3
A. 4 cl., 1-2 hr. lab.
Prereq.: 600, Psychol. 402 or 404 and 10 cr. hrs. in Soc.
Not for graduate credit to students in Social Work.
Practice and demonstration in leadership of recreational activities. Use of games, music, folk and square dancing, dramas, and other program resources to achieve specific objectives. Longo.

648 Guidance and Group Aspects of Camping U G 3
A. 3 cl.
Prereq.: 600 and Soc. 645 or equiv.
Not for graduate credit to students in Social Work.
Objectives of youth agency camps and democratic procedures in their achievement. Interpersonal relationships, use of organizational structure and program media, staff training, supervisions, and evaluation. Longo.

650 Principles of Group Leadership U G 3
A. W. 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 experience used as illustrative material. Nichols, Longo.

659 Social Work Aspects of the Individual and His Family U G 4
A. W. 4 cl.
Prereq.: Soc. 600, Psychol. 402 or equiv.
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. Prince, Sisson.

661 The Individual and the Social Agency U 4
A. W, Sp.
Prereq.: 601 and 658 or Nurs. 339 or Ed. 505.
Not open 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. Prince, Sisson, Nichols.

675 Social Welfare Observation and Experience U 3-8
Su, A, W, Sp. Social Agency Assignment and 2-4 hr. seminar
Prereq.: 600 and 655, 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.

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, Daykin.

696 Case Studies in Public Social Services U 3
W. 3 cl.
Prereq.: 601 and 661.
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, Sisson.

698 Senior Seminar in Social Welfare U 3
Su, A, W, Sp. 2-4 hr. cl.
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 U 4
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 U 4
A. 3 cl.
Prereq.: Social Work grad. standing.
Dynamic interaction of physical, intellectual, emotional, spiritual, and social influences which affect human social functioning in preadolescent years. Prince, Muller.

706 Dynamics of Behavior for Social Work II U 4
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, Muller.
Dynamics of Behavior for Social Work III  
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.

Social Welfare Policy and Services II  
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.

Interpretation of Social Work  
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. Fanny.

Social Casework I  
A. 2 cl.
Prereq.: Social Work grad. standing. 701 or concur.
Not open to students with credit for 810.
Introduction to the social casework method; basic elements in the casework process; study, diagnosis and treatment; application to practice. Prince, Schneiderman, Haywood.

Social Casework II  
W. 3 cl.
Prereq.: Social Work grad. standing. 713.
Not open to students with credit for 817.
Continued study of the social casework method with emphasis upon the process of psychosocial diagnosis and how it determines treatment aim.

Research Methods in Social Work I  
Sp. 2 cl., 1 3-hr. lab.
Prereq.: Social Work grad. standing. 511 or equiv.
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, Cynmes.

Research Methods in Social Work II  
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 application to social work research.

Medical Aspects of Social Work  
Sp. 2 cl.
Prereq.: Social Work grad. standing. 701.
Not open to students with credit for 855.
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.

Rehabilitation I  
W. 3 cl.
Prereq.: 701, 705 or equiv. and permission of instructor.
Not open to students with credit for 893.
Integration of medical and extra-medical services in rehabilita-

Community Organization for 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 improved program development. Leedy.

Community Organization for 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. Leedy, Shimp.

Social Group Work I  
A. 2 cl.
Prereq.: Social Work grad. standing. 701 or concur.
Principles and concepts. Worker's role in enabling members of a group to use group experience for personal growth and development of social responsibility. Nichols, Longo.

Social Group Work II  
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. Baker, Nichols, Longo.

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 responsibilities with recipients of agency service.

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 area of social work as listed.

a. Corrections.  
Social Group Work.  
Social Work Administration.  
Social Work Research.  
Social Casework.  
Community Organization.  
Rehabilitation of the Handicapped.  
Psychiatric Social Work.  
Other Areas.
COURSES OF INSTRUCTION

SOCIAL WORK

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.

819 Social Work in Multi-Professional Settings G 2
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 Hopkins.

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 in multi-professional services. Mueller,
Sisson.

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.

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.

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. Leedy.

843 The Administration of Social Work Agencies G 3
W. 3 cl.
Prereq.: Social Work grad standing, 824 or 826 or 881.
An introduction to the basic factors in the administration of social
agencies. Livingston, Nichols.

851 Social Welfare Policy and Services III G 3
Sp.
Prereq.: Social Work grad standing, 709 and 843.
Analysis and critical evaluation of social welfare policy and issues.
Role of the profession in affecting policy. Livingston.

852 Supervision in Social Work G 2
Sp. 2 cl.
Prereq.: Social Work grad standing, 843.
The nature and function of the supervisory process in social work
practice. Concepts and methods of social work supervision in
personnel practices and staff development. Nichols.

857 Seminar in Social Work Research I G 3
A. 2 cl. One field project.
Prereq.: Social Work grad. standing. 720, 721 or equiv.
Evaluation of problems in planning and administration of social
work research projects. Cornell, Cymes 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, Cymes 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, need. Cornell, Cymes.

862 Seminar in Psychiatric Applications in Social Work G 2
W. 2 cl.
Prereq.: Social Work grad. standing, 706.
Psychiatric understanding relevant to treatment of more severe
problems of emotional disturbance. Prince.

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 particular-
izing of group members. Baker, 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
work as a means and context for therapeutic experience.

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. Daykin.

875 Agency Laboratory Experience II G 6-15
Prereq.: Social Work 2nd yr. grad. standing and 775.
Repeatable to a maximum of 36 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 com-
munity effort in building balanced programs. Effects of national
agencies on local programs. Leedy.
Sociology

Office: 112 Hagerty Hall, 1775 S. College Rd.
PROFESSORS: LETT (Chairman), BERRY, BULLOCK,
CUBER, DENUNE (Emeritus), DINITZ, JONASSEN,
KRADER, IMANGUS, TOYLER, and RECKLESS; ASSOCIATE
PROFESSORS: CLARK, DYNES, GEIGER, HAAS,
THINKLE, INAGI, NISSEN, and QUARANTELLI; ASSISTANT
PROFESSORS: CLATWORTHY, CORWIN, JEXNOM, HALL,
HELFRICH, SCHWIRIAN, VANDER ZANDEN, and ZELNIEK.

401 Introductory Sociology
Su, A, W, Sp. 5 cl.
Prereq.: 5 cr hrs. in Soc. or equiv., with permission of
instructor. Not open to students with credit for 410, or 507,
or 511, or Rur. Soc. 405.
A study of the fundamental concepts of sociology and an intro-
duction to the analysis of social problems. Buben, Geiger.

402 Social Trends and Problems
Su, A, W, Sp. 5 cl.
Prereq.: 5 cr hrs. in Soc. or equiv., with permission of
instructor. Not open to students with credit for 410 or 511.
A study of recent social trends and contemporary social problems.
Buben and Staff.

407 Sociology of Education
Prereq.: 5 cr hrs. in Soc.
Current social trends as they affect education. Backgrounds of
school children, social status of teachers, role of power and
bureaucracy. Bullock, Corwin, Nissen.

505 The Sociology of Urban Life
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
field and census data. Jonasen, Schurian.

506 Race Problems in the United States
A, W. 3 cl.
Prereq.: 5 cr hrs. in Soc.
A study of social problems associated with contemporary industry
including growth of formal and informal occupational structure,
communication processes, attitudes, and social problems and morale.
Helfrich.

507 Fundamentals of Sociology
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. Berry and Staff.

510 The Standard of Living
Sp. 4 cl.
Prereq.: 5 cr hrs. in Soc. or equiv., with permission of
instructor, or Econ. 403 or Econ. 502.
A study of the content of the various standards of living in American society, their economic and social significance. Problems in family budgets and retail buying. Nissen.

518 Social Implications of Low Income
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 consequent social participation. Nissen.

520 Factors in Successful Marriage
Su. A, W. 3 cl.
An understanding of successful married life. Types of problems faced by dating and married couples and the methods whereby
they may be dealt with successfully. Clark, Dynes, Nissen.

530 Types of Sociological Inquiry
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 514.
Introduction to sociological research techniques, methodological
approaches, and relevant quantitative techniques. Nissen.

562 Social Change
A. 3 cl.
Prereq.: 5 cr hrs. in Soc. or equiv., with permission of
instructor.
Not open to students with credit for 514.
Recent social changes, especially in Western civilization and the
United States. Types of societies in historical perspective. Requirements of a good society. Dinitz.

600 The Modern Family
Impact of modern culture upon the family, including size of family,
marriage, age, divorce, setlement of status of women. Opler, Nissen.

601 Types of Family Organization
W. 4 cl.
Prereq.: 600.
Analysis of family organization in various societies and groups;
problems of comparative study. Opler.

604 Race Relations
A survey of the problems arising from the contacts of people who
differ as to race and culture. Berry.

612 Human Relationships in Industry
A, W. 3 cl.
Social processes and problems associated with contemporary industry including growth of formal and informal organizational structure, communication processes, attitudes and social problems and morale. Helfrich.

A-225
<table>
<thead>
<tr>
<th>COURSES OF INSTRUCTION</th>
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</thead>
<tbody>
<tr>
<td>SOCIOLOGY</td>
</tr>
</tbody>
</table>

**614** The Community  
SU, A, 4 cl.  
Development of the modern community. Approaches to the study of communities, Significance to processes and value systems for community organization and disorganization. Jonasen.

**620** Sociological Interpretation of Modern Values  
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. Geiger.

**621** Contemporary Soviet Society  
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. Geiger.

**622** Social Factors in Personality  
A, SP, 4 cl.  

**623** Collective Behavior and Social Movements  
A, Sp, 3 cl.  
Examination of the dynamic social processes characteristic of mass societies through analysis of crowds, mobs, riots, publics, and the initial stages of social movements. Quinnetelli.

**624** Culture Patterns and Personality  
SP, 3 cl.  
Prereq.: 622 or Psycol, 591 or eqv.  
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.

**625** Criminology  
SU, A, W, SP, 5 cl.  
The nature, variation, and causes of crime and delinquency, Studies of criminal liability, criminal careers, and organized racketeering. Dinitz, Eynon, Reckless.

**626** Penology  
A, SP, 3 cl.  
Prereq.: 625.  
Not open to students with credit for Soc. Work 636.  
The handling and treatment of adult offenders by courts, jails, reformatories, prisons, probation, and parole. Eynon.

**627** Sociological Aspects of Mass Communication  
W, 3 cl.  
Selective analysis of communicators, contents, audiences, and effects of mass media. Research procedures, findings, and theoretical formulations, drawn primarily from studies of popular culture. Quinnetelli.

**629** General Sociology  
A, 4 cl.  
A critical examination of the more fundamental ideas and concepts of modern scientific sociology. Hinkle.

**630** Sociological Research Methods  
A, W, 3 cl.  
Prereq.: 403, 407, 410, or 507, and a course in elementary statistics.  
Not open to students with credit for 705 or 800.  

**638** Population Dynamics and Social Change  
W.  
Prereq.: 10 cr. hrs. of Soc. or equiv. and permission of instructor.  
Not open to students with credit for 704.  
Changes in size, composition and distribution of populations, the dynamics underlying them, and their social consequences. Zeldin.

**643** Analysis of Small Groups  
A, 4 cl.  
Prereq.: 10 cr. hrs. in Soc. and 10 cr. hrs. in Psychol. or equiv. and permission of instructor.  
Effect of size on group processes. Analysis of social interaction, communication patterns, and functional roles within small groups. Observation techniques. Haas.

**644** Sociology of Complex Organizations  
SP.  
Prereq.: 10 cr. hrs. in Soc. or equiv. and permission of instructor.  
Functioning of large complex social groupings. Goals, structures, coordination, dispersion, survival, change as seen in various organizations, e.g., governmental, educational, religious, business, and occupational organizations. Haas.

**645** Work and Leisure in Mass Society  
A, SP, 4 cl.  
An analysis of current relationships between work and leisure emphasizing social implications of increased leisure time, and changing conceptions of work and leisure. Clarke.

**648** Religious Institutions in Modern Society  
A, SP, 3 cl.  
The social role of religious institutions and beliefs, with particular reference to the United States: the relation between religion and other aspects of society. Dynes.

**650** Medical Sociology  
A.  
Prereq.: 10 cr. hrs. in Soc. or equiv. and permission of instructor.  
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.

**660** Development of Sociological Thought  
A, W, SP, 5 cl.  
Prereq.: 15 cr. hrs. in Soc. or equiv.  
A survey of major concerns and conceptions in sociology in relation to their social-historical setting, from 1800 to the present time. Hinkle.

**663†** Social Control  
SP, 3 cl.  
A theory of social control and analysis of selected cases of social control. Text, class reports, projects. Hinkle.
668i Development of Social Thought U G 4 A.
Frereq.: 10 cr. hrs. in Soc. or equiv. and permission of instructor.
A sociological analysis of Western ideas on social relations before
the advent of the social sciences. Himble.

676 Social Stratification U G 4 W.
4 cr.
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. Dynes.

677 Social Organization in a Changing World
U G 4
An examination of present institutional organization in American
society. The impact of world problems upon American culture.
Cuber.

678 The School and the Community U G 3
Su, W. 3 cr.
The school as a social institution in the American community.
The sociological importance of community structures, processes,
and problems in determining school-community relationships.
Jonassen.

680 Social Orientation of Children U G 4
Su (1st term), W. 3 cr. and 1 hr. for field study of a child group.
Frereq.: 409 or 497 or permission of instructor.
A study of the ways in which society socializes children. Current
breakdown in the socializing processes and implications for the
school and other educational agencies. Clarke.

700 Special Problems U G 1-4
Frereq.: 10 cr. hrs. in Soc. Permission of instructor.
A Sociological Theory
B Social Organization and Planning
C Medical Sociology
D Criminology and Penology
E Educational Sociology
F Race Relations
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 U G 3
A
(See National Security Policy Studies 702.)

Problems in National Security U G 3-5
W.
(See National Security Policy Studies 703.)

706 Methods of Social Measurement U G 3
A, Sp. 3 cr.
Frereq.: 630 or Soc. Work 720.
Not open to students with credit for 890.
A critical evaluation of social surveys, areal and regional studies,
the ecological approach, sociometric studies, prediction of outcome,
and case study methods. Bullock.

707 Problems in the Design of Sociological Research
U G 3
A, W, Sp. 3 cr.
Frereq.: 550 or equiv.
Repeatable to a maximum of 9 cr. hrs. Individual sec-
tions 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 cr.
Frereq.: 505 or 614 or equiv. and permission of in-
structor.
Methods, techniques, sources of data and objectives of community
analysis. Jonassen.

725 Control and Prevention of Crime U G 3
and Delinquency
A. 1 2-hr. cl. One field project.
Frereq.: 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
Sp.
(See National Security Policy Studies 601.)

808 Practicum in Sociological Research
U G 3
W, Sp. 3 cr.
Frereq.: 706 and 3 cr. hrs. in 707.
A supervised practical experience in the independent execution of
sociological research, the application of appropriate analytical
techniques, and preparation of research reports.

861 Problems in Social Organization
U G 3
Not open to students who have credit for 860.
A critical examination of problems in social organization, theory,
and research. Cropper, Hens.

862 Problems in Social Organization
U G 3
W.
Continuation of 861.

864 Advanced Criminology
U G 3
Sp.
Frereq.: 625.
A critical study of the most important aspects of criminology.
Reckless, Eynon.

865 Contemporary Sociological Theory
U G 3
Sp.
Frereq.: 660 or equiv.
A critical examination of problems and issues central to recent
developments in sociological theory. Himble.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit</th>
<th>Instructor</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>899</td>
<td>Interdepartmental Seminar</td>
<td>G 1-5</td>
<td>Su, A, W, Sp.</td>
<td>(See under Interdepartmental Seminars.)</td>
</tr>
<tr>
<td>900</td>
<td>Seminars in Sociology</td>
<td>G 1-4</td>
<td>Su, A, W, Sp.</td>
<td>Fields of specialization are listed under the description of 700. Registration in 900 should be followed by an alphabetical letter indicating the field of the seminar.</td>
</tr>
<tr>
<td>401</td>
<td>Elementary Spanish</td>
<td>U 5</td>
<td>Su, A, W, Sp. 5 cl.</td>
<td>May not be taken concurrently with French 401-403, Italian 401-402. Not open to students who are not eligible to take Engl. 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.</td>
</tr>
<tr>
<td>407</td>
<td>Reading of Spanish</td>
<td>G 0</td>
<td>Su, A, W, Sp. 3 cl.</td>
<td>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 had no formal preparation in Spanish and who wish to acquire a reading knowledge.</td>
</tr>
<tr>
<td>415</td>
<td>Elementary-Intermediate Spanish for</td>
<td>U 5</td>
<td>Selected Students</td>
<td>W, 5 cl.</td>
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<tr>
<td></td>
<td>Selected Students</td>
<td>W, 5 cl.</td>
<td>Prereq.: Grade of A in 401 and permission of department. Successful completion of 401-415-416 fulfills language requirements and satisfies prerequisites for 500 courses.</td>
<td></td>
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<tr>
<td></td>
<td>Selected Students</td>
<td>Sp. 5 cl.</td>
<td>Prereq.: 415.</td>
<td>Successful completion of 401-415-416 fulfills language requirements and satisfies prerequisites for 500 courses.</td>
</tr>
<tr>
<td>522</td>
<td>Intermediate Spanish Conversation and Composition</td>
<td>U 2</td>
<td>W, 2 cl.</td>
<td>Prereq.: 410. Vocabulary building, practice in speaking Spanish, conversation and composition dealing with aspects of Spanish and Spanish American life. Frosch, Perdo.</td>
</tr>
</tbody>
</table>
531 Prose Fiction and Essays
A. 5 cr.
Prereq.: 517.
Reading and discussion of various types of modern prose fiction and essays. Loveluck.

532 Drama and Poetry
Sp. 5 cr.
Prereq.: 517.
A selection of plays and poems representing the principal movements and tendencies of the modern period. Babcock.

570 Spanish Literature in English Translation
A. 5 cr.
Not open to Spanish majors.
Selection of major works in Spanish literature in English translation from the early Renaissance period to the present. Babcock.

605 Advanced Composition and Conversation
Su, Sp. 3 cr.
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. Berens.

607 The Spanish Novel of the Nineteenth Century
A. 4 or 5 cr.
Prereq.: 517 and 531 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 cr.
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 cr.
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 Alfonso Sastre. Froesch.

611 Drama of the 16th and 17th Centuries
W. 4 or 5 cr.
Prereq.: 517 and 531 or 532.
An intensive study of a limited number of plays of the representative dramatists, particularly Lope, Tirso, Alarcén, and Calderón.

612 Poetry of the 16th and 17th Centuries
W. 5 cr.
Prereq.: 10 cr. hrs. in Spanish literature at the 500 level.
Major poets and movements of the 16th and 17th centuries.

613 Prose of the 16th and 17th Centuries
Sp. 4 or 5 cr.
Prereq.: 517 and 531 or 532.
Selected prose works by major Renaissance and Baroque authors. Loveluck.

614 Cervantes
W. 4 or 5 cr.
Prereq.: 517 and 531 or 532.
An intensive study of Don Quixote. Loveluck.

617 Modern Spanish Syntax
A. 5 cr.
Prereq.: 517, 518 and 521 or 522.
Systematic study of Spanish grammar with composition and other exercises based on contemporary authors. Modern tendencies in syntactic analysis. Roswell.

620 Spanish Phonetics
A. 4 cr. hrs., 1 hr lab.
Prereq.: 517 or 518, 519 and 521 or 522.
A detailed analysis of the phonological structure of Spanish and a contrastive comparison with English. Practical problems of pronunciation and of teaching are stressed. Griffin.

623 Spanish Translating
W. 3 cr.
Prereq.: 617 or equiv.
Translations from Spanish to English and from English to Spanish. Roswell.

631 Romanticism in the Hispanic World
A. 3 cr.
Prereq.: 517 and 531 or 532.
A study of dramatists, poets, novelists, and essayists designed to bring out the literary unity of the Hispanic world in the Romantic period.

637 Spanish American Literature through Romanticism
A. 5 cr.
Prereq.: 10 cr. hrs. in Spanish literature at the 500 level.
A study of the chronicles and main trends in colonial Spanish American literature. Works of Inca Garcilaso, Sor Juana and Alarcón will be included. Froesch.

638 Spanish American Literature since Romanticism
W. 5 cr.
Prereq.: 10 cr. hrs. in Spanish literature at the 500 level.
The advent of 'americanismo literario'. A study of the romantics and the schools that followed up to 'modernismo'. Froesch.

639 Contemporary Spanish American Fiction
Sp. 3 cr.
Prereq.: 517 and 531 or 532.
The development of narrative prose in Spanish America from 1820 to the present. Loveluck.

640 The Generation of 1898
W. 3 cr.
Prereq.: 517 and 531 or 532.
Readings in fiction, poetry and the essay from such authors as Unamuno, Azorín, Valle-Inclán, Baroja, A. Machado and J. R. Jiménez.

641 Contemporary Hispanic Poetry
Sp. 5 cr.
Prereq.: 517 and 531 or 532.
Currents of Spanish and Spanish American poetry from Rubén Darío to the present time.
645 Spanish Literature U G 3-5
Su. 5 cl.
Prereq.: 517 and 531 or 532.
Repeatable to a maximum of 15 cr. hrs.

701 Minor Problems in Spanish U G 1-5
Prereq.: Permission of instructor.

705 Honors Course in Spanish U 3-10
A.
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.

706 Honors Course in Spanish U 3-10
W.
Prereq.: 705.
Continuation of 705.

707 Honors Course in Spanish U 3-10
Sp.
Prereq.: 706.
Continuation of 706.

729 History of the Spanish Language U G 3
W. 3 cl.
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.

730 Introduction to Medieval Literature G 3
S. 3 cl.
Prereq.: M.A. candidacy or permission of instructor.
Selected readings in Spanish poetry and prose from the beginning to the end of the fifteenth century, partly in modernized versions. Scholberg.

731 Introduction to Methods in the History of Literature and Criticism of Literature G 3
A. 3 cl.
Selected readings in basic literary history, criticism, and theory, with practice in the use of standard bibliographical aids to scholarship. Loclelack.

805 Old Spanish I G 3
A. 3 cl.
Prereq.: Knowledge of Latin.
The development of Old Spanish phonology and morphology with an introduction to the reading of Old Spanish texts. Griffin.

806 Old Spanish II G 3
W. 3 cl.
Prereq.: 805.
A continuation of Old Spanish I, with attention to syntax, vocabulary and dialectology. Griffin.

816 Seminar in Spanish Literature G 2-5
Su. (2-3 cr. hrs.), A. (3-5 cr. hrs.)
Prereq.: Permission of instructor.
Topics: Su., Sor Juana Inés de la Cruz. Rivers.
A., to be announced. Scholberg.

817 Seminar in Spanish Literature G 2-5
Su. (2-3 cr. hrs.), W. (3-5 cr. hrs.)
Prereq.: Permission of instructor.
Su. (2nd term) Sor Juana Inés de la Cruz. Rivers.
W. To be announced. Loclelack.

818 Seminar in Spanish Literature G 3-5
Sp.
Prereq.: Permission of instructor.

821 Old Spanish Literature G 3
Sp.
A literary approach to medieval poetry and prose. Scholberg.

880 Bibliography and Method G 3
Sp.
A course to acquaint graduate students with problems, tools, and methods of linguistic and literary research. Rcecell.

950 Research in Spanish Language or Literature G Arr.
Research for thesis purposes only.

Speech

Office: 205 Derby Hall, 154 North Oval Drive.

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. Knower and Staff.

402 Group Discussion U 5
Su, A, W, Sp. 5 cl.
Designed to develop the attitudes, skills, and knowledge of methods favorable to effective participation in discussion by conferences, committees, and other small groups. Tucker and Staff.

405 Speech for International Students U 5
A, W, Sp. 5 cl.
Often taken in conjunction with Engl. 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.
410 Personal Speech and Hearing U O or 3 
Rehabilitation
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
Morrison, Stromata, Irwin, Moses, Wallace.

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. Yeager 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, Moses, Irwin, Morrison.

425 Introduction to Radio and Television U 2 
W, Sp. 2 cl.

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. Crepeau, 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. Rieke.

501 Principles of Effective Speaking U 3 
A, W, Sp. 3 cl.
Prereq.: 3rd or 4th yr. standing.
Not open to students with credit for 401.

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 1830-1962. Harding.

504 Speech Functions and Responsibilities U 3 of the Teacher
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. Schlanger and Staff.

505 Fundamentals of Oral Interpretation U 5
Su, A, W. 5 cl.
Introductory course to develop understanding and appreciation of literature through the oral re-creation of literary materials and critical listening. Brooks.

506 Persuasion U 3
A, W. 3 cl.
Analysis of the motivations which lead to belief and action of individuals and audiences. Studies in the techniques of achieving persuasive purposes. Fotheringham.

508 The Speech Situation U 2
Su, A, Sp. 2 cl.
A study of oral communication as a social process in terms of speaker-listener relationships. Fotheringham.

509 Personal Speech Effectiveness U 2
Not open to students with credit for 517.
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. Riley and Staff.

511 Parliamentary Law U 2
A, W, Sp. 2 cl.

521 Acting I U 3
Su, A, W, Sp. 2 2-hr. cl. (Su, 3 2-hr. cl.).

522 Acting II U 3
Su. 3 2-hr. cl. W, Sp. 2 2-hr. cl.
Characterization and scene study for stage, radio, and television. Glancy.

525 Stage Make-up U 1
W. 1 3-hr. lab.
Fundamentals of stage make-up for straight and character roles. Crepeau.

541 Elementary Stagecraft U 3
A, W. 2 cl., 1 3-hr. lab.
Basic aspects of stagecraft for theater and television. Ducey.

545 Play Production U 3
Su, A, Sp.
Principles of mounting and staging a play including the theories of play selection and analysis. Schreck, Lewis.

560 Radio and Television Speech U 3
A, W, Sp. 5 cl.
Speaking in the radio or television situation; basic training in preparation and presentation of radio and television talk and interview materials. Riley and Staff.

565 Introduction to Radio and Television Production U 3
A, Sp. 5 cl.
Prereq.: 560 or equiv.
Basic concepts and elements in the production of radio and television programs. Moll, Lynch.
566 Broadcasting Laboratory Practice U 1
A, W, Sp. 1 cl., 1 3-hr. lab.
Prereq.: 560 or equiv.
Repeatability to a maximum of 3 cr. hrs.
Experience in presentation of radio and television programs under broadcasting conditions. Mall and Staff.

571 Radio and Television Program U 2
Departments
W. 3 cl.
Prereq.: 560 or permission of instructor.
Not open to students with credit for 572.
Organization and functions of station program departments; staff requirements, traffic, music library organization, and continuity department operations. Mall.

580 Bases of Speech Production U 3
A, W, Sp. 3 cl.
An analytical study of speech, particularly an orientation to the psychological, neurological, physiological, physical, genetic, phonetic, sociological, linguistic and semantic aspects of speech production. Stromata.

585 Introduction of Phonetics U 3
Su, W, Sp. 3 cl.
Prereq.: 580 recommended.
The International Phonetic Alphabet as applied to American speech. Analysis of the physiological postures and movements involved in the production of English speech sounds. Block.

590 Speech Development in Children U 3
Su, W, Sp. 3 cl.
Language growth from the first vocalization to the expression of abstract thought. Deviations from the normal patterns are noted. Morrison.

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 forensic activities, see Mr. Riecke; 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 U 1
Su, A, W, Sp. A minimum of 3 hrs. of group participation each week.
Repeatable to a maximum of 6 cr. hrs.
Riecke.

B Theatre Arts U 1
Repeatable to a maximum of 6 cr. hrs.
Dewey.

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 not more than two allied subjects, or ten hours in such allied subjects plus ten hours in Speech. Five hours each from the 401-403 and 410-417 sequences are advisable.

601 The Forms of Public Address U G 5
Su. A. 5 cl.
The organization, style, and delivery of speeches for special occasions. Hostettler.

603 Group Thinking and Conference Leadership U G 5
A, Sp. 5 cl.
The methods and procedure employed in setting up conferences and in leading conferences and committee discussion. Tucker.

610 Advanced Argumentation and Debate U G 5
Sp. 5 cl.
Prereq.: 470.
History of the theories of formal argument with study of representative examples of oral argumentation.

617 Problems of American Phonetics U G 3
Su. 3 cl.
Prereq.: 585.
The chief problems treated are: phonetic alphabets and dictionaries, research in dialect, and phonetic analysis.

620 Ancient Rhetorical Theory U G 3
W. 3 cl.
A study of the contributions of early Greek and Roman speech teachers and theorists. Harding.

621 British Rhetorical Theory U G 3
Sp. 3 cl.
The contributions of British speech teachers and theorists from the Renaissance to the present. Hostettler.

623 British Speakers and Speech Making U G 3
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 U G 3
Sp. 3 cl.
Prereq.: 621.

626 Advanced Acting U G 3
Su, W. 2 2-hr. cl.
Prereq.: 592 or equiv.
Advanced study of the theories of acting as related to historical and contemporary developments. Bowne.

627 Stage Design U G 2
A. 1 cl., 3 hrs. lab.
Prereq.: 541 or equiv.
Principles of design as applied to dramatic production. Crapeau.

The Teaching of Speech in Secondary Schools
(See Education 627)

The Teaching of Dramatics and Oral Interpretation in Secondary Schools
(See Education 628)

629 Stage Lighting U G 3
Su, Sp. 2 cl., 1 3-hr. lab.
Prereq.: 541.
Theories in the illumination of stage productions and the creation of aesthetic effects. Dewey.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prereq.</th>
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</thead>
<tbody>
<tr>
<td>631</td>
<td>History of the Theatre</td>
<td>U C 3</td>
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<td>Prereq.: Engl. 550 or 555; Engl. 670 recommended.</td>
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<td></td>
<td>Greek, Roman, Medieval and Commedia dell'arte. McDowell.</td>
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<td>632</td>
<td>History of the Theatre</td>
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<td>Prereq.: Engl. 550 or 555; Engl. 670 recommended.</td>
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<td>633</td>
<td>History of the Theatre</td>
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<td>Sp. 3 cl.</td>
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<td>Prereq.: Engl. 550 or 555 Engl. 670 recommended.</td>
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<td>641</td>
<td>History of Stage Costume</td>
<td>U G 3</td>
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<td>Su, W. 2.2-hr. cl.</td>
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<td>Prereq.: 631 or concur.</td>
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<td></td>
<td>History of costume from the Egyptian period through the 19th century. Crepeau.</td>
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<td>646</td>
<td>Stage Direction</td>
<td>U G 5</td>
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<td>W. 3 2-hr. cl.</td>
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<td></td>
<td>Theories and principles of play direction. Schrock.</td>
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<td>651</td>
<td>Modern Theatre Styles</td>
<td>U G 3</td>
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<td>Prereq.: Engl. 670 or equiv.</td>
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<tr>
<td></td>
<td>Realistic and non-realistic styles in the modern theatre. Schrock.</td>
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<td>652</td>
<td>Broadcast Programs and Audiences</td>
<td>U G 3</td>
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<td>Su, A, Sp. 3 cl.</td>
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<td></td>
<td>Broadcast program types, requirements of effective structure, listener characteristics and preferences in relation to program selection and listener attention. Riley, Mall.</td>
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<td>654</td>
<td>Writing for Radio and Television</td>
<td>U G 3</td>
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<td>A, W, 3 cl.</td>
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<td>Prereq.: 653, Engl. 505 or equiv.</td>
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<td>Writing of continuities for non-dramatic radio and television programs of types presented on local stations. Mall, Lynch.</td>
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<td>662</td>
<td>Television Drama</td>
<td>U G 3</td>
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<td>Sp. 3 cl.</td>
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<td></td>
<td>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.</td>
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<td>670</td>
<td>Radio and Television Program Planning</td>
<td>U G 2</td>
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<td>A, W. 3 cl.</td>
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<td>Prereq.: 653.</td>
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<td></td>
<td>The planning of new programs for radio and television, to the format stage. Replanning programs already on the air, for increased effectiveness. Mall, Riley.</td>
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<td>672</td>
<td>Television Programming</td>
<td>U G 3</td>
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<td>Su, A. 3 cl.</td>
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<td>Prereq.: 652.</td>
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<td>Critical analysis and evaluation of television programs and program forms; factors considered in the over-all scheduling of programs on television stations. Lynch.</td>
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<td>677</td>
<td>Anatomy and Physiology of the Ear and Vocal Mechanisms</td>
<td>U G 5</td>
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<td>A, Sp. 5 cl.</td>
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<td></td>
<td>The structure and functions of the speaking and hearing mechanisms. Strohmets.</td>
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<td>678</td>
<td>Hearing and Speech</td>
<td>U G 3</td>
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<td>W. 3 cl.</td>
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<td></td>
<td>Prereq.: 682 or equiv. and Physics 645.</td>
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<td></td>
<td>Theoretical concepts and supporting data of the process of hearing with particular reference to the reception of speech. Black.</td>
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<td>682</td>
<td>Introduction to Audiology</td>
<td>U G 3</td>
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<td>Su, A, W. 3 cl.</td>
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<td></td>
<td>Prereq.: 10 cr. hrs. in Speech and Psychol.</td>
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<td></td>
<td>Introduces the student to the study of aberrant hearing, information on prevalence, causes, types, and effects of impairments of hearing. LaGourgue.</td>
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<td>683</td>
<td>Speech Reading</td>
<td>U G 3</td>
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<td></td>
<td>Su, W. 5 cl.</td>
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<td>Prereq.: 580, 585, 682.</td>
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<td></td>
<td>Study of major theories of speech reading. LaGourgue, Moser, Wallace.</td>
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<td>684</td>
<td>Speech Reading Clinic</td>
<td>U G 2 or 3</td>
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<td></td>
<td>A, W, Sp. 5 cl.</td>
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<td>Prereq.: 683.</td>
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<td>Repeateble one time.</td>
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<td></td>
<td>Clinical application of principles studied in 683. Strohmets, Wallace.</td>
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<td>688</td>
<td>Audiology: Principles and Practices</td>
<td>U G 3</td>
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<td>Su, W. 3 cl.</td>
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<td>Prereq. 682.</td>
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<td></td>
<td>Study of the functional tests of hearing including individual and group screening and threshold tests. LaGourgue.</td>
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<td>689</td>
<td>Theories of Language Development</td>
<td>U G 3</td>
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<td>of the Deaf</td>
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<td>A. 3 cl.</td>
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<td>Prereq.: 590, Psychol. 609.</td>
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<td>Study of the communicative processes of acoustically handicapped individuals: symbolisation, meaning, syntax. Black and Staff.</td>
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<td>690</td>
<td>The Pre-School Deaf Child</td>
<td>U G 3</td>
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<td>Su. 3 cl.</td>
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<td>Prereq.: 590, Ed. 611, 650.</td>
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<td></td>
<td>Study of the problems of communication of the deaf child.</td>
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<td>693</td>
<td>Theories of Speech Development</td>
<td>U G 3</td>
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<td>of the Deaf</td>
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<td>W. 3 cl.</td>
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<td>Prereq.: 580, 585, 683.</td>
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<td></td>
<td>Study of the development of speech under conditions of minimal auditory stimulation and acoustic feedback. Black and Staff.</td>
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</table>
COURSES OF INSTRUCTION

SPEECH

694 Speech Disorders Survey U G 3
Su, A, Sp. 3 cl.
Prereq.: 560, 585, and 590.
Introduces the student to the study of disorders of speech. Information on prevalence, causes, types, and effects. Moser, Schlangen.

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 U G 2-5
Therapy
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 for Vocal and Articulatory Disorders of Children and Adults U G 3

697B Principles, Methods, and Basic Tools in the Diagnosis and Appraisal of Children and Adults with Speech Disorders U G 2

698 Clinical Practice in Speech U G 2 or 3
Therapy
Su, W, Sp. 5 cl. other hrs. arr.
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. Conf., 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 in Speech U G 3
Su, A. 3 cl.
Prereq.: 25 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. Knower.

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
Sp. 2 cl., 3 hrs. lab.
Prereq. or concur.: 627 and 631, 632, 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 concur.: one of the following: Engl. 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. Glancy.

741 Costume of Period Drama U G 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
Su, A, W. 3 cl.
Prereq. or concur.: 646.
Directing and producing plays for children. Schreck, Lewis.

745 Advanced Theater Direction and Production
Sp. 3 3-hr. cl.
Prereq.: 666.
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 U G 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 U G 2
Sp. 3 cl.
Prereq.: 654 or equiv. and 762.
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
A, W. 2 cl., 1 3-hr. lab.
Prereq.: 10 cr. hrs. in radio-television courses, including 565 or equiv.
Introduction to the art of television production; experience in the direction of short program units. Lynch.

766 Advanced Television Production and Direction
W, Sp. 4-9 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 U G 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
Sp. 3 cl.
Prereq.: 775.
Repeatable one time.
Clinical application of principles studied in 775. Stromata.

778 Experimental Phonetics U G 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.

781† Curricular and Instructional Adjustment for the Deaf Child U G 3
Su. 3 cl.
Prereq.: 690, Ed. 735.
Laboratory projects directed toward the development of language, silent reading, lip-reading among deaf children.

785 Advanced Clinical Practice in Speech, Hearing and Instruction of the Deaf U G 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.: 688, 689, and 10 hours of psychology, or permission of instructor.
Irwin.
b. Stuttering
Prereq.: 696 and 10 hrs. in Psychol., or permission of instructor.
Stromata.
c. Cleft Palate and Laryngeal Speech Disorders
Su, A, W.
Prereq.: 695, 880C or permission of instructor.
Moser, Schlanger.
d. Cerebral Palsy and Aphasia
Prereq.: 695, 880K or permission of instructor.
Moser, Schlanger.
e. Foreign Accent
Prereq.: 585 or permission of instructor.
Black, Morrison.
f. Voice
Prereq.: 697 or permission of instructor.
Moser, Irwin.
g. Articulation
Prereq.: 697 or permission of instructor.
Morrison.
h. Parent Education and Counseling
Prereq.: 697 and 10 cr. hrs. of psychol. or permission of instructor.
Irwin, Morrison.
i. Aural Rehabilitation
Prereq.: 684, 880H or permission of instructor.
Black, Stromata, Wallace.
j. Diagnostic Audiology
Prereq.: 688, 880F or permission of instructor.
Black, La Gourgue, 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)

820 Seminar in Public Address G 2-5
Repeatable.
a. Rhetoric of Plato
Su. (1st term).
Carmack.
b. Rhetoric of Aristotle
Su. (2nd term).
Carmack.
c. The Presidential Campaign Speech of 1964
A.
Harding.
d. Abolition and Secession Speech Making
A.
Carmack.
e. Attic Orators
W.
Carmack.
f. The Rhetoric of Quintilian
W.
Harding.
g. Reform Speakers and Speech Making
Sp.
Carmack.
h. Goodrich as Rhetorical Critic
Sp.
Harding.

840 Seminar in Theatre C 2-5
Repeatable.
a. Early Twentieth Century Staging in the U.S.A.
Su.
McDowell.
b. Educational Theatre
Su. (2nd Term).
Dewey.
c. Festivals and Pageantry in the Renaissance Theatre
A.
McDowell.
d. The Development of Dramatic Art: Classical through Renaissance
A.
Ritter.
e. The Development of Dramatic Art: America.  
W.  
Ritter.

f. Theatre Aesthetics.  
W.  
Schreck.

g. The Development of Dramatic Art: Nineteenth and Twentieth Centuries.  
Sp.  
Ritter.

h. Pioneers of the American Theatre: Designers.  
Sp.  
Crepeau, Lynch, Mall, Riley.

860 Seminar in Radio and Television Programming  
G 2-5
Su, A, W, Sp.  3-4 cr.
Repeatable.

a. Broadcast Critics and Criticism.  
Su.  (1st term)  
Riley.

b. Historical Research in Broadcasting.  
Su.  (2nd term).  
Lynch.

c. Television in the Presidential Campaign.  
A.  
Lynch.

d. Study of Selected Television Documentary Programs.  
A.  
Riley.

e. Historical Study of Broadcast Drama.  
W.  
Riley.

W.  
Mall.

g. Audience Research Methods in Radio and Television.  
Sp.  
Mall.

h. Broadcasting in Foreign Countries.  
Sp.  
Lynch.

877 Advanced Speech and Hearing Pathology  
G 2
W.  1 3-hr. cr.
Prereq.: 677, 678, 698.

Major impairments traceable to diseases of the ear and vocal mechanisms in relation to the sources of rehabilitation. Schlegel and Medical Consultants to the Speech and Hearing Clinic.

880 Seminar in Speech and Hearing Science  
G 1-5
Repeatable.

a. The Application of Psychophysical Techniques to Speech and Hearing.  
A.  
A. 1967.

b. Comparative Phonetics and Dialect  
Su.  
Su. 1967.

c. The Speech Manifestations of Facial, Maxillary, and Laryngeal Disturbances  
Su.  
W.

d. Instrumentation for Speech and Hearing Science  
W.  1966.

e. Clinical Approach to Persons with Phonetic and Vocal Disorders  
Sp.

f. An Analytical Study of Special Screening, Diagnostic and Threshold Tests  
Sp.

g. The Design of Experiments in Speech Hearing  
A.  
A. 1966

h. Auditory Training and Hearing Aids  
W.

i. Psychogenic Disorders of Speech  
Sp.

j. Speech and Language of Acoustically Handicapped Persons  
Su.  1965

k. Language Disorders of Brain-Damaged Persons  
Su.  1965

l. Communicative Disorders of Adults  
A.  
A. 1965

m. Communication Functioning of the Mentally Retarded  
Su.  
Su.  1967

n. Acoustic Spectrography for the Deaf  
Su.  1965

o. Speech Linguistics  
Su.  
Su.  1968

Black, Moser, Schlegel, Irwin, Stromata

881 Seminar in the Nature of Oral Language  
G 1-5
Su, W, Sp.
Repeatable.

Analysis of the bases of word symbols and meanings. The relationship of words and behavior to speech problems.

a. General Semantics.  
Su.  (1st Term)  
Brooks.

W.  
Knowles.

c. Administration of a Speech Department.  
Sp.  
Yeager, Fotheringham.

899 Interdepartmental Seminar  
(See Interdepartmental Seminars)

950 Research in Speech  
G Arr.
Research for thesis or dissertation purposes only.
SURVEY COURSES IN ARTS AND SCIENCE

Surgery

Office: University Hospital, 410 W. Tenth Avenue

PROFESSORS: ROBERT ZOLLINGER (Chairman), TALLON, O'CLAVINGTON, SELLER, HAMELBERG, HAVENER, KLASSEN, TWINTER, and W. WILLIAMS; ASSOCIATE PROFESSORS: ANDREWS, BOLES, COLLINS, GARVIN, HARDMON, HUNT, JAMES, KINSEY, LEBLANC, MEAGHER, MECKSTROTH, PATTON, ROTH, SATTER, STIRAK, TAYLOR, WILSON, and RICHARD ZOLLINGER; ASSISTANT PROFESSORS: ARNOLD, BAKER, BENNETT, COLEMAN, DAWSON, ECKMAN, FURSTE, FUSCO, HAMILTON, HARDING, HEYDINGER, IRETON, KEECH, KINSEY, KIRK, LACEY, LEWIS, LIPPERT, LITARRE, MILLER, MOSSBACH, B. N. PAGE, PUPPEL, RANDALL, SECREST, R. SMITH, P. SMITH, WILTSBERGER, and ZOX.

625 Introduction to Surgery          P 1
    W. 2-hr. conf.
Frereq.: Med. Ist yr. standing.
Emergency management of injured patients and discussions of various aspects of accidents.

670 Introduction to Clinical Surgery          P 1
    A. 2 hr. conf.
Frereq.: Med. 2nd yr. standing.
An introductory course designed to demonstrate how the basic sciences studied in the first two years of medical school are fundamental to clinical surgical practice.

671 Introduction to Clinical Surgery          P 1
    W.
Frereq.: 670.
Continuation of 670.

715 Clinical Surgery          P 17
Frereq.: Med. 3rd yr. standing.
The student serves as clinical clerk both in inpatient and outpatient departments on the General Surgical Services. He is instructed in total patient care.

736 Clinical Surgery          P 16
Frereq.: 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.

755 Anesthesia          P 2
Frereq.: Med. 3rd yr. standing.
Principles and practices of anesthesia. Normal physiology of respiration and circulation as well as abnormal conditions to be

780 Minor Problems          P 1-5
Frereq.: Adequate preclinical training and permission of instructor.
Library, conference, clinic and laboratory work. Zollinger and Staff.

900 Seminar in Surgery          G P 3-5
Attendance at Grand Rounds and weekly X-ray and pathological conference is required. Students are responsible for the material presented.

Survey Courses in Agriculture

401 Survey of Agriculture          U 1
Frereq.: 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, Young.

501 Survey of Agriculture          U 1
    A, W, 1 cl.
Problems of employment in agriculture, business and industry; interviews; selection and application for positions. Hutchison.

502 Agricultural Honors Colloquium          U 2
    W, 2 cl.
Frereq.: 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 of outside speakers. Ritchie.

Survey Courses in Arts and Sciences

401 Orientation to the College of Arts and Sciences          U 0
    Su, A, W, Sp. 1 cl. every other week.
Frereq.: 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          U 1
    W, 1 cl.
Frereq.: 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.

A-237
Survey Courses in Engineering

401 Elements of Engineering U 1
A. 1 cl.
Prereq.: Engr. 1st yr. standing.
The nature of the engineering profession, the work of the professional engineer, and unique characteristics of the various branches of engineering.

402 Elements of Engineering U 1
Sp. 1 cl.
Prereq.: 401.
Continuation of 401.

601 Engineering Concepts and Methods U G 5
Su. 3 cl., 2 2-hr. lab.
Prereq.: Chem. 408 or equiv., Math. 440, Physics 412 and 413.
Not open to students in the College of Engineering.
The science of professional engineering; methodology of engineering analysis and design and its relation to mathematics and physical sciences.

Survey Courses in Social Work

401 Survey of Social Work U 1
A. 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.

Survey Courses in Commerce

401 Commerce College Orientation U O
Prereq.: Admission to College of Commerce and Administration with less than 45 quarter-hour 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.
McCoy, Lynn, Schlenker and Others.

Survey Courses in Arts and Science

490 Methods of Inquiry U 2
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 U G 5
A, Sp.
A study of the major movements of thought in science, social philosophy, the humanities, and religion in the development of Western civilization. Encns.

608 Development of Modern Science U G 5
A, W, Sp. 5 cl.
Prereq.: 4th yr. standing.
The nature of science and its place in modern culture as revealed by detailed sequences of discovery from the history of its development. Speiker.

750 Arts-Graduate Course U G O
Prereq.: Senior standing and approval by the Honors Committee of the College of Arts and Sciences and the Graduate School.
A pass grade 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 degrees.

A-238
Veterinary Anatomy

Office: 102-A Susan Hall, 1900 Coffey Road.
PROFESSORS: VENZKE (Chairman) and DIESEM; ASSISTANT PROFESSOR ANDRES; INSTRUCTORS HOROWITZ and LATHAW.

451 Veterinary Anatomy
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
A: 4 cl., 8 lab. hrs.
The morphology of the cow, sheep, and goat. Diesem, Venzke, Horowitz.

611 Anatomy of Domestic Animals
W. 4 cl., 8 lab. hrs.
The morphology of the horse, pig, and fowl. Diesem, Venzke, Horowitz.

616 Veterinary Histology
W. 3 cl., 4 lab. hrs.
The microscopic structure of the cell and fundamental tissues. Andres, Lathaw.

617 Veterinary Histology
Sp. 3 cl., 4 lab. hrs.
The microscopic structure of organs. Andres, Venzke, Lathaw.

618 Veterinary Embryology
A. 3 cl., 4 lab. hrs.
The developmental anatomy of the chick, pig, cat, and dog. Venzke, Andres, Lathaw.

620 Surgical Anatomy
Sp. 2 cl., 6 lab. hrs.
A thorough dissection of the dog and lecture-demonstrations on areas of special surgical significance in other animals. Diesem, Horowitz, Venzke.

701 Minor Problems
PreReq.: 611, 617, 618.
Training in laboratory investigation of special problems. Venzke, Diesem, Andres.

751 Anatomical Techniques
PreReq.: 611, 617.
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.

VETERINARY CLINICS

755 Veterinary Endocrinology
PG 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.

Veterinary Clinics

Office: 115 Veterinary Clinic Building, 1981 Neil Avenue.
VERNON L. THARP (Director) and RICHARD L. RUDY (Associate Director).
Departments participating in Veterinary Clinics: Veterinary Anatomy; Veterinary Medicine; Veterinary Parasitology; Veterinary Pathology; Veterinary Physiology and Pharmacology; Veterinary Preventive Medicine; Veterinary Surgery and Radiology; Microbiology.

721 Veterinary Clinics
A. 7 2-hr. lab.
Pre Req.: Vet. Med. 3rd yr. standing.
Not open to students with credit for 731.

722 Veterinary Clinics
W. 7 2-hr. lab.
Pre Req.: 731.
Not open to students with credit for 732.

723 Veterinary Clinics
Sp. 7 3-hr lab
Pre Req.: 732.
Not open to students with credit for 733.

724 Veterinary Clinics
Su. 7 24-hr. lab duty, 1 cl.
Pre Req.: 723.
Not open to students with credit for 740.
Intense training in clinical work for one term.

725 Veterinary Clinics
A, W, Sp. 7 24-hr lab duty, 1 cl.
2 quarters required.
Not open to students who have credit for 741.

A-239
Veterinary Medicine

PROFESSORS: KRILL (Dean), THARP (Chairman), THORNE, and EVENSE; ASSOCIATE PROFESSORS: DANHAMEL, DONOVAN, WEAKLEY, and WHITE; INSTRUCTORS: GARDNER, MARTIN, AKINS, and MURDICK.

610 Survey of Veterinary Medicine

A series of lectures designed to acquaint the student with the history and purpose of the profession, professional ethics, and conduct of professional students. Krill.

620 Physical Diagnosis

Sp. 1 cl., 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. Wearely, Murdick, Donoone, Whiteus.

701 Minor Problems

Prereq.: Vet. Med. 4th yr. standing. Adequate clinical training and permission of instructor.
Special problems in veterinary medicine. Wearely, Donoone, Murdick.

719 Veterinary Practice

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. Donoone, Wearely, Whiteus.

720 Veterinary Practice

Sp. 2 cl.
Prereq.: 719.
Continuation of 719.

730 Diseases of Small Animals

A. 3 cl.
Prereq.: 630.
A study of the diseases of small animals with emphasis on the diagnosis and treatment. Donoone.

731 Diseases of Small Animals

W. 3 cl.
Prereq.: 730.
Continuation of 730.

732 Diseases of Small Animals

Sp. 3 cl.
Prereq.: 731.
Continuation of 731.

735 Diseases of Large Animals

A. 4 cl.
Prereq.: 620.
A study of the diseases of large animals with emphasis on diagnosis and treatment. Wearely, Donahme, Gardner.

736 Diseases of Large Animals

W. 3 cl.
Prereq.: 735, 740.
Continuation of 735 and 740.

738 Obstetrics and Genital Diseases

Sp. 3 cl.
Prereq.: Vet. Med. 3rd yr. standing.
Lectures and demonstrations in obstetrics, diseases associated with reproduction and artificial insemination of domestic animals. Tharp, Murdick, Akins.

740 Diseases of Large Animals

A. 4 cl.
Prereq.: 620.
A study of the diseases of large animals with emphasis on diagnosis and treatment. Wearely, Murdick.

750 Ophthalmology

A study of the eye of domestic animals with emphasis upon diagnosis of the eye and the relation of this organ to general diseases. Donoone.

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: 204 Sisson Hall, 1990 Coffey Road.
PROFESSORS: KOUTZ (Chairman) and REBASSIER (Emeritus); ASSOCIATE PROFESSOR GROVES; ASSISTANT PROFESSOR SCOTHORN.
Open only to students registered in the College of Veterinary Medicine.

621 Parasitology

A. 4 cl., 2 2-hr. lab.
Prereq.: Vet. Med. 2nd yr. standing.
A study of the classification, structure, reproduction, habitat, life history, control and treatment of the nematode, cestode, trematode parasites found in domesticated animals. Koutz, Groves.

622 Parasitology

W. 4 cl., 2 2-hr. lab.
Prereq.: 621.
Lectures and demonstrations on the classification, structure, reproduction, habitat, life history, control and treatment of the arthropods and protozoal parasites found in domestic animals. Koutz, Groves.
623 Advanced Veterinary Parasitology  P  G 2-5
Su, A. W. Sp.
Prereq.: 621, 632, or equiv., and permission of chairman.
Repeatable to a maximum of 15 hrs.

701 Minor Problems  P  G 2-8
Su, A. W. Sp.
Kouts, Groves.

827 Seminar in Veterinary Parasitology  G  1
A. W. Sp.

950 Research in Veterinary Parasitology  G Arr.
Su, A. W. Sp.
Research for thesis or dissertation purposes only.
For participation in Clinical Instruction, see courses offered under Veterinary Clinics.

Veterinary Pathology

Office: 207 Goss Laboratory, Veterinary Pathology, 1825 Caffey Road.
PROFESSORS: COLE (Chairman) and FARRELL; ASSOCIATE PROFESSORS GRIESEMERS, KOESTNER and MARSH; ASSISTANT PROFESSOR ILOEB; INSTRUCTORS CAPEN, KASZA, STORTS, and WOLF.

610 Pathology Technic.  P  G 2-10
Su, A. W. Sp.
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, hemat and lymphatic, digestive, respiratory, urinary, genital musculo-skeletal and integumentary systems, and organs of special senses. Griesemers, Koestner, Storts.

701 Minor Problems  P  G 1-10
Su, A. W. Sp.
Prereq.: 621 or equiv. and permission of instructor.
Laboratory, library, conference, and reports concerning animal disease problems. Cole.

731 Pathology of Infectious Diseases  P  4
A. 3 cl, 2 lab. hrs.
Prereq.: 622.
Reaction of the animal body to injury to specific infectious agents. Functional pathology is correlated with morphological and chemical lesions. Griesemers, Farrell.

732 Avian Pathology  P  3
W. 3 cl.
Prereq.: 731.
Diseases of chickens, turkeys, caged birds, game birds, and water fowl. Marsh, Wolf.

733 Veterinary Clinical Pathology  P  2
A. 2 cl, 2 lab. hrs.
Prereq.: 731.
Techniques and interpretation of laboratory determinations applicable to clinical patients. Hematology, urinalysis, chemistry, function studies, and fertility studies are considered. Loeb, Storts.

776 Advanced Systemic Pathology  P  G 2-10
Su, A. W. Sp.
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, Griesemers.

778 Veterinary Surgical Pathology  P  G 2-10
Sp.
Prereq.: 776, Vet. Surg. 623 or equiv., 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.

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, Griesemers.

807 Seminar in Veterinary Pathology  G  1
Su, A. W. Sp.
Repeatable.

950 Research in Veterinary Pathology  G Arr.
Su, A. W. Sp.
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: SMITH (Chairman), MARKS, REDDING, and POUNDEW; ASSOCIATE PROFESSOR POWERS; ASSISTANT PROFESSORS RAY and 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 611.

Concepts and principles involved in the function of various body systems and principles of growth and aging will be considered.
C. R. 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. 622.

Comparative study of physiological concepts and principles involved in reproduction and metabolism in various species of domestic animals. C. R. Smith and Staff.

610 Physiology of Domestic Animals P 5
W. 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
Sp. 4 cl., 3 lab. hrs.
Prereq.: 610.

Physiology of the cardiovascular and respiratory systems, digestion in the simple stomach and rumen. Smith, Hamlin.

619 Veterinary Pharmacology P 3
Sp. 3 cl.
Prereq.: 610.

Pharmaceutical standards, pharmaceutical preparations, weights and measures, prescription writing, drug administration, drugs acting on the nervous system and histamine antagonists. Redding.

620 Veterinary Pharmacology P 3
A. 3 cl.
Prereq.: 619.

Drugs acting on skin, mucous membranes, digestive tract, heart, and parenteral fluid replacement. Redding, Smith.

621 Veterinary Pharmacology P 3
W. 3 cl.
Prereq.: 620.

Anti-infective drugs, antiseptics and disinfectants, diuretics and hormones used as drugs. Powers.

622 Physiology of Domestic Animals P 5
A. 4 cl., 3 lab. hrs.
Prereq.: 621.

Physiology of digestion, metabolism; renal physiology, reproduction, and endocrinology.

701 Minor Problems P G 3-15
Prereq.: 621 and 622 or equiv. and permission of instructor.

Smith, Redding, Pounden.

A-242

950 Research in Veterinary Physiology G Arr.
and Pharmacology

Research for thesis or dissertation purposes only.

For participation in Clinical Instruction, see courses offered under Veterinary Clinics.

Veterinary Preventive Medicine

Office: 252 Sisson Hall, 1900 Coffey Road.

PROFESSORS: HELWIG (Chairman), JONES, ITZYNIK, and BOHL; INSTRUCTORS BULLER, LINDERODGE, and PAYNE; LECTURERS ADAMS, BENDER, BOYD, MYERS, and WITTICH.

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, Linderode.

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, Linderode.

620 Hygiene and Environmental Sanitation P 3
Sp. 3 cl.
Prereq.: Vet. Med. 2nd 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, Linderode.

701 Minor Problems P G 2-5
Prereq.: 620, and permission of instructor.

Helwig, Jones.

730 Biological Research Techniques P G 3
A, W, Sp. 2 2-hr. cl. and lab.
Prereq.: Advanced standing in biological sciences, Microbiol. 607, or equiv., and permission of instructor.

The more common laboratory animals used in biological research and testing will be dealt with as they relate to research purposes, design, and application. Hentthorne.

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 Herb Disease Management.
WELDING ENGINEERING

Veterinary Surgery and Radiology

Office: 111 Veterinary Clinic, 1981 Neil Avenue.

PROFESSORS: RUDY (Chairman), GUARD (Emeritus), and JOHNSON; ASSOCIATE PROFESSORS: GABEL and ROENIGK; ASSISTANT PROFESSOR WILSON.

623 General Surgery
Sp. 4 cl., 2 2-hr. lab.
Prereq.: Vet. Med. 2nd yr. standing.
Lectures, recitations and demonstrations of surgery. RUDY, GABEL, WILSON.

701 Minor Problems
Prereq.: Vet. Med. 4th yr. standing.
Advanced work in surgery and radiology. RUDY, JOHNSON, ROENIGK.

742 Food Hygiene and Public Health
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 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. HELDUG and STAFF.

750 Germfree and Gnotobiotic Animals
W, Sp. 3 2-hr. cl. and lab.
Prereq.: Advanced standing in biological sciences, Microbiol. 607 or equiv., and permission of instructor.
The instrumentation of biological research through application of germfree and gnotobiotic animals. HENTHORNE and STAFF.

800 Seminar in Veterinary Preventive Medicine

810 Veterinary Public Health
S, A, W.

HELDIG, JONES, RUSSELL.

950 Research in Veterinary Preventive Medicine
Research for thesis or dissertation purposes only.
For participation in Clinical Instruction, see courses offered under Veterinary Clinics.

Welding Engineering

Office: 128 Industrial Engineering Bldg., 190 West 18th Avenue.

PROFESSORS: MCCAULEY (Chairman), GREEN, and McMAST; and INSTRUCTORS.

415 Forging, Heat Treating, and Welding
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
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. Qutr.
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 G 3
W.  3 cl.
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  U  6
Industry
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 8th yr.

701  Physics of Welding  U G 4
A.  3 cl., 1 3-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 G 4
A.  3 cl., 1 3-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.
Safety glasses must be worn in the laboratory.
Principles, equipment, techniques, and interpretation of nondestructive test with X-rays, radioscopes, magnetic fields, penetrants, ultrasonics, 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. Qutr.
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.: 708 and 744.
The design of resistance weld products. A selection of process and equipment and a study of tooling used in high production work. Green.

748  Special Problems in Welding  U  3-15
Engineering
Prereq.: 741.
Special studies not offered in the fixed curriculum in the areas related to courses 701, 702, 760, 739, 741, and 742. This work may be taken in more than one area.

754  Thesis  U  3-12
A, W, Sp.  6 lab. hrs.

841  Advanced Problems in Welding  G  2-6
Engineering
Prereq.: Permission of instructor.
Repeatable to a maximum of 34 cr. hrs.
Special studies not offered in the fixed curriculum. Work may be taken under one or more of the special topics in the field including theory of welding processes and their physical mechanisms, 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


For related courses see Biology.

401 General Zoology U 5
W, Sp. 2 cl., 3 1-hr. lab.
Prereq.: 400 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. 2 cl., 2 3-hr. labs.
Prereq.: 401 or Biol. 401 or equiv. or concur, with permission of instructor.
A survey of the animal kingdom with emphasis on classification, function and biology.

Introduction to Ecology U 5
(See Biology 505.)

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.

508 Ornithology U 5
Sp. 2 cl., 1 2-hr. lab.
Prereq.: 404 or 10 cl. hrs. of Biol. 402.
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. Receive.

605 Animal Behavior U 5
A. 2 cl., 2 2-hr. labs.
Prereq.: 404 and 10 additional cl. hrs. of Biol. 402.
An experimental study of the anatomical basis of animal rejections. Putnam.

607 Management of Fisheries U 5
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. Langlais.

610 Animal Parasites U 5
W, Sp. 2 cl., 3 2-hr. labs.
Prereq.: 404 or equiv. and 10 additional cl. hrs. of Biol. 402.
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.

620 Advanced Zoology of Vertebrates U 5
A. Sp. 3 cl., 2 2-hr. labs.
Prereq.: 404 or equiv. and 10 additional cl. hrs. of Biol. Sc., Biol. 509 and Asst. 613 or equiv. recommended. Permission of instructor.
A study of the various vertebrate groups, emphasizing their origin, phylogeny, classification, life histories, habits, distribution and economic importance. Price.

623 Fish Ecology U 5
Su. 2nd term, 3 all day classes per week.
Prereq.: 624 or equiv. and permission of instructor.
Gives only at the Franz Theodore Stone Laboratory. Studies of life histories and interspecific relationships of fishes and of the various factors influencing their abundance.

624 Ichthyology U 5
Su. (1st term), 3 all day classes per week.
Prereq.: 624 or equiv., 15 additional cl. hrs. of Biol. Sc. or equiv. and permission of instructor.
Gives 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.

629 Mammalogy U 5
W. 3 2-hr. cl.
Prereq.: 620 or 640 or equiv.
The comparative morphology, taxonomy, life histories, distribution, and importance of the mammals. Good.

631 Animal Parasitology U 5
Su. 3 all day classes per week.
Prereq.: 404 or equiv. and 10 additional cl. hrs. of Biol. Sc.
Gives only at the Franz Theodore Stone Laboratory. A course emphasizing the parasites infecting freshwater vertebrates, including field and laboratory experiences, host examination, and techniques dealing with staining, fixing, and mounting of specimens.

632 Comparative Embryology U 5
W. 3 cl., 2 2-hr. labs.
Prereq.: 404 or equiv. and 10 additional cl. hrs. of Biol. Sc.
A survey of various modes of embryonic development, illustrated with both invertebrate and vertebrate type material with emphasis on fundamental aspects and processes. Price.

633 Invertebrate Zoology U 5
Su. 2nd term, 3 all day classes per week.
Prereq.: 20 cl. hrs. of Biol. Sc. including 404, or equiv.
Gives only at the Franz Theodore Stone Laboratory. The collection and identification of invertebrate animals, development of methods of classification and use of keys.

634 Biology of Birds U 5
W. 2 cl., 2 2-hr. lab.
Prereq.: 508 or equiv. and 10 additional cl. hrs. of Biol. Sc.
The aspects of anatomy, physiology, taxonomy, and behavior which are pertinent to the study of birds. Putnam.

636 Principles of Animal Ecology U 5
Sp. 3 cl., 2 2-hr. labs. Saturday field trips.
Prereq.: 404, Biol. 401, 402.
Principles and methods of animal ecology and their application to other closely related biological sciences. Stanbery.
637  Ecological Physiology of Aquatic Animals U G 4

Prereq.: 20 cr. hrs. of Biol. Sc.

A study of the aquatic habitat includes physical and chemical adjustment, tolerance, and acclimatization to environment of vertebrates and invertebrates.

640  Wildlife Conservation U G 5

Prereq.: 20 cr. hrs. of Biol. Sc.

A study of research and management techniques employed in the field of wildlife management. This course is especially designed for majors in wildlife conservation.

642  Field Zoology U G 4

Prereq.: 20 cr. hrs. of Biol. Sc. including 404 or equiv.

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.

652  Limnology U G 4

Prereq.: 20 cr. hrs. of Biol. Sc. including 404 or equiv.

Topics include life of birds, the breeding cycle, social relations, territory, ecology, characteristics of population, and techniques in field study of birds.

654  Advanced Ornithology U G 4

Prereq.: 20 cr. hrs. of Biol. Sc.

Study of the aquatic habitat includes physical and chemical adjustment, tolerance, and acclimatization to environment of vertebrates and invertebrates.

656  Herpetology U G 4

Prereq.: 20 cr. hrs. of Biol. Sc.

Study of the aquatic habitat includes physical and chemical adjustment, tolerance, and acclimatization to environment of vertebrates and invertebrates.

671  Invertebrate Zoology U G 5

Prereq.: 20 cr. hrs. of Biol. Sc.

A study of the invertebrates with emphasis on morphology and relationships of representative types.

701  Special Problems U G 2-5

Prereq.: Permission of instructor.

Individual work in the field of the chosen problem.

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

Prereq.: 20 cr. hrs. of Biol. Sc.

A study of the morphology, physiology, life histories, and classification of the acelomate pseudocoelomate invertebrates and the annelid worms.
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 classi-
cation of the eucoelomate invertebrates exclusive of annelid
worms. Broader.

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

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

900 Seminar  G  1 or 2
A. (1 or 2 cr. hrs.), W, Sp. (1 cr. hr.)
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950 Research in Zoology  G Arr.
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SUMMER QUARTER 1964

JUNE 1
Last day applications received without penalty (Mon.)

JUNE 10
Last day applications received with penalty (Wed.)

JUNE 15-16
Last days for placement testing (Mon.-Tues.)

JUNE 18
Last day for completing registration (Thurs.)

JUNE 18
Last day for payment of fees before classes begin for the first term and the quarter (Thurs.)

JUNE 22
Welcome Program for all new students (Mon. even.)

JUNE 22
Classes begin 8:00 a.m. (Mon.)

JULY 3
Final day for late payment of fees with penalty for the first term and the quarter (Fri.)

JULY 4
Legal holiday—No classes—*Offices closed (Sat.)

JULY 6
Last day for withdrawal from the University for the first term with any refund of fees (Mon.)

JULY 20
Last day for withdrawal from the University for the quarter with any refund of fees (quarter students) (Mon.)

JULY 23
Last day for payment of second term fees before the second term classes begin (Thurs.)

JULY 23-24
Final examinations—First term (At regular class hour) (Thurs.-Fri.)

JULY 24
First term ends 12 midnight (Fri.)

JULY 27
Second term begins 8:00 a.m. (Mon.)

JULY 31
Schedule cards available for the Autumn Quarter (Fri.)

AUGUST 1
Schedule cards for the Autumn Quarter may be filed in the college office (Sat.)

AUGUST 7
Final day for late payment of fees for second term with penalty (Fri.)

AUGUST 8
Last day for withdrawal from the University for the second term with any refund of fees (Sat. noon)

AUGUST 27-28
Final examinations (At regular class hour) (Thurs.-Fri.)

AUGUST 28
Summer Convocation (Commencement)

AUGUST 28
Summer Quarter ends 12 midnight (Fri.)

AUGUST 31
Last day for filing Autumn Quarter schedule cards without penalty (Mon.)

AUTUMN QUARTER 1964

SEPTEMBER 1
Last day applications received without penalty (Tues.)

SEPTEMBER 7
Legal holiday—Labor Day—*Offices closed (Mon.)

SEPTEMBER 10
Last day applications received with penalty (Thurs.)

SEPTEMBER 21-22
Last days for placement testing (Mon.-Tues.)

SEPTEMBER 24
Last day for payment of fees (Thurs.)

SEPTEMBER 24
Last day for completing registration (Thurs.)

SEPTEMBER 24-25
Welcome Program for all new students (Thurs.-Fri.)

SEPTEMBER 28
Classes begin 8:00 a.m. (Mon.)

OCTOBER 9
Final day for late payment of fees with penalty (Fri.)

OCTOBER 12
Legal holiday—Columbus Day—Classes as usual—*Offices open (Mon.)

OCTOBER 24
Last day for withdrawal from the University with any refund of fees (Sat. noon)

NOVEMBER 3
Legal holiday—Election Day—12 Noon to 5:30 p.m. Classes as usual—*Offices open (Thurs.)

NOVEMBER 9-10
Schedule cards for Winter Quarter may be obtained in college offices (A-K on Mon. and L-Z on Tues.)

NOVEMBER 11
Legal holiday—Veterans' Day—Classes as usual—*Offices open (Wed.)

NOVEMBER 11-13
Schedule cards for Winter Quarter may be filed in college offices (Wed., Thurs., Fri.)

NOVEMBER 21
Last day for filing Winter Quarter schedule cards without penalty (Sat. noon)

NOVEMBER 26
Legal holiday—Thanksgiving—No classes—*Offices closed (Thurs.)

NOVEMBER 27-28
Student vacation—No classes—*Offices open (Fri.-Sat.)

DECEMBER 12-18
Final Examinations (Sat., Mon., Tues., Wed., Thurs., Fri.)

DECEMBER 18
Autumn Convocation (Commencement)

DECEMBER 18
Autumn Quarter ends, 12 midnight (Fri.)

DECEMBER 25
Legal holiday—Christmas—*Offices closed (Fri.)

DECEMBER 26
*Offices closed (Sat. morn.)
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| MARCH 10 | Last day applications received with penalty (Wed.) |
| MARCH 22-23| Last days for placement testing (Mon.-Tues.) |
| MARCH 25 | Last day for completing registration (Thurs.) |
| MARCH 25 | Last day for payment of fees (Thurs.) |
| MARCH 29 | Classes begin, 8:00 a.m. (Mon.) |
| MARCH 29 | Welcome Program for all new students begins (Mon. even.) |
| APRIL 9  | Final day for late payment of fees with penalty (Fri.) |
| APRIL 24 | Last day for withdrawal from the University with any refund of fees (Sat. noon) |
| MAY 6   | Free day 10:00 a.m. to 5:00 p.m. for undergraduate colleges —*Offices will remain open (Thurs.) |
| MAY 7   | Schedule cards for Summer Quarter may be obtained in the Registrar’s Office (Fri.) |
| MAY 10  | Schedule cards for Summer Quarter may be filed in the college office (Mon.) |
| MAY 25  | Last day for filing Summer Quarter schedule cards without penalty (Sat. noon) |
| MAY 31  | Legal holiday—No classes—*Offices closed (Mon.) |
| JUNE 5-11| Final Examinations (Sat., Mon., Tues., Wed., Thurs., Fri.) |
| JUNE 11 | Spring Convocation (Commencement) 9:00 a.m.—OSU Stadium (Fri.) |
| JUNE 11 | Spring Quarter ends, 12 midnight (Fri.) |

**SUMMER QUARTER 1965**

| JUNE 1  | Last day applications received without penalty (Tues.) |
| JUNE 10 | Last day applications received with penalty (Thurs.) |
| JUNE 14-15| Last days for placement testing (Mon.-Tues.) |
| JUNE 17 | Last day for completing registration (Thurs.) |
| JUNE 17 | Last day for payment of fees (Thurs.) |
| JUNE 21 | Classes begin 8:00 a.m. (Mon.) |
| JULY 5  | Legal holiday—No classes—*Offices closed (Mon.) |
| JULY 23 | First term of the Summer Quarter ends (Fri.) |
| JULY 26 | Second term of the Summer Quarter begins (Mon.) |
| AUGUST 27| Summer Quarter ends, 12 midnight (Fri.) |

*Some divisions of the University must keep offices open and operate at times other than those specified by this calendar.
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*These hours apply only while classes are in session. For further information consult with the specific library concerned.*

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### MAIN LIBRARY REGULAR SCHEDULE OF HOURS

- **Monday through Thursday:**
  - 8:00 a.m. — 11:00 p.m.
  - 8:00 a.m. — 10:00 p.m.
  - 8:00 a.m. — 5:00 p.m.
  - 2:00 p.m. — 10:00 p.m.

- **Friday:**
  - 8:00 a.m. — 11:00 p.m.
  - 8:00 a.m. — 10:00 p.m.
  - 8:00 a.m. — 5:00 p.m.
  - 2:00 p.m. — 10:00 p.m.

### SUMMER SCHEDULE

- **Monday through Friday:**
  - 8:00 a.m. — 10:00 p.m.
  - 8:00 a.m. — 5:00 p.m.

- **Saturday:**
  - 8:00 a.m. — 12:00 M.

- **Sunday:**
  - Closed

### BETWEEN QUARTER AND HOLIDAY SCHEDULE

- **Monday through Friday:**
  - 8:00 a.m. — 5:00 p.m.

- **Saturday:**
  - 8:00 a.m. — 12:00 M.

- **Sunday:**
  - Closed

The departmental libraries operate on varying schedules, which are posted in these libraries and also in the Main Library.

### SUMMER QUARTER

- **June 22** — Summer Quarter hours begin.
- **July 4** — Between quarter hours begin.
- **August 27** — All libraries closed.

### AUTUMN QUARTER

- **September 5-7** — Labor Day Weekend — All libraries closed.
- **September 28** — Fall Quarter begins.
- **November 25** — All libraries close at 5:00 p.m. except Health Center and Children's Hospital Library.
- **November 26** — All libraries closed.
- **November 27** — Begin holiday schedule.
- **December 17** — Begin between quarter schedule.
- **December 25-27** — All libraries closed for Christmas holidays.

### WINTER QUARTER

- **January 1** — All libraries closed.
- **January 4** — Begin regular schedule.
- **March 18** — Begin between quarter schedule.

### SPRING QUARTER

- **March 29** — Begin regular schedule.
- **April 18** — All libraries closed for Easter.
- **May 31** — Libraries follow regular Sunday Schedule.
- **June 10** — Begin between quarter schedule.

### SUMMER QUARTER

- **June 21** — Summer Quarter hours begin.
- **July 5** — All libraries closed.
- **August 27** — Begin between quarters schedule.