The Ohio State University Bulletin is issued twenty-eight times during the year; one time each month in August and September; two times each month in October, November, and January; three times in February; five times each month in March, April, and May; two times in June.
COURSES OF INSTRUCTION OFFERED BY THE FACULTIES OF THE OHIO STATE UNIVERSITY

ISSUE FOR
1963-1964 SESSIONS

THE OHIO STATE UNIVERSITY
COLUMBUS
FOREWORD

This bulletin contains the descriptive information of the courses of instruction offered by The Ohio State University. On the last page is printed a list of the annual bulletins published by the University.

All of the Bulletin numbers, except the Directory issues, will be sent upon request. All requests for bulletins and entrance information should be addressed to the Director of Admissions, The Ohio State University, 100 N. Oval Drive, Columbus 10, Ohio.

KENNETH R. VARNER,
University Editor
SUMMER QUARTER

June 1  Last day applications received without penalty. (Sat. Noon)
June 9  Last day applications received with penalty. (Mon.)
June 9-11 Last days for placement testing. (Mon.-Tues.)
June 13 Last day for completing registration. (Thurs.)
June 15 Last day for payment of fees before classes begin for the first term and the quarter. (Thurs.)
June 17 Welcome Program for all new students begins. (Mon.)
June 17 Classes begin 8:00 a.m. (Mon.)
June 28 Final day for late payment of fees with penalty for the first term and the quarter. (Fri.)
June 29 Last day for withdrawal from the University for the first term with any refund of fees. (Sat. Noon)
July 4 Legal holiday—No classes—Offices closed. (Thurs.)
July 15 Last day for withdrawal from the University for the quarter with any refund of fees (quarter students). (Mon.)
July 18 Last day for payment of second term fees before the second term classes begin. (Thurs.)
July 18-19 Final Examinations, first term (at last regular class hour). (Thurs.-Fri.)
July 19 First term ends, 12 midnight. (Fri.)
July 23 Second term begins, 8:00 a.m. (Mon.)
July 31 Schedule cards available for the Autumn Quarter. (Wed.)
August 1 Schedule cards for the Autumn Quarter may be filed in the college office. (Thurs.)
August 2 Final day for late payment of fees for the second term classes with a penalty. (Fri.)
August 1 Last day for withdrawal from the University for the second term with any refund of fees. (Sat. Noon)
August 22-23 Final Examinations (at regular class hour). (Thurs.-Fri.)
August 23 Summer Convocation (Commencement), 9:00 a.m., St. John Arena. (Fri.)
August 23 Summer Quarter ends, 12 midnight. (Fri.)
August 31 Last day for filing Autumn Quarter schedule cards without penalty. (Sat. Noon)

AUTUMN QUARTER

September 1 Last day applications received without penalty. (Must be postmarked Sun.)
September 2 Legal holiday—Labor Day—Offices closed. (Mon.)
September 9 Last day applications received with penalty. (Tues.)
September 22-24 Last days for placement testing. (Mon.-Tues.)
September 25 Last day for completing registration. (Thurs.)
September 26 Last day for payment of fees. (Thurs.)
September 26-27 Welcome Program for all new students. (Thurs.-Fri.)
September 30 Classes begin 8:00 a.m. (Mon.)
October 11 Final day for late payment of fees with penalty. (Fri.)
October 12 Legal holiday—Columbus Day—Classes as usual—Offices open until Noon. (Sat.)
October 26 Last day for withdrawal from the University with any refund of fees. (Sat. Noon)
November 5 Legal holiday—Election Day—12 noon-5:30 p.m. Classes as usual—Offices open. (Tues.)
November 11 Legal holiday—Veterans' Day—Classes as usual—Offices open. (Mon.)
November 14-15 Schedule cards for Winter Quarter may be obtained in college offices. (A-X on Thurs., and L-Z on Fri.)
November 15-19 Schedule cards for Winter Quarter may be filed in college offices. (Mon., Tues., and Wed.)
November 23 Last day for filing Winter Quarter schedule cards without penalty. (Sat. Noon)
November 28 Legal holiday—Thanksgiving—No classes—Offices closed. (Thurs.)
November 29-30 Student vacation—No classes—Offices open. (Fri. and Sat.)
December 14-20 Final Examinations. (Sat., Mon., Tues., Wed., Thurs., and Fri.)
December 20 Autumn Convocation (Commencement), 9:30 a.m., St. John Arena. (Fri.)
December 20 Autumn Quarter ends, 12 midnight. (Fri.)
December 25 Legal holiday—Christmas—Offices closed. (Wed.)
December 26 Offices open. (Thurs.)
WINTER QUARTER

December 1     Last day applications received without penalty. (Must be postmarked Sun.)
December 10    Last day applications received with penalty. (Tues.)
December 16-17 Last days for placement testing. (Mon.-Tues.)

January 1      Legal holiday—New Year’s Day—Offices closed—No classes.
January 2      Last day for completing registration. (Thurs.)
January 2      Last day for payment of fees. (Thurs.)
January 6      Classes begin 8:00 a.m. (Mon.)
January 8      Welcome Program for all new students begins. (Mon. evening)
January 17     Final day for late payment of fees with penalty. (Fri.)
February 1     Last day for withdrawal from the University with any refund of fees. (Sat. Noon)
February 12    Legal holiday—Lincoln’s birthday—Classes as usual—Offices open (Wed.)
February 13-14 Schedule cards for the Spring Quarter may be obtained in college offices. (A-K on Thurs. and L-Z on Fri.)
February 17-19 Schedule cards for Spring Quarter may be filed in college offices. (Mon., Tues., and Wed.)
February 22    Legal holiday—Washington’s birthday—Classes as usual—Offices open until Noon. (Sat.)
February 22    Last day for filing Spring Quarter schedule cards without penalty. (Sat. Noon)
March 14-20    Final Examinations. (Sat., Mon., Tues., Wed., Thurs., and Fri.)
March 19       Winter Convocation (Commencement), 9:30 a.m., St. John Arena. (Thurs.)
March 20       Winter Quarter ends, 12 midnight. (Frl.)

SPRING QUARTER

March 1        Last day applications received without penalty. (Must be postmarked Sun.)
March 10       Last day applications received with penalty. (Tues.)
March 23-24    Last days for placement testing. (Mon.-Tues.)
March 26       Last day for completing registration. (Thurs.)
March 26       Last day for payment of fees. (Thurs.)
March 30       Classes begin 8:00 a.m. (Mon.)
March 30       Welcome Program for all new students begins. (Mon. evening)
April 10       Final day for late payment of fees with penalty. (Fri.)
April 25       Last day for withdrawal from the University with any refund of fees. (Sat. Noon)
May 7         Free day, 10:00 a.m. to 5:00 p.m., for undergraduate colleges. Offices will remain open. (Thurs.)
May 8         Schedule cards for Summer Quarter may be obtained in the Registrar’s Office. (Fri.)
May 11        Schedule cards for Summer Quarter may be filed in the college office. (Mon.)
May 16        Last day for filing Summer Quarter schedule cards without penalty. (Sat. Noon)
May 30        Legal holiday—Memorial Day—No classes—Offices closed. (Sat.)
June 6-12     Final Examinations. (Sat., Mon., Tues., Wed., Thurs., and Fri.)
June 12       Spring Convocation (Commencement), 9:00 a.m., OSU Stadium. (Fri.)
June 12       Spring Quarter ends, 12 midnight. (Frl.)

SUMMER QUARTER

June 1         Last day applications received without penalty. (Mon.)
June 10        Last day applications received with penalty. (Wed.)
June 11-12     Last days for placement testing. (Mon.-Tues.)
June 18        Last day for completing registration. (Thurs.)
June 18        Last day for payment of fees. (Thurs.)
June 22        Classes begin 8:00 a.m. (Mon.)
July 4         Legal holiday—No classes—Offices closed. (Sat.)
July 24        First term of the Summer Quarter begins. (Frl.)
July 27        Second term of the Summer Quarter begins. (Mon.)
August 28      Summer Quarter ends, 12 midnight. (Frl.)

* Some divisions of the University must keep offices open and operate at times other than those specified by this calendar.
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Residence: 3200 Kiska Ave.—656-6538

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Residence: 361 E. Main St., Circleville—GR-4-2754

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Residence: 1876 Coventry Rd.—HU-8-7487

Dean of Women.................................................................. CHRISTINE Y. CONATIA
Office: 216 Pomerene Hall—CY-3-6091
Residence: 1230 Glenn Ave.—HU-8-1770


(3) Number enclosed by parentheses indicates the number of Quarter credit hours provided by the course.

(4h) Credit hours to be arranged.

(720) Course number enclosed by brackets indicates that course will not be given any Quarter during the current Bulletin year.

# 720 Course will be given in alternate years.

c) Class sessions. Unless stated otherwise, class sessions are 45 minutes in length.

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Acc: Accounting  
Aero-Astro E: Aeronautical Astronautical Engineering  
Agr Bl: Agricultural Biochemistry  
Agr Ed: Agricultural Education  
Agr E: Agricultural Engineering  
Agron: Agronomy  
Air Sc: Air Science  
Anat: Anatomy  
Animal Sc: Animal Science  
Anthrop: Anthropology  
Arch: Architecture  
Arts: Arts Survey  
Astron: Astronomy  
Aviation: Aviation  
Biophys: Biophysics  
Botany: Botany  
Bus Org: Business Organization  
Chem E: Chemical Engineering  
Chem: Chemistry  
Chinese: Chinese  
Civil E: Civil Engineering  
Class Lang: Classical Languages and Literature  
Comp L: Comparative Literature and Languages  
Conserv: Conservation  
Dairy Sc: Dairy Science  
Dairy Tech: Dairy Technology  
Dent Hyg: Dental Hygiene  
Dent: Dentistry  
Econ: Economics  
Eon: Education  
Elec E: Engineering Drawing  
Eng Dr: Engineering Mechanics  
Eng Mech: Engineering Mechanics  
Engl: English  
Entom: Entomology  
Fine Arts: Fine Arts  
Forest: Forestry  
French: French  
Geod Sci: Geodetic Science  
Geog: Geography  
Geol: Geology  
Ger: German  
Greek: Greek  
Health Ed: Health Education  
Home Ed: Home Economics  
Hort: Horticulture  
Ind Eng: Industrial Engineering  
Interdisc: Interdisciplinary Seminars  
Ital: Italian  
Japanese: Japanese  
Journal: Journalism  
Land Arch: Landscape Architecture
COURSES OF INSTRUCTION

The abbreviated description of courses offered by the University follow the page in alphabetical order. The prerequisites of each course are a part of the descriptive material. The system of numbering courses at The Ohio State University is limited to a 300 through 999 series in each course area.

Courses numbered below 500 are primarily designed for freshmen and sophomores and do not carry credit for graduate students. Courses numbered from 500 to 999 are not open to freshmen and do not carry credit for graduate students. Courses numbered 600 through 799 are designed for upperclassmen and graduate students and are not open to freshmen and sophomores except with the consent of the Dean of the Graduate School. Courses numbered 800 and above are designed for graduate students and are open to undergraduate students only upon consent of the Dean of the Graduate School.

General prerequisites for courses numbered from 600 to 799:

At least junior standing and prerequisites that amount to 20 quarter hours in the same and allied subjects of which a minimum of at least 10 quarter hours must be in the same subject; or 50 quarter hours in not more than two allied subjects.

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

General prerequisites for courses numbered 800 or above.

These courses are open only to students registered in the Graduate School and have prerequisites that amount to 30 quarter hours in the same and allied subjects, of which a minimum of 15 quarter hours must be in the same subject.

WORKSHOPS

A workshop is defined as an academic offering in which the students work on specific problems, preferably drawn out of their own experience and proposed by themselves, under individual guidance by qualified staff members, with collateral activities such as group meetings for discussion, examination of visual aids, etc., and consultation with other staff members who may be available; but in no case should such collateral activities occupy more than a contributory place in the whole program.

Workshops are usually given under the number and title “799-Workshop” and are listed in the course offerings of the various departments. The full time of students is required in workshops; hence, registrants may not take other studies or be employed concurrently. The minimum period for a workshop carrying graduate credit is three weeks. The period of time for a workshop conforms to the regular quarter and term periods of the University calendar. Three-week workshops carry four quarter hours of credit and six-week workshops carry eight quarter hours.

No more than twelve hours of Workshop credit may count toward a graduate degree.
ACCOUNTING
Office, 452 Hagerty Hall

PROFESSORS HECKERT (EMERITUS), MCCOY, FERTIG, DICKERSON, ECKELBERRY (EMERITUS), JENCKS, AND SHONTING, ASSOCIATE PROFESSORS BRUSH, BURNHAM, GRIMSTAD, IVY, and KOLLARITSCH, LYLE, McCOLOUGH, AND NORDHEIM; MR. DITTRICH, MRS. GORDON, MR. KING, MR. MOTTICE, MR. SIMMONS, MR. WILLINGHAM, MR. ZIMMER, AND ASSISTANTS

FOR UNDERGRADUATES

501 (5) Su,A,W,S. 502 (5) Su,A,W,S. Introduction to Accounting. 5 cl. Prereq or concur: Econ 401 or 403 or 406 or 507. Not open to students who have credit for 401-402, or 405. Staff

The meaning and uses of accounting reports from the standpoint of the user. Emphasis is given to the accrual interpretation of transactions, refinements in income determination, and the use of accounting reports in managerial decisions.

503 (5) Su,A,W,S. Accounting Methods. 3 cl, 2 2 hr lab. Prereq: 412. Not open to students who have credit for 403. Staff

The application of accounting techniques to recording and reporting financial information. Special emphasis is given to accounting systems and the use of working papers.

510 (5) Su,A,S. Outline of Accounting. 5 cl. Not open to students who have credit for 401 or 411. Mrs. Gordon

Survey of accounting in modern business. This course is intended for students whose major interest is in fields other than business.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

603 (4) Su,A,W,S. Cost Accounting. 4 cl. Prereq: 403 or 413. Not open to students who have credit for 624. Not for graduate credit for majors in Acc. Mr. Brush


Not for graduate credit for majors in Acc. Mr. Burnham, Mr. Grimstad

Analysis and interpretation of financial statements; advanced study of principles of asset valuation, income determination, and equity measurement; business combinations.

623 (3) A,W. Principles of Automatic Data Processing. 2 cl, 1 2 hr lab. Prereq: 402 or 412, Econ 542, and permission of instructor. Mr. McCollough

The principles of processing business data automatically; the uses and limitations of computers in business. Techniques used in formulating and solving business problems on computer.

624 (5) A,S. Factory Costs. 5 cl. Prereq: 402 or 412 or 502. Not open to majors in Acc. Mr. Kollaritsch

Survey of industrial cost accounting for the student whose major interest is in fields other than accounting.

641 (3) Su,A,W,S. Tax Accounting I. 3 cl. Prereq: 403 or 405 or 412. Not for graduate credit for majors in Acc. Mr. Istvan

A study of the federal income tax provisions affecting individuals and business enterprises.

642 (3) Su,A,W,S. Tax Accounting II. 3 cl. Prereq: 641 and 403 or 412. Mr. Istvan

The responsibilities of the accountant for tax reporting and tax planning. Federal, state and local taxes.

643 (3) A. 644 (3) W. Introduction to Management Accounting. 3 cl and conf as reqd. Open only to students with a baccalaureate degree who are preparing for the degree of M.B.A. in the department of Bus Org. Not for graduate credit. Mr. Lyle

A survey of accounting principles from a viewpoint of management; income measurement; analysis and interpretation of accounting data, internal accounting reports.
713 (4) Su, A,W,S. Accounting Practice. 4 cl. Prereq: 602, 616 or 606 and 608. Mr. Burnham
A study of the accounting concepts and standards underlying corporate and non-corporate financial statements, including consideration of typical accounting problems.

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

724 (3) S. Accounting Systems. 3 cl. Prereq: 603 and permission of instructor. Not open to students who have credit for 821, 822, 823 or 824. Mr. Shonting
The principles underlying the design and installation of accounting systems.

735 (5) Su, A,W,S. Auditing Principles and Procedures. 5 cl. Prereq: 603, 616 or 606 or 602. Mr. Jencks, Mr. Northrup
Basic concepts and standards of auditing. Audit procedures and working papers. Internal and external audit reports.

740 (15) Su,W. Field Work in Accounting. Open only to students who hold internships with public accounting firms, or with industrial concerns for which advance approval has been given by the department. 15 hrs and one qtr of residence will be added to graduation requirements for students enrolled in this course. This additional qtr is to be required for the Su Qtr preceding the qtr of field work. Mr. Burnham

799 (2-5) Su,A,W,S. Special Problems. Repeatable to a maximum of 15 cr. hrs.
Individual reports on selected accounting problems in the following fields of accounting: registration for this course number shall be followed by the letter designating the field of study.
(a) Auditing. Mr. Jencks and others.
(b) Budgeting. Mr. McCollough and others.
(c) Cost Accounting. Mr. Brush and others.
(d) Systems. Mr. Shonting and others.
(e) Taxes. Mr. Dickerson and others.
(f) Theory. Mr. Grimstad and others.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

801 (3) A.S. Business Controls. Prereq: 644 or equiv, and Econ 542 or equiv. Not for graduate credit for majors in Acc. Mr. Istvan, Mr. Lyle
Examination of business planning and the controls over operations and property. The use of accounting data in the management enterprise.

804 (3) A. 805 (3) W. 806 (3) S. Seminar in Accounting. Senior Staff

812 (3) A.S. Advanced Tax Accounting. 3 cl. Prereq: 641. Not open to students who have credit for 810 or 811. Mr. Istvan
Tax alternatives and tax planning. Tax research. Post-filing problems and procedures.

813 (3) A.S. Advanced Auditing. 3 cl. Prereq: 738. Mr. Jencks, Mr. Northrup
Growth of the auditor's liability and its effects on auditing procedures. Advance auditing problems. Discussion of current material affecting the auditing profession.

817 (3) Su,W. Theory and Practice. 3 cl. Prereq: 606. Not open to students who have credit for 814, 815, or 816. Mr. Grimstad
Readings, reports, and advanced problems in accounting.

820 (3) Su,W. Controllership. 3 cl. Prereq: 30 hrs in Acc cr equiv. Mr. Kollaritsch
The accounting executive's role in the management of an enterprise. Accounting data for planning, coordination, control, and protection.

[828] (3) A. Accounting Problems of Financial Institutions and Fiduciaries. 3 cl. Prereq: 30 hrs in Acc cr equiv. Mr. Jencks
Accounting principles and problems peculiar to banks, insurance companies, brokerage and investment houses, receivers, executors, and trustees.
ACCOUNTING

830 (3) A. Governmental Accounting. 3 cl. Prereq: 30 hrs in Acc or equiv. Mr. Shonting
The application of accounting principles to government. Problems relating to funds, appropriations and allotments.

856 (3) W. Accounting Policies of Regulatory Agencies. 3 cl. Prereq: 30 hrs in Acc or equiv. Not open to students who have credit for 860 or 865. Mr. Jencks

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

950 (arr) Su. A.W.S. Research in Accounting.
Research for thesis or dissertation purposes only.

AERONAUTICAL AND ASTRONAUTICAL ENGINEERING
Office, 328 Civil and Aeronautical Engineering Building

PROFESSORS VON ESCHEN, SDIE, GATEWOOD, AND LEE, ASSOCIATE PROFESSOR MALETT, ASSISTANT PROFESSOR SOLLINGER, MR. DALE, MR. FISHBURN, MR. GREGOREK, MR. NEREM, MR. PETRIE, MR. THOMAS

FOR UNDERGRADUATES

661 (4) A. 682 (4) W. 683 (4) S. Elements of Aeronautics and Astronautics. 4 cl. Prereq: Physics 523, Math 544 or concur.
An integrated study at an intermediate level of dynamics, fluid mechanics, propulsion, and light weight structures as related to Aeronautical and Astronautical Engineering.

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

698 (3-5) A.W.S. Special Studies in Aeronautical and Astronautical Engineering. 3-5 cl. Not more than 15 cr hrs may be earned in this course. Prereq: permission of department. Not open for graduate credit.
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.

713 (4) A. Aeronautical Laboratory. 2 cl, 2 3 hr lab. Prereq: 5th yr standing in Aero Astro E.
Laboratory demonstrations and experiments in aerodynamics, aeroelasticity, propulsive and structures of flight vehicles.

731 (4) S. Structural Design of Flight Vehicle Components. 2 cl, 2 3 hr lab. Prereq: 730.

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

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

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

760 (4) A. Aerokinetica. 4 cl. Prereq: 688.
Derivation of fundamental equations governing internal and external aerodynamic flows.

765 (4) W. Aerothermochemistry I. 4 cl. Prereq: 700. To be taken in sequence.
The aerodynamics of one-dimensional compressible flow from the molecular-kinetic point of view including chemical reactions in the fluid.
AERONAUTICAL AND ASTRONAUTICAL ENGINEERING

707 (4) S. Compressible Aerodynamics. 4 cl. Prereq: 705, 708.
The fundamentals of the aerodynamics of compressible fluids.

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

714 (3) W. 715 (3) S. Advanced Aeronautical Laboratory. 3 2 hr lab.
Prereq: permission of instructor, 713 or equiv.
The solution of problems in aero-space engineering by experimental methods.

724 (4) S. 725 (4) W. Stability and Control of Flight Vehicles. 4 cl.
Prereq: 729.

729 (4) A. Motion and Deformation of Flight Vehicles. 4 cl. Prereq: 683,
Eng Mech 617, Math 622.
Derivation of the basic equations and methods of analysis governing the motions, deforma-
tions, and resulting stresses encountered by flight vehicles.

Stress and deformation analysis of light weight structures for flight vehicles under static
and dynamic loadings.

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

Dynamic loads analysis of elastic flight vehicles subjected to unsteady airloads.

Functional characteristics and performance of rocket, ramjet, turbojet, turbo-propeller,
pulse jet, and hybrid engines.

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

Characteristic methods, conical flow phenomena, supersonic wing theory, and slender body
theory.

773 (4) S. Advanced Compressible Flow II. 4 cl. Prereq: 772 and 775.
Wing-body interference, shock wave-boundary layer interaction, and control surface in
supersonic flow.

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

776 (4) W. Aerodynamics of Viscous Fluids II. 4 cl. Prereq: 775.
Advanced problems in boundary layer flows.

777 (4) S. Superaerodynamics. 4 cl. Prereq: 707.
Molecular theory of flow, rarefied gas phenomena, aerodynamic forces and heat transfer in
rarefied gas flow.

778 (4) S. Aerodynamic Heating. 4 cl. Prereq: 775.
The analysis of laminar and turbulent boundary layer heat transfer in high speed flow.

779 (4) W. 789 (4) S. Hypersonic Flows. 4 cl. Prereq: 772 and 775.

787 (4) W. Analytical Dynamics of Astronautics I. 4 cl. Prereq: 729 or
equiv.
The dynamical analysis of spacecraft trajectories and orbits including atmospheric re-entry.

788 (4) S. Analytical Dynamics of Astronautics II. 4 cl. Prereq: 787 or
equiv.
Drag estimation, transfer orbits, perturbations, and three-body problems.
AERONAUTICAL AND ASTRONAUTICAL ENGINEERING

798 (2-10) A.W.S. Advanced Studies in Aeronautical and Astronautical Engineering. Repeatable to a maximum of 15 cr hrs.
The course covers special advanced topics in aeronautical and astronautical engineering with the specific area under consideration, announced from quarter to quarter.

799 (2-10) Su,A.W.S. Special Problems in Advanced Aeronautical and Astronautical Engineering. Repeatable to a maximum of 15 cr hrs.
This course is designed to give the advanced student opportunity to pursue special studies in aeronautical and astronautical engineering. Work may be taken under one or more of the special topics of the field, including aircraft structures, aerodynamics, propulsion, flutter and vibration, and stability and control.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

821 (3) A. 822 (3) W. 823 (3) S. Advanced Dynamics of Flight Vehicles. 3 cl. Prereq: 725 or 755 or equiv.

831 (3) A. 832 (3) W. 833 (3) S. Aerodynamics of Plasmas. 3 cl. Prereq: 707, 775 and Elec E 832 or equiv.

841 (3) A. 842 (3) W. 843 (3) S. Advanced Structures for Flight Vehicles. 3 cl. Prereq: 730 or equiv.

851 (3) A. 862 (3) W. 863 (3) S. Advanced Propulsion for Flight Vehicles. Prereq: 764 or equiv.

871 (3) A. 872 (3) W. 873 (3) S. Advanced Aerodynamics. 3 cl. Prereq: 772, 776 or equiv.

881 (1) A.W.S. Seminar. 1 2 hr cl. Repeatable.

950 (arr) Su,A.W.S. Research in Aeronautical and Astronautical Engineering.
Research for thesis or dissertation purposes only.

AGRICULTURAL BIOCHEMISTRY
Office, 101 Vivian Hall

PROFESSORS DEATHERAGE, MOORE, MOXON, SNELL, ALMY (EMERITUS), HURRELL (EMERITUS). ASSOCIATE PROFESSORS BULEW AND GANDER. ASSISTANT PROFESSORS IVES, MENDICINO, SERIF, CLEMENTS AND ASSISTANTS

FOR ADVANCED UNDERGRADUATES AND GRADUATES
According to University regulations, courses in this group are not open to freshmen or sophomores.

610 (3) Su,A.W.S. Introduction to Biological Chemistry. 3 cl. Prereq: (Chem 405 or 406 or 551) and 2 qtrs biological science.
An introductory course in biochemistry dealing with the molecular basis of structure and metabolism of plants, animals, and micro-organisms.

611 (3) Su,A.W.S. Introduction to Biological Chemistry: Laboratory. 2 cl. 2 2 hr labs. Prereq or concur: 610.
Laboratory work to accompany 610. Assay techniques for chemical constituents and metabolic reactions of living cells.

#(613) (5) W. Chemistry of Foods and Food Processing. 3 cl. 2 3 hr labs Prereq: 1 qtr of Organic Chem and 1 qtr of quantitative analysis. Mr. Deatherage.
The chemical, physical and biological nature of foods in relation to handling, processing, packaging, quality and consumer acceptance.

621 (3) A.S. Biochemistry of Animal Function Laboratory. 2 3 hr labs. Prereq or concur: 620. Laboratory course to accompany 620. Assay techniques for chemical constituents and metabolic reactions in animals. Biochemistry of nutritional deficiency.

Bot 690 (5) Topics in Biological Sciences. (See under Botany and Plant Pathology.)


705 (3) A. 707 (3) W. 709 (3) S. General Biological Chemistry. To be taken in sequence. Prereq: Chem 647, 648, 649, 650, or 655, 656, 657, 659 or equiv, and Math 536 or equiv. Chem 681 is recommended. An intensive treatment of modern biochemistry. 705, Protein structure, thermodynamics of enzyme catalyzed reactions and oxidation-reduction reactions in living systems. 707, Chemistry and intermediary metabolism of lipids and carbohydrates. 709, Intermediary metabolism of proteins and nucleic acids; function of vitamins and hormones.

706 (3) A. 708 (3) W. 710 (3) S. General Biological Chemistry Laboratory. 2 4 hr labs. Prereq or concur: 705, 707, and 709. Laboratory to accompany 705, 707, and 709.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

804 (1 or 2) A,W,S. Seminar. Req'd of all graduate students majoring in biochemistry.

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

804A (1) Topic to be announced.
804B (1) Journal Seminar.

805 (3) A. Advanced Biochemical Techniques and Preparations. 1 cl, 2 3 hr labs. Prereq: 710, Chem 660 or equiv, permission of instructor. Mr. Snell Isolation and preparation of compounds of biochemical interest with emphasis on newer techniques involving use of isotopes, chromatography, counter-current extraction, etc.

807 (3) A. Proteins and Nucleic Acids. 3 cl. Prereq: 709 or equiv. An examination of the current research on the chemistry and metabolism of proteins and nucleic acids.

808 (3) W. Enzymes. 3 cl. Prereq: 709 or equiv. Advanced studies of enzymes and the mechanism of enzyme action.

#809 (3) S. Carbohydrates. 3 cl. Prereq: 709; Chem 704 recommended. Mr. Gander Advanced study of the metabolism of the carbohydrates.

#813 (2) W. Special Topics in Food Chemistry. 2 cl. Prereq: 613, 806, Chem 681, 682, 649 or equiv. Mr. Deatherage Advanced study of the chemistry of foods.

888 (1) S. Interdepartmental Seminar in Nutrition and Food Technology. (See under Interdepartmental Seminar)

AGRICULTURAL ECONOMICS

Department of Agricultural Economics and Rural Sociology
Office, 103 Agricultural Administration Building

PROFESSORS SMITH, RALPH BAKER, BAUMER, CRAVENS, CRAY, DAMBACH, FAL-CONEE (EMERITUS), HENNING, NEWBERG, OLSON, SHERMAN, SITTERLEY
AND WENTZ (EMERITUS), ASSOCIATE PROFESSORS HUMBLE BAKER, BAILEY
CLAYTON, MCCORMICK, MOORE (EMERITUS), SHAUDYS, STOUT, TOMPKIN, WATT
AND WILLIAMS, ASSISTANT PROFESSORS PADBERG, REESE, WALKER, AND
ASSISTANTS

FOR UNDERGRADUATES

420 (5) A.W.S. Economic Development of Food and Agriculture. 5 cl. Mr.
McCormick, Mr. Bailey, and Assistants
An introduction to agricultural economics. A study of the major economic trends such as
production, consumption, marketing, prices and the economics underlying these trends.

502 (5) A.W.S. Farm Management. 4 cl, 1 2 hr lab, 1 field trip during qtr.
Prereq: 420 and Econ 401, 402 or 406. Mr. Sitterley, Mr. Shaudys
Organization and operation of farm business. Economic and management principles in-
volved in decision making, farm planning, enterprise selection, financing and tenure.

510 (3) W. Farm Records and Analysis. 1 2 hr cl, 1 2 hr lab. Prereq: 420
Mr. Sitterley, Mr. Richard Baker, Mr. Shaudys
Nature and need for farm business records and analysis and interpretation of essential
records from farm manager viewpoint. Their use in income tax reporting.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

602 (5) A. Advanced Farm Organization. 4 cl, 1 2 hr lab, 1 all day field
trip during qtr. Prereq: 502. Mr. Sitterley, Mr. Shaudys
Detailed application of production economics, management principles and decision making
techniques to the organization, operation and administration of farms. Farm plans are developed.

603 (5) W. Cooperation in Agriculture. 5 cl. Prereq: 420 and Econ 401,
402 or 406. Mr. Henning
Basic principles of cooperatives including types of organizations, legal aspects, membership,
relations, financing, organizational and intercooperative problems, and distribution of savings.

605 (3) A.W.S. Agricultural Policy. 3 cl. Prereq: 420 and Econ 401, 402
or 406. Mr. McCormick, Mr. Smith
Characteristics and problems of agriculture. Description and analysis of programs and
policies designed to assist agriculture and alternative proposals for the future.

608 (5) W. Livestock Marketing. 5 cl. Prereq: 618. Mr. Henning, Mr.
Stout. (Offered in cooperation with the Department of Animal Sc)
Selling methods, basis of sale, agencies involved, organization of markets, transportation,
financing, marketing costs, prices, when to market, grade differentials, government regulations
will be studied.

610 (3) Su. Agricultural Finance. 3 cl. Prereq: 420 and Econ 401, 402 or
406. One Saturday and one overnight field trip required. Mr. Bailey
Agricultural Credit: Facilities, Procurement, Extension and Management.

612 (3) W.S. Prices of Farm Products. 3 cl. Prereq: 420 and Econ 401, 402
or 406. Mr. Padberg
Characteristics of agricultural price, movement, measurement, seasonality, cycles and
forecasting, including analysis of price formation, elasticity, parity, and other price statistics.

613 (5) A.W.S. Marketing Farm Products. 5 cl. Prereq: 420 and Econ 401,
402 or 406. Two-day field trip reqd. Mr. Henning, Mr. Baumer, Mr. Sharp, Mr.
Padberg
Study of local, wholesale, and retail marketing agencies and principles involved in the
marketing of farm products.
614 (3) S. Business Management in Agricultural Marketing. 2 cl, 1 lab. Prereq: 420 and Econ 401, 402 or 406. Mr. Henning
A detailed study of representative agricultural marketing agencies including their problems of administration, employees, financial statements, selling, purchasing, and warehousing.

615 (3) S. Land Economics. 3 cl. Prereq: 420 and Econ 401, 402 or 406 and for juniors permission of instructor. Mr. Sitterley Land resources and requirements. Economic principles involved in land use. Major land use problems. Ways of achieving better land use. Public's interest in land policy.

616 (3) S. Food Economics. 3 cl. Prereq: Econ 401, 402 or 404, or 406. Mr. Sherman Economic aspects of the production, distribution, and consumption of food.

618 (3) S. Farm Appraisal. 3 cl, 3 hr field trips during qtr. Prereq: 502. Mr. Richard Baker Farm real estate appraisal with emphasis on methods, procedure and reporting. Factors influencing land value and fluctuation in land prices.

621 (5) S. Poultry Marketing. 5 cl. Prereq: Poul Sc 401 or Zool 401 or equiv and Agr Ec 613 or Bus Org 700. Mr. Baker. (Offered in cooperation with the Department of Poul Sc) Factors affecting supply and demand for poultry products. Organization to achieve technical and economic efficiency within and among industry segments.

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

628 (5) S. Marketing Fruits and Vegetables. 4 cl. 1 lab equiv. A 2 day field trip will be taken. Prereq: 420 and Econ 401, 402 or 406. Mr. Cravens Principles involved in the marketing of fruits and vegetables and the agencies concerned.

633 (3) A. Grain Marketing. 3 cl. Prereq: 420 and Econ 401, 402 or 406. Mr. Sharp Principles and practices involved in grain and feed marketing and the theory of grain pricing. Economics of storage, current development and trends affecting grain marketing.

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

697 (4) W. Natural Resources Problems, Programs, and Policies. 2 2 hr. Prereq: Conserv 401 and 514 or equiv with permission of instructor. Mr. Dambach An analytical study of contemporary and future problems of natural resources conservation and the programs and policies related to their solution.

701 (2-5) Su, A,W,S. Special Problems. Prereq: 8 cr hrs of Agr Ec and permission of instructor. Repeatable. Staff Planning, conducting, and reporting a special problem in agricultural economics fitting the needs of the student, under the guidance of an instructor.

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

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.
20 AGRICULTURAL ECONOMICS

810 (2) A.W. Research Methods in Agricultural Economics. 1 2 hr cl. Courses in Philos, Statistics, and advanced courses in Econ and Agr Ec are recommended. Mr. Sherman, Mr. Walker
The principles of scientific investigation. Methods and techniques for organizing and conducting research, including collection and analysis of data.

815 (3) A.S. Advanced Agricultural Economic Theory. 3 cl. Prereq: 15 hrs Agr Ec or Econ plus 6 hrs statistics and permission of instructor. Mr. Walker
This course is designed to provide a critical consideration of economic principles as they apply to production problems in agriculture.

897 (1) A.W.S. Interdepartmental Seminar in Natural Resources.
(See under Interdepartmental Seminars)

900 (1-4) A.W.S. Seminars in Agricultural Economics. 1 or 2 cl. Prereq: permission of instructor. Repeatable. Staff
INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

Intensive consideration is given to current theories and future problems in special fields of Agricultural Economics during the following quarters:
900A Agricultural Policy, S, 1965, Staff
900B Agricultural Economics Theory, A, 1963, Staff
900C Farm Organization and Management, W, 1965, Staff
900D Land Tenure, Agrarian Reform and Economic Development, A, 1964, Staff
900E Agricultural Marketing, W, 1964, S, 1965, Staff
900F Agricultural Price Analysis, S, 1964, Staff
900G Agricultural Finance, W, 1965, Staff
900H Research in Agricultural Economics, W, 1964, Staff
900I Problems in Agricultural Economics Statistics, A, 1962, S, 1964, Staff
900J Problems in Foreign Agricultural Development, W, 1965, Staff
900K Linear Programming, S, 1964, Staff
900L Advanced Economics of Agricultural Production, W, 1964, Staff

950 (arr) Su A.W.S. Research in Agricultural Economics and Rural Sociology. Staff
Research for thesis or dissertation purposes only.

AGRICULTURAL EDUCATION
Office, 208 Agricultural Administration Building

PROFESSORS BENDEL, KIRBY, ROBINSON, STEWART (EMERITUS), WOLF, WOOD, AND WOODIN, ASSOCIATE PROFESSORS MCCORMICK, BITCHIE, TAYLOR, AND WILSON, ASSISTANT PROFESSORS GUILER AND WORRALL, MR. BOUCHER AND MR. CUNNINGHAM

FOR UNDERGRADUATES

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

591 (5) A.S. Methods in Teaching Vocational Agriculture. 4 cl, 4 lab hrs
Prereq: 455. Mr. Wolf
The learning process and its application to teaching vocational agriculture. Field trips to schools with special attention to vocational departments.

594 (5) A.W. 505 (5) A.W. 506 (5) A.W. Student Teaching in Vocational Agriculture. Courses taken concurrent. Teaching experience in a selected school community with full time devoted to these courses. Prereq: 501 and acceptance by Guidance Committee. Mr. Boucher, Mr. Guiler, Mr. Wilson
Guided participation in the professional responsibilities of a teacher of vocational agriculture, including an intensive study of the problems encountered and the competencies developed.

526 (3) A.S. Principles in Extension Program Development. 3 cl. Mr. Cunningham
Objectives and procedures in developing extension programs in agriculture and home economics with emphasis on program determination, teaching methods, and relationships between other groups.
550 (2-5) Su (either term or quarter), A.W.S. Experience in Agricultural Education. Repeatable to a maximum of 10 cr hrs. Prereq: permission of instructor. Mr. Wilson, Mr. Cunningham

A period of practical experience in an area of agricultural education approved by the adviser. Written reports of the experience are required.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

611 (3) S. Teaching Aids for Agricultural Education. 2 cl, 1 lab. Mr. Woodin, Mr. Guiler

Theory and practice in the development and utilization of teaching materials in agricultural education.

624 (3) W.S. 625 (3) W.S. 626 (5) W.S. Apprenticeship in Agricultural Education. Courses taken concur. Experience in a selected county and school community with full time devoted to these courses: Prereq: 504, 505, 506 and permission of instructor. Not open for graduate credit. Mr. Boucher, Mr. Cunningham, Mr. Wilson, Mr. Guiler

Guided participation in vocational agriculture, agricultural extension, and other programs in agricultural education in order to develop further competency in teaching present and prospective farmers.

701 (2-5) Su (either term or quarter) A,W.S. Special Problems. Staff

Planning, conducting, and reporting a special problem in agricultural education appropriate to the needs of the student.

703 (3) Su (1st term) W. Methods in Teaching Agriculture. 3 cl. Prereq: teaching or extension experience in agriculture or permission of instructor. Mr. Bender

Conditions and procedures that promote effective teaching in agricultural education at the secondary and college level.

705 (3) A. Farming Programs. 3 cl. Prereq: experience in agricultural education. Mr. Woodin, Mr. Wolf

Principles and procedures used in selecting, planning, conducting, and evaluating farming programs as related to teaching-learning situations.

707 (3) Su (1st term). Curriculum in Vocational Agriculture. 3 2 hr cl. Prereq: teaching experience in vocational agriculture, or permission of instructor. Mr. Guiler

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.

708 (3) Su (1st term). Methods in Teaching Farm Mechanics. 3 2 hr cl. 1 2 hr lab. Prereq: teaching experience in vocational agriculture. Mr. Guiler

Emphasis upon teaching procedures and the development of resource units for use in vocational agriculture.

709 (3) Su (1st term). Methods in Teaching Farm Production and Economics. 3 2 hr cl, 1 2 hr lab. Prereq: teaching experience in vocational agriculture. Mr. Boucher

Emphasis upon teaching procedures and the development of resource units for use in vocational agriculture.

712 (3) S. Future Farmers of America. 3 cl. Prereq: experience in agricultural education or permission of instructor. Mr. Bender, Mr. Taylor

An analysis of the Future Farmers of America organization in terms of the education of farm boys with emphasis on planning and conducting local programs.

715 (3) A. Adult Education in Agriculture. 3 cl. Prereq: experience in agricultural education or permission of instructor. Mr. Bender, Mr. Wolf

Principles and practices appropriate to the solution of problems encountered in developing and conducting instructional programs for young and adult farmers.
AGRICULTURAL EDUCATION

797 (3) S. Evaluation in Agricultural Education. 5 cl. Prereq: experience in agricultural education or permission of instructor, Mr. Woodin
Principles and procedures of evaluation used in projecting and developing programs in agricultural education.

799 (4) Workshop in Agricultural Education. Full time of student required for three weeks, therefore registrants not permitted to take other University work concurrently.

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

799A (4) W. Workshop—Program Planning in Agricultural Extension. Open only to persons employed or about to be employed as extension workers. Mr. McCormick
Principles and methods involved in the formulation of policies and programs in various aspects of agricultural and home economics extension.

799B (4) Su. (2nd Term) Workshop—Program Planning in Vocational Agriculture. Repeatable to a total of 8 cr. hrs. Open only to persons employed or about to be employed as teachers of vocational agriculture. Mr. Woodin, Mr. Wolf
Objectives and methods of local program planning with special attention devoted to the appraisal of student needs and the use of community resources.

[799C] (4) Su. Workshop—Communication in Agricultural Education. Prereq: permission of instructor, Mr. Woodin, Mr. McCormick
Methods and procedures in communication involving the use of appropriate individual, group, and mass media in the development of a program of agricultural education.

[799D] (4) Su. Workshop—Student and Apprentice Teaching in Agricultural Education
Educational objectives for student teaching, the development of programs the provision of experiences, the guidance and evaluation of professional growth of trainees.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the 890 or 906 group except by permission of the Graduate Council.

801 (3) W. Program Planning in Agricultural Education. 3 cl. Prereq: experience in Agr Ed or permission of instructor, Mr. McCormick and Mr. Taylor
Principles, theory and practices of the development of state and local programs in agricultural education.

804 (3) A. Administration and Supervision in Agricultural Education. 3 cl. Prereq: experience in Agr Ed or permission of instructor, Mr. Taylor and Mr. McCormick
Principles in the development and operation of agricultural education programs with an emphasis given to federal-state-local relationships, in-service education, evaluation, and supervision procedures.

#806 (3) Su (1st term). S. Teacher Education for Vocational Agriculture. 5 cl. Prereq: teaching experience in vocational agriculture or permission of instructor, Mr. Bender
Principles and methods in the development of teacher-education programs for vocational agriculture, including selection and guidance of students, curriculum, placement, in-service education, and research.

810 (1-5) A.W.S. Seminar in Agricultural Education. Staff
Investigation and discussion of current problems and research in agricultural education.

835 (3) Su (either term or qtr), A.W.S. Advanced Studies in Agricultural Education. Open only to students pursuing the Master of Education degree program. Staff
Designed primarily to enable students to demonstrate competence in planning, conducting and reporting a field service study in agricultural education.

850 (3) Su (1st term), W. Research Methods in Agricultural Education. 4 cl. Prereq: at least 8 hrs of graduate work or permission of instructor. Mr. Woodin, Mr. Wolf, Mr. Wilson
Principles of investigational procedure and criteria for evaluating research. Exploratory methods and techniques appropriate for planning, organizing, and conducting research in agricultural methods.

950 (arr) Su (either term or qtr), A.W.S. Research in Agricultural Education.
Research for thesis or dissertation purposes only.
AGRICULTURAL ENGINEERING

Office, 105 Ives Hall

PROFESSORS STEWART, BARDE (EMERITUS), HARROLD, KENNEDY (EMERITUS), McCUEH (EMERITUS), MCLEOD, MILLER (EMERITUS), OVERTWEIT (EMERITUS), AND SCHEER, ASSOCIATE PROFESSORS BRAKE, HUBER, C. JOHNSON AND W. JOHNSON, INSTRUCTOR HABERMANN, AND ASSISTANTS

FOR UNDERGRADUATES

402 (3) W. Agricultural Drawing. 3 2 hr cl. Mr. Barre
Principles and practices in understanding and making charts, graphs, pictorial and working drawings, contours, etc. To develop skills in communication through the graphic language.

502 (3) A. Farm Structures. 3 2 hr. Not open to professional Agr E students. Mr. Barre
The function, needs, safety, economy, durability, sanitation, and conveniences in planning and constructing farm buildings.

503 (5) W. Farm Power. 3 cl, 2 2 hr lab. Prereq: Math 416 or equiv or Physics 411 or equiv. Not open to professional Agr E students. Staff
Fundamental principles of mechanical power on the farm. The farm tractor is used to develop a broad conception of an efficient farm power program.

504 (5) A.W.S. Farm Shop Teaching Methods. 2 cl, 6 lab hrs. Prereq or concur: Agr Ed 501. Mr. C. Johnson
Principles and methods of teaching selection, use, and care of hand and power tools, materials for wood and metal construction based upon farm needs.

507 (5) A.S. Farm Drainage, Erosion Control, and Irrigation. 4 cl, 1 3 hr lab. Prereq: Agron 501. Not open to professional Agr E students. Mr. Schwab
Use and application of survey instruments, aerial and topographic maps, rainfall and runoff and engineering problems of soil and water management of farms.

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

509 (5) A.S. Electricity in Agriculture. 3 cl, 2 2 hr labs. Prereq: Math 416 or equiv or Physics 411. Not open to professional Agr E students. Mr. Harkness
Principles of farmstead electric systems with analysis of their functional requirements for distribution and control of electricity for power, heat, and light applications in agriculture.

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

512 (5) A.S. Special Field Machinery. 2 cl, 6 lab hrs. Prereq: major in Agr Ed. Not open to students who have credit for Agr E 401. Mr. Huber
Principles in the selection, evaluation, adjustment, maintenance, and repair of farm machinery for a unified farm program in plowing, seeding, cultivating, and harvesting farm crops.

515 (3) S. Farm Structure Ventilation. 3 cl. Prereq: 8 cr hrs in Agr E. Mr. Barre
Principles and practices of ventilation, insulation, and heat control in farm structures and drying of farm crops.

518 (5) W. S. Farm Power Use and Maintenance. 3 cl, 2 2 hr labs. Prereq: major in Agr Ed. Staff
A study of principles of operation and maintenance and the use of tractors and electricity on sources of farm power.

521 (5) A.S. Field Machinery. 3 cl, 2 2 hr lab. Prereq: Physics 411, Agron 418, concur Agron 501. Not open to professional Agr E students. Mr. Huber, Mr. Harkness
Study of physical principles involved in machine function, design, adjustment, and operation. Selection of machinery and machinery programs.
557 (4) W. Engineering of Crop Growth Environment I. 4 cl. Prereq: Agron 606, Bot 605, Math 546. Mr. Schwab
Plant ecology, especially crop response to extremes of soil moisture. Precipitation, infiltration, evapotranspiration, runoff, and probabilities of drought and excess moisture. Soil classification.

557 (4) S. Engineering of Crop Growth Environment II. 3 cl, 1 3 hr lab. Prereq: 557, concour Eng Mech 610. Mr. Schwab
Soil erosion, principles and control of contouring, terracing, vegetation, tillage and hydraulic conveyance structures. Earth dams and farm reservoirs. Headwater flood reduction and flood routing.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

600 (1) S. Farm and Home Safety, Mr. Stewart
Course of accidents. Methods for conducting farm and home safety programs. For students interested in vocational agriculture, extension, and farm organization work.

605 (5) Su (1st term), A. Advanced Farm Power and Field Machinery. 3 cl, 2 3 hr lab. Prereq: 10 hrs Agr E, 8 hrs Agron. Not open to professional Agr E students. Staff
An advanced study of harvesting machines and power units from the mechanical, operational, and economic standpoint. Study of machinery, power, and labor program requirements.

655 (5) W. Sources and Utilization of Energy in Agriculture. 3 cl, 2 2 hr lab. Prereq: Mech E 601, Elec E 642. Not open for graduate credit for professional Agr E students. Mr. Huber
A study of sources of energy, principles of energy conversion, and energy conversion systems of importance to agriculture.

677 (5) A. Engineering of Crop Growth Environment III. 3 cl, 2 3 hr lab. Prereq: 557, Bot 506. Not open for graduate credit for professional Agr E students. Mr. Schwab
Pumps and pumping. Design of drainage channels, sub-surface drains, and irrigation systems. Methods of irrigation. Special soil problems and plant requirements. Legal aspects.

687 (4) S. Engineering of Crop Growth Environment IV. 3 cl, 1 2 hr lab. Prereq: 677, Agr Bio 610. Not open for graduate credit for professional Agr E students. Mr. Huber

701 (2-5) Su, A, W, S. Special Problems. Prereq: permission of instructor. Staff
Advanced study of problems not included in regular courses of this department.

702 (3-5) Su, A, W, S. 703 (3-5) Su, A, W, S. Special Problems. Prereq: 15 hrs of 600 level Agr E courses and permission of instructor. Not open for graduate credit for professional Agr E students. All instructors
Work on problems that are not included in regular courses. Practice in development organization, solution, and report on problems of students' choosing.

752 (5) A. Engineering of Agricultural Processes and Related Structures I. 5 cl. Prereq: 655, concour 765, Mech E 610, Physiol 652. Not open for graduate credit for professional Agr E students. Mr. Barre
Functional requirements and principles involved in housing animals and biological materials. Analysis of physical-chemical factors and properties affecting energy exchanges with the environment.

762 (5) W. Engineering of Agricultural Processes and Related Structures II. 5 cl. Prereq: 752, Elec E 644. Not open for graduate credit for professional Agr E students. Mr. Harkness
Analysis of processing and materials-handling subsystem functions in agriculture designed to provide greater yield from raw products and to reduce human labor.
765 (4) A. Functional Design of Harvesting Machines. 3 cl, 1 3 hr lab. Prereq: 687, Eng Mech 607 and Mech E 786. Not open for graduate credit for professional Agr E students. Mr. McLeod
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.

772 (4) S. Engineering of Agricultural Processes and Related Structures III. 3 cl, 1 3 hr lab. Prereq: 762, Mech E 723. Not open for graduate credit for professional Agr E students. Mr. Barre
Design of agricultural structures and interior environments to meet load requirements and to optimize recovery of animal and plant production.

775 (5) W. Engineering of Agricultural Machines. 3 cl, 2 2 hr lab. Prereq: 786, Indus E 519, Mech E 627. Not open for graduate credit for professional Agr E students. Mr. McLeod
Complete engineering development of machines for agricultural operations. Introduction to experimental work, advanced work in analysis, functional and mechanical design, economic consideration.

779 (5) S. Engineering of Agricultural Systems. 3 cl, 2 2 hr lab. Prereq: concurrent 772. Not open for graduate credit for professional Agr E students. Staff
Integration of engineering and biological principles in agriculture to optimize complete operational production systems. Application of relevant theory to present and future systems.

791 (1) A. Senior Seminar. 1 cl. Prereq: senior standing, College of Engineering. Staff
Study of professional ethics, examinations, and societies, and employment opportunities.

798 (3) A.S. Advanced Studies in Agricultural Engineering. 3 cl. Prereq: 15 hrs of 600 level Agr E courses and permission of instructor. Repeatable to a total of 9 cr hrs. A—Farm Structures, Mr. Stewart; S—Power and Machinery, Staff
Advanced subjects to agricultural engineering. Course content to be announced in previous quarter.

799 (4) Su. Workshop. First term, first three weeks—full time. Prereq: 15 hrs Agr E. Permission of instructor. Not open to professional agricultural engineering students. Staff
a. Workshop—Farm Mechanics. Mr. Johnson
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.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

801 (1) A.W.S. Seminar. 1 cl. Repeatable for a total of 2 cr hrs. Req'd for Agr E graduate students. Graduate Staff

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

883 (3) S. Soil-Machine Dynamics in Plant Environment. 3 cl. Prereq: Agron 608, Bot 605, Civil E 725, Eng Mech 717, Math 661, Mech E 610, Physics 703, or equiv. Mr. McLeod
Mass and heat transfer in soil and dynamics of mechanical actions on soil in relation to plant environment and agricultural machine design and use.

885 (4) A. Aerosol Mechanics in Agricultural Engineering. 4 cl. Prereq: Math 626, Math 661, Math 674, Eng Mech 717, Physics 608, or equiv. Mr. Bazzette
Small particle statistics; dissipation of particle motion; force fields in aerosols and curvilinear motion of particles; aerosol diffusion processes; turbulence of aerosols. With engineering implications.
887 (3) W. Advanced Agricultural Drainage. 3 cl. Prereq: 677 and Mat. Mr. Schwab
Theory of agricultural drainage, both tile and surface methods. Measurements of drainage and frequency analysis. Hydrologic characteristics of drainage systems. Drainage requirements of crops.

897 (1) A,W,S. Interdepartmental Seminar in Natural Resources.
(See under Interdepartmental Seminars.)
S50 (arr) Su,A,W,S. Research in Agricultural Engineering. Staff
Research for thesis and dissertation purposes only.

AGRONOMY

Offices, 108 Townshend Hall and 101 Horticulture and Forestry Building

PROFESSORS VOLL, DAVIS, HOLOWAYCHUK, LAMB, MCLEAN, MEDESKI, MONTEN,
SEN, MSUNGEREV, SMITH, TAYLOR AND WILLARD (EMERITUS), ASSOCIATE PRO-
FESSORS ANDERSON, PARSONS, AND RAY, ASSISTANT PROFESSORS BADE,
BENDIXEN, GILBERT, HINES, HOFF, STRONDE, AND WILDING AND ASSISTANTS

FOR UNDERGRADUATES

403 (4) Su,A,W,S. Field Crop Production. 3 cl, 1 2 hr lab. Mr. Bader
A study of the fundamental principles essential to crop production and a survey of accu-
tion, utilization, and problems in production of leading agronomic crops.

501 (5) Su,A,W,S. Soils. 4 cl, 1 2 hr lab. Prereq: Chem 411, 412, or Chem
407, 408 or equiv. Mr. Himes
Introduction to the genetic, physical, chemical and biological properties influencing soil
productivity. Laboratory exercises include observation and quantitative determination of certain
of these soil properties.

515 (4) W.S. Grain Crops. 3 cl, 1 2 hr lab. Prereq: 403 or permission of
instructor and Bot 401. Mr. Ray
A study of the grain crops, their classification, geographic distribution, culture, varieties
improvement, seed selection, seed production, harvesting, handling, recognition, grading, and
utilization.

520 (4) Su,A,W,S. Forage Crops. 3 cl, 1 2 hr lab. Prereq: 403 or permission
of instructor and Bot 401. Mr. Anderson
Characteristics, tolerances, requirements, uses, and production of principal forage plants.
Management of pastures and meadows, based on a study of literature and experimental data.

525 (3) A. Weed Control. 2 cl, 1 2 hr lab. Prereq: 403 and Bot 401. Mr.
Bendixen
A study of weeds, losses due to them, and their control.

599 (2) W. Undergraduate Seminar. 2 cl. Prereq: 15 or hrs in Agron and
junior or senior standing in Agron. Req Agron. Staff
Research publication review and interpretation; the function of agronomic industries is
studied.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or
sophomores.

609 (4) W. Crop Production in Developing Countries. 4 cl. Prereq: 408, 501
or equiv. Mr. Gilbert, Mr. Alban, Mr. Hartman
Fundamental studies of field and plantation crops in tropical and sub-tropical countries
with emphasis on means and techniques for obtaining production increases.

611 (5) W.S. Crop Management Problems and Practices. 5 cl. Prereq: 501,
520 or equiv. Mr. Gilbert
Recognizing, correlating, and solving crop problems relating to the efficient production and
use of field crops.

603 (5) S. Origin and Classification of Soils. 4 cl, 1 2 hr lab. Prereq: 401
and Geol 401 or equiv. Mr. Holowaychuk
Factors and processes in soil formation and the classification of soils with specific reference
to Ohio conditions.
604 (5) A. Soil Erosion and Its Control. 4 cl, 1 3 hr lab. Prereq: 501 and Geol 401 or equiv. Mr. Hoff
A study of the mechanics of soil erosion and its control. Field trips to observe erosion and conservation practices are included.

#605 (5) S. Soil Microbiology. 3 cl, 2 2 hr lab. Prereq: 501, Microbiol 507 or permission of instructor. Mr. Mortensen
A study of the morphology and physiology of soil microorganisms and their biochemical transformations of inorganic and organic materials in relation to soil fertility.

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

611 (3) A. Soil Fertility. 3 cl. Prereq: 501. Mr. Himes
A study of the factors affecting soil productivity and the practices needed in good soil management. Fertilizer properties and practices are included.

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

#614 (4) W. Field Crop Breeding. 3 cl, 1 2 hr lab. Prereq: 408, Bot 401, Agr Bio 410 and Zool 408 or equiv. Mr. Smith
Principles of genetics and methods of plant breeding applied to the improvement of field crops and the ultimate development of superior varieties.

620 (4) S. Principles of Grassland Management. 4 cl, 4 day field trip included. Prereq: 501 and 520 or permission of instructor. Mr. Anderson
An advanced course primarily dealing with establishment, management, maintenance, and utilization of important forage species as pasture, hay, silage, college and sod crops and ranges.

630 (4) S. Principles of Turfgrass Selection and Management. 4 cl. Prereq: 501 and Bot 401 or permission of instructor. Mr. Bader
Adaptation, identification, uses, growth characteristics, growth responses and fundamental principles essential to the production of quality turf.

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

701 (2-5) S PA, W, S. Special Problems. Prereq: permission of instructor. Staff
Students may select special agronomic problems, not included in regular courses and involving library, laboratory or field studies.

712 (5) W. Chemistry of Soils and Fertilizers. 3 cl, 2 2 hr lab. Prereq: Chem 521 or equiv and permission of instructor. Mr. McLean
A study of the chemical properties of soils and fertilizers affecting plant growth and composition including modern laboratory analysis of soil, fertilizer, and plant tissue.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

801 (1) A.W.S. Agronomy Seminar. 1 cl. Repeatable to a total of 6 cr hrs. Req'd of all graduate students in Agron Staff
Discussion of current problems in agronomy.

802 (3) A.W.S. Advanced Studies in Agronomy. Prereq: permission of instructor. Staff
(a) A. Techniques with Field Plot Data. Mr. Ray
(b) W. Soils of the Cold Regions. Mr. Dalrymple
(c) W. Radioactive Tracers in Plant and Soil Research. Mr. Mortensen
(d) A. Theories and Application of Agronomic Research. Mr. McLean
(e) S. Recent Concepts and Developments in Soil-Plant Relationships. Mr. McLean
AGRONOMY

805 (5) W. Physical Chemistry of Soils. 3 cl, 2 3 hr lab. Prereq: 605. Chem 670 or Chem 681, 682 and permission of instructor. Mr. McLean
A study of the physico-chemical properties of soils including methods of characterizing clay minerals, soil solids, ionic absorption and release, and plant nutrient uptake.

807 (5) W. Techniques of Experimental Design. 5 cl. Prereq: Zool 630, or equiv. Mr. Smith
A study of experimental designs and their application to agricultural research.

#[814] (4) W. Advanced Field Crop Breeding. 3 cl, 1 2 hr lab. Prereq: Zool 618 or 630 or equiv and permission of instructor. Mr. Ray
A detailed study of the genetic fundamentals and modern procedures used in the development of plant breeding programs for the improvement of agronomic crops.

897 (1) A,W,S. Interdepartmental Seminar in Natural Resources.
(See under Interdepartmental Seminars.)

950 (arr) Su,A,W,S. Research in Agronomy. Staff
Research for thesis or dissertation purposes only.

AIR SCIENCE
Office, 300 Military Science Building

COLONEL ROBERTSON AND STAFF

BASIC AIR SCIENCE (Freshmen and Sophomores)

401 (2) A. 402 (2) W. 403 (2) S. Foundations of Aerospace Power. 2 cl, 1 lab hr. Courses normally taken in sequence. Staff
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 as factors in the preservation of national security and the United States Air Force as a major factor in the security of the free world.

501 (2) A. 502 (2) W. 503 (2) S. Fundamentals of Aerospace Weapon Systems. 2 cl, 1 lab hr. Prereq: 401-402-403 or approval of the Professor of Air Science. Courses normally taken in sequence. Staff
An introductory survey of aerospace vehicles, their propulsion and guidance systems and their employment in strategic, tactical and defensive operations including target intelligence and electronic countermeasures; mechanics, problems and military implications of space operations and contemporary military thought.

ADVANCED AIR SCIENCE (Juniors and Seniors)

601 (3) A. 602 (3) W. 603 (3) S. Air Force Officer Development. 4 cl, 1 lab hr. Prereq: 501, 502, and 503 or approval of the Professor of Air Science. Courses to be taken in sequence. Staff
A study of Air Force staff organization and functions designed to prepare the student for positions of leadership as an Air Force Officer. Includes study of oral and written communications, problem solving, principles of leadership, and an introduction to military justice.

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

704 (9) A,W,S. The Air Force Officer, 1 cl, 1 lab hr. Prereq: 601, 602, 603. Staff
A study to help the student make a rapid and effective adjustment to active duty as an officer in the United States Air Force.
ANATOMY
Office, 414 Hamilton Hall

PROFESSORS BAKER (EMERITUS), KNOUFF (EMERITUS), GRAVES, EDWARDS,
J. EGLITIS, AND PALMER, ASSOCIATE PROFESSORS ACKERMAN, H. APLINGTON,
J. EGLITIS, GAUGHAN, GERSTEN, LEACH, RUSSELL, AND WESTON, ASSISTANT
PROFESSORS BOSTON, CASO, DELPHIA, HALL, AND VERNALL, INSTRUCTORS K.
APLINGTON, HUMBERTSON, JULYAN, KAELEBLING, PHILLIPS, WISMAN, AND
WOOTEN, AND ASSISTANTS

FOR UNDERGRADUATES

504 (5) Su.A.W.S. Introductory Anatomy. 2 cl, 3 hr lab. Prereq: Zool 490 or equiv. Zool 401 recommended. Not open to pre-dental or pre-medical students. Reqd of students in Dent Hyg, Med Illus, Nurs, Oc Ther, Phys Ther, and of majors in Phys Ed. Others may elect. Mr. Aplington, Mrs. Aplington
A course dealing with the fundamental principles of anatomy as illustrated by the dissection of the cat, supplemented by demonstrations of human material.

505 (5) A. Neuro-Muscular Anatomy. 2 cl, 2 hr lab. Prereq: 504 or equiv. Not open to pre-dental or pre-medical students. Reqd of students in Med Illus, Oc Ther, and Phys Ther. Others may elect with permission of instructor. Mrs. Wooten, Mrs. Mathiott.
A course dealing primarily with neuro-muscular anatomy of the human body.

513 (6) Su.A.W.S. Comparative Vertebrate Anatomy. 3 cl, 2 hr lab. Prereq: Zool 400-401 or equiv. Open only to optometry, pre-dental, pre-medical and pre-veterinary students. Mr. Leach, Mr. Julyan
The basic plan of vertebrates with emphasis on the dogfish shark and on phylogeny leading to the mammals.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

604 (5) A. Anatomical Methods. 2 cl, 6 lab hrs. Prereq: minimum of 15 cr hrs of Anat and permission of instructor. Mr. Weston and Staff
A study of the various techniques employed in anatomical research. The course is designed for students desiring to begin such research.

607 (5) W. General Histology. 2 cl, 2 hr lab. Prereq: 504. Reqd of students in Optom and Med Illus. Open to others with permission of instructor. Staff
A detailed study of the tissues and a general survey of the microscopic structure of the various organs.

608 (5) S. The Eye. 2 cl, 2 hr lab. Prereq: 607. Reqd of students in Optom. Others may elect with permission of instructor. Staff
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 (5) A. Comparative Histology. 3 cl, 3 hr lab. Prereq: 513 or 613 or Zool 620 and permission of instructor. Miss Wismar
A general consideration of cells, tissues and organs of animals with emphasis on the comparative and evolutionary aspects.

613 (5) A. Comparative Morphology of the Lower Vertebrates. 2 cl, 2 hr lab. Prereq Zool 400-401 or equiv. Not open to optometry, pre-dental, pre-medical or pre-veterinary students. Mr. Leach, Mr. Julyan
Comparative morphology of representative lower vertebrates.

615 (4) A. Human Developmental Anatomy. 2 cl, 3 hr lab. Medicine, first yr. Open only to students registered in Med and to students doubly registered in the College of Medicine and the Graduate School. Mr. Weston, Mr. Russell, Mr. Delphia, Mr. Caso
Emphasis is on human gametogenesis, fertilization, and the formation of germ layers, fetal membranes and organs.
616 (5) Su.W. Fundamentals of Embryology. 2 cl, 2 3 hr lab. Prereq: 513 or 613 or Zool 620. Mr. Delphia
The fundamental principles of embryology with special emphasis on development of the lower vertebrates.

618 (5) A. Introductory Neurology. 3 cl, 3 2 hr lab. Prereq: 513 or 613 or permission of instructor. Mr. Hall
An elementary presentation of the structure and function of the human nervous system. A basic consideration of the neurological systems and servomechanisms.

619 (5) W. Comparative Morphology of Mammals. 2 cl, 2 3 hr lab. Prereq: 513 or 613 or equiv. Mr. Leach, Mr. Julyan
Morphology of mammals, including man, from the point of view of their structural evolution.

621 (6) A.W. Human Anatomy. 2 cl, 12 lab hrs. Open only to students registered in Med and to students doubly registered in the College of Medicine and the Graduate School. Mr. Gersten, Mrs. Eglitis, Mr. Gaughran, Mr. Edwards, Mr. Graves
The gross anatomy of the head, neck, thorax, and upper extremity, supplemented by body sections, roentgenograms, anatomical models and special demonstrations. Television presentations of the physical diagnosis of the respective regions are followed by individual practice in the clinic.

622 (6) A.W. Human Anatomy. 2 cl, 12 lab hrs. Open only to students registered in Med and to students doubly registered in the College of Medicine and the Graduate School. Mr. Gaughran, Mr. Edwards, Mr. Graves, Mr. Gersten, Mrs. Eglitis
The gross anatomy of the abdomen, perineum, and inferior extremity, supplemented by body sections, roentgenograms, anatomical models and special demonstrations. Television presentations of the physical diagnosis of the respective regions are followed by individual practice in the clinic.

624 (5) W. Histology. 3 cl, 3 2 hr lab. Open only to students registered in Med and to students doubly registered in the College of Medicine and the Graduate School. Mr. Eglitis, Mr. Ackerman, Mr. Weston, Mr. Caso, Mr. Vernal, Miss Wismar
General history; cytology; epithelial, connective, bone, muscular and nervous tissue; blood, hematopoietic tissue and vascular system.

625 (5) S. Histology. 3 cl, 3 2 hr lab. Open only to students registered in Med and to students doubly registered in the College of Medicine and the Graduate School. Mr. Eglitis, Mr. Ackerman, Mr. Caso, Mr. Vernal, Miss Wismar
Special histology of the integumentary, digestive, respiratory, urogenital, and endocrine systems.

626 (5) S. Human Neuro-anatomy. 3 cl, 3 2 hr lab. Open only to students registered in Med and to students doubly registered in the College of Medicine and the Graduate School. Mr. Hall, Mr. Kaelbling
The gross and microscopic anatomy of the human brain and spinal cord with special emphasis on the reaction systems.

627 (2) S. Clinical Anatomy. 2 cl. Elective only for students registered in Med and students doubly registered in the College of Medicine and the Graduate School. Mr. Graves and staff
A study of selected anatomical regions correlated with clinical diagnostic methods.

633 (3) A. Essentials of Embryonic Development. 2 cl, 1 3 hr lab. Dentistry, first yr. Open only to students registered in Dent. Mr. Edwards, Mr. Russell, Mr. Boston
The essential features of embryonic development as represented by the chick and pig.

638 (5) W.S. Human Anatomy. 3 cl, 2 3 hr lab. Open only to students registered in Dent and to students doubly registered in the College of Dentistry and the Graduate School. Mr. Edwards, Mr. Appling, Mrs. Wooten, Mr. Edwards, Mrs. Eglitis
Gross anatomy of the abdomen and extremities.
639 (7) W.S. Human Anatomy. 4 cl, 3 3 hr lab. Open only to students registered in Dent and to students doubly registered in the College of Dentistry and the Graduate School. Mr. Russell, Mr. Boston, Mr. Phillips, Mr. Edwards
Gross anatomy of the head, neck, and thorax.

640 (8) A. Histology. 3 cl, 3 3 hr lab. Open only to students registered in Dent and to students doubly registered in the College of Dentistry and the Graduate School. Mr. Eglitis, Mr. Vernall, Mr. Caso
General histology of the tissues and special histology of the organ systems.

641 (1) A. Applied Anatomy. 1 cl. Open only to students registered in Dent and to students doubly registered in the College of Dentistry and the Graduate School. Mr. Russell
Anatomy of the head and neck as applied to clinical dentistry.

650 (4) S. Survey of Anatomy. 4 cl. Prereq: 15 cr hrs in Anat. Reqd of all students majoring in Anat. Mr. Edwards
A survey of the historical development of anatomical knowledge, including leading investigators and their contributions in gross, comparative, developmental, microscopic and neuroanatomy.

701 (2-5) Su,A,W,S. Minor Problems in Anatomy. 1 cl, 2-3 lab and/or library hrs. Prereq: minimum of 15 cr hrs of Anat or allied fields and permission of instructor. Graduate staff
A course designed to enable the student to pursue a minor investigation in some anatomical field of his choice.

704 (5) W. Histochemistry. 1 cl, 8 lab hrs. Prereq: 604, 611 or equiv, Biochem or Physiol Chem and permission of instructor. Mr. Ackerman, Mr. Weston
A course designed for students desiring to do investigative work involving histochcmistry. Classical histochmistry methods will be emphasized and evaluated.

727 (3) S. Anatomy of the Newborn. 1 cl, 6 lab hrs. Prereq: 621-622, or 623-623, or 821-822-823. Elective only for students registered in the College of Medicine or Dentistry or the Graduate School. Gross Anatomy Staff
Gross anatomy of the newborn correlated with pre-natal and post-natal development.

728 (2-4) S. Topographical Anatomy. 1 cl, 3-9 lab hrs. Prereq: 621-622, or 623-623, or 821-822-823. Elective only for students registered in the College of Medicine or Dentistry or the Graduate School. Gross Anatomy Staff
A study of special dissections and of body sections with emphasis on structural relations.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

705 (5) S. Anatomical Methods in Electron Microscopy. Prereq: permission of instructor. Mr. Weston
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.

807 (arr) Su,A,W,S. Special Problems in Anatomy. Prereq: permission of instructor. Repeatable to a maximum of 15 cr hrs.
The student will select or be assigned special topics in one of the following fields:
(a) Problems in endocrinology. Mr. Eglitis, Mr. Applington, Mr. Leach
(b) Special studies in blood and connective tissues. Mr. Ackerman
(c) Special studies in embryology. Mr. Applington, Mr. Weston, Mr. Delphi
(d) Advanced comparative morphology. Mr. Edwards, Mr. Leach, Mr. Applington, Mr. Delphi
(e) Problems in microscopic anatomy. Mr. Eglitis, Mr. Ackerman, Mr. Weston
(f) Special studies in neurology. Mr. Hall, Mr. Palmer, Mr. Graves
(g) Special problems in epithelial tissue, including glands. Mr. Eglitis
(h) Problems in gross human anatomy. Mr. Edwards, Mr. Gerstein, Mr. Graves, Mr. Gaughan, Mr. Eglitis, Mr. Russell
(i) Special studies in electronmicroscopy. Mr. Ackerman, Mr. Eglitis, Mr. Weston
(j) Special studies in tissue culture. Mr. Caso
ANATOMY

817 (5) W. Comparative Neurology. 3 cl, 3 2 hr lab. Prereq: 618 or 626 or 826 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.

821 (5) A. 822 (5) W. 823 (5) S. Primate Anatomy. 2 cl, 9 lab hrs. Prereq: permission of instructor. Gross Anatomy Staff
Gross sections of the primate body for advanced students in comparative morphology. Special attention is given to the phylogenetic and ontogenetic history of the organ systems.

824 (5) W. Advanced Mammalian Histology. 3 cl, 6 lab hrs. Prereq: permission of instructor. Mr. Egliitis, Mr. Ackerman, Mr. Weston
General histology of mammalian tissues and special histology of the vascular system.

825 (5) S. Advanced Mammalian Histology. 3 cl, 6 lab hrs. Prereq: permission of instructor. Mr. Egliitis, Mr. Ackerman, Mr. Weston
Special histology of mammalian organ systems except the vascular.

826 (5) S. Neurology. 3 cl, 6 lab hrs. Prereq: permission of instructor: Mr. Hall, Mr. Kaelbling
Gross morphology, microscopic structure, and reaction systems of the primate nervous system and sense organs.

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

950 (arr) Su,A,W,S. Research in Anatomy. Graduate Staff
Research for thesis or dissertation purposes only.

ANIMAL SCIENCE
Office, 110 New Animal Science Building

PROFESSORS G. R. JOHNSON, MOXON, BELL, CAHILL, KLOSTERMAN, KUNDE,
TREAGUE TYZNICK, R. F. WILSON, K. M. JOHNSON, KOTTMAN, LUDWICK, SETTLE,
VENZKE, ASSOCIATE PROFESSORS CLINE, R. R. JOHNSON, REED, ASSIST.
PROFESSORS DEHORITY, OCKERMAN, PARKER, MR. ALTHOUSE, MR. JUDY, ES.
G. R. WILSON

FOR UNDERGRADUATES

401 (5) A,W,S. Introductory Animal Science. 3 cl, 2 2 hr lab. Mr. Park
Mr. Reed, Mr. R. F. Wilson, Mr. G. R. Wilson, Mr. Judy
Introduction to selection, breeding, feeding, management, marketing and utilization of beef cattle, swine and sheep. A limited discussion of the horse is included.

407 (3) A,W,S. Meat Selection and Identification. 3 2 hr lab.Mr. KELLY
Mr. Cahill, Mr. Althouse
The structure and composition of beef, pork, veal and lamb are used to distinguish grade and usefulness of meat products for domestic and institutional purposes.

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

502 (5) A.S. Beef Cattle Production and Management. 3 cl, 2 2 hr lab.
Prereq: 401, 402, or 530, and 10 cr hrs in Biol Sc. Mr. G. R. Wilson
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.

503 (5) A.S. Swine Production and Management. 3 cl, 2 2 hr lab. Prereq:
401, 402, or 530, and 10 cr hrs in Biol Sc. Mr. R. F. Wilson
Selection of breeding stock, reproduction, feeding, management and sale of commercial and breeding swine. Swine breeds, markets, and research stations are visited.
W.S. Sheep Production and Management. 3 cl, 2 2 hr lab. Prereq: 401, 402, or 530, and 10 cr hrs of Biol Sc. Mr. Judy
The place of sheep on the farm—selection, breeding, management and marketing. Inspection trips: breeding flocks, feed yards, wool warehouse and Experiment Station.

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

A.W.S. Meat and Meat Products. 3 cl, 2 3 hr lab. Prereq: 401, 402, or 530. Mr. Cahill, Mr. Kunkle
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.

S. Meat Grading. 1 cl, 2 2 hr lab. Prereq: 401, and 402 or 530: Home Ec students 407. Mr. Althouse
The factors that influence the value of meat animals, carcasses, and wholesale cuts in accordance with recognized grading standards. Laboratory practice.

W.S. Livestock Management. 3 cl, 2 2 hr lab. Prereq: 401 and 402, or 530. For Agr Ed majors. Mr. Reed
Feeding, breeding, and managing of beef, sheep and swine. Laboratory exercises are concerned with major management problems.

A.W.S. Principles of Animal Improvement. Mr. Fechheimer, Mr. Jaap, Mr. Parker. (Offered in cooperation with the Departments of Animal Sc and Poult Sc)

Agr Sc 520 (5) A.W.S. Principles of Animal Nutrition. 4 cl, 1 2 hr lab. Prereq: Chem 408 or 412 and Math 416 or equiv. Required of Pre-Veterinary Medicine, Agr Ed and major students in Animal, Dairy and Poultry Sc. Not open to students who have credit for Animal Sc 402 or Poult Sc 509. Mr. Cline, Mr. Naber, Mr. Tyniik. (Offered in cooperation with the Departments of Dairy Sc and Poult Sc)
A study of the fundamental principles of nutrition in mammals and birds.

FOR ADVANCED UNDERGRADUATES AND GRADUATES
According to University regulations, courses in this group are not open to freshmen or sophomores.

W. Livestock Marketing. Mr. Stout. (Offered in cooperation with the Department of Animal Sc)

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

W. Nutrition and Feeding of Monogastric Animals. 4 cl, 1 2 hr lab. Prereq: 530 or equiv. Not open to students who have credit for Poult Sc 521. Mr. Cline, Mr. Naber. (Offered in cooperation with the Department of Poult Sc)
The nutrition of swine, poultry and laboratory animals: principles and practice.

W. Nutrition and Feeding of Ruminant Animals. 4 cl, 1 2 hr lab. Prereq: 530 or equiv. Not open to students who have credit for Animal Sc 618. Mr. Conrad, Mr. Cline, Mr. Tyniik. (Offered in cooperation with the Department of Dairy Sc)
The nutrition of dairy cattle, beef cattle and sheep: principles and practice.

Su. A.W.S. Special Problems. Prereq: senior standing. Staff
Special assignments in the advanced phases of animal production and meat. Students will not work in desired subjects after conferences with the instructor in charge.
ANIMAL SCIENCE

Dairy Sc 720 (5) W. Genetics of Animal Populations. Mr. Jaap. (Offered in cooperation with the Departments of Animal Sc and Poul Sc)
(See under Dairy Science)

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the 800 or 900 range except by permission of the Graduate Council.

810 (1) A,W,S. Animal Science, Seminar. Req'd of all graduate students in Animal Sc. Graduate Staff
Discussions of current animal science research.

Dairy Sc 820 (3) W.S. Current Topics in Animal Breeding. Mr. Fechheimer, Mr. Harvey, Mr. Jaap. (Offered in cooperation with the Departments of Animal Sc and Poul Sc)
(See under Dairy Science)

830 (3) A,W,S. Advanced Studies in Nutrition. 3 cl. Prereq: Agr Bio 710 and 710 or Physiol Chem 611 and 612 or permission of instructor. Repeatable to a maximum of 18 credit hours. Required of graduate students in animal nutrition. Topics may be repeated in alternate years. Graduate Nutrition Staff.
(Offered in cooperation with the Departments of Dairy Sc and Poul Sc)

Topics for 1963-64:
(a) Autumn Quarter. Energy Utilisation. Mr. Conrad
(b) Winter Quarter. Mineral Metabolism. Mr. Clines
(c) Spring Quarter. Proteins and Amino Acids. Mr. Naber

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

Research for thesis or dissertation purposes only.

ANTHROPOLOGY

Department of Sociology and Anthropology
Office, 112 Hagerty Hall

PROFESSORS SLETTO, AND BERRY, ASSOCIATE PROFESSORS BOURGUIGNON, AND ESTEL, ASSISTANT PROFESSORS HAMER, AND PETTAY, LECTURER IN ARCHEOLOGY, RAYMOND S. BABY

FOR UNDERGRADUATES

501 (5) Su,A,W,S. Introduction to Anthropology. 5 cl. Prereq: sophomore standing. Staff
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 (5) A,W. Introduction to Physical Anthropology. 5 cl. Prereq: sophomore standing. Staff
The organic development of man; human evolution; the modern groupings of man.

503 (5) S. Introduction to Ethnology. 5 cl. Prereq: sophomore standing Staff
A comparative survey of tribal peoples in basic world areas—Asia, Africa, Oceania, North and South America.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores. Students may also register under Sociology 700 for special problem work in anthropology.

607 (4) S. Culture Contact and Technological Change. 4 cl. Prereq: 501 and Soc 401 or 507, or permission of instructor. Mrs. Bourguignon
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.
ANTHROPOLOGY

#612 (4) A. Social Relations in Folk Societies. 4 cl. Prereq: 5 hrs of Anthrop, or equiv with permission of instructor. Mrs. Bourguignon
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.

613 (4) A. Religion in Folk Societies. 4 cl. Prereq: 5 hrs of Anthrop or equiv with permission of instructor. Mrs. Bourguignon
World views in folk societies, emphasizing religion and sacred beliefs. Integration of these beliefs with social organization and the arts. Slides, motion pictures, recordings.

624 (3) Su,S. Culture Patterns and Personality.
(See under Sociology)

630 (4) S. Indians of the Americas. 4 cl. Prereq: 5 hrs of Anthrop or equiv with permission of instructor. May be taken in sequence with 632. Mr. Estel
American Indian cultures of the time of European conquest.

632 (4) A. American Indian Prehistory. 4 cl. Prereq: 5 hrs of Anthrop or equiv with permission of instructor. Mr. Estel
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.

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

634 (4) W. Ethnology of Asia. 4 cl. Prereq: 5 hrs of Anthrop or equiv with permission of instructor. Mr. Estel
A survey of the peoples of Asia. High civilizations and tribal cultures. Prehistoric origins of Asian cultures; the distribution of physical types; languages; social customs.

635 (4) A. Ethnology of Africa. 4 cl. Prereq: 5 hrs of Anthrop or equiv with permission of instructor. Mr. Hamer
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 (4) W. Fossil Man. 4 cl. Prereq: 502 or 15 hrs of Biol or Geol. Miss Pettay
A comprehensive study of the fossil hominids. Fossils of Homo sapiens and their relation to other fossil hominids.

637 (4) S. Living Races of Man. 4 cl. Prereq: 502 or 15 hrs of Biol including genetics. Miss Pettay
The racial classification of man on a biological basis. The formation of races. Biological race differences and race mixtures.

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

659 (3) S. Peoples and Cultures of Latin America. 3 cl. Prereq: 5 hrs of Anthrop or equiv with permission of instructor. Mrs. Bourguignon
The emergence of Latin America as a distinct culture area in the modern world.

660 (4) W. Introduction to Anthropological Linguistics. 4 cl. Prereq: 10 hrs of Anthrop or Ling 601. Mrs. Bourguignon
Relations of language to social organization, world view, socialization and cultural analysis.

670 (4) S. Principles of Research in Archaeology. Prereq: 10 hrs of Anthrop, including 501 or 10 hrs of work closely related to archaeological field research, and permission of instructor. Mr. Baby
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.
ANTHROPOLOGY

674 (3-16) Su, 8 cr hrs for either term. Archaeological Training Expedition. Full time in expedition camps. Prereq: 670 or 10 hrs of work closely related to archaeological field research, and permission of instructor. Mr. Eby. Joint expedition of the Ohio State University and the Ohio State Museum, engaged in excavating prehistoric sites in Ohio. Experience in archaeological field work.

700 (1-4) Su, A, W, S. Special Problems. Prereq: 10 hrs of Anthrop. Permission of instructor.
   a. Theory
   b. History
   c. Anthropological Linguistics
   d. Research Methodology
   e. Prehistory
   f. Ethnography
   g. Physical Anthropology
   h. Unclassified

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

730 (2) W. Osteometry. 1 hr lec, 3 hr lab. Prereq: Anthrop 686, taken or in progress. Mr. Estel, Miss Pettay. Laboratory measurements of human skeletons.

731 (2) S. Anthropometry. 1 hr lec, 3 hr lab. Prereq: Anthrop 637, taken or in progress. Mr. Estel, Miss Pettay. Laboratory measurement of living human beings.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the 800 or 900 range except by permission of the Graduate Council.

820 (3) Su, A, W, S. Seminar in Anthropology.

899 (1-5) Su, A, W, S. Interdepartmental Seminar.
   (See under Interdepartmental Seminars)

   Research for thesis or dissertation purposes only.

ARCHITECTURE

School of Architecture and Landscape Architecture
Office, 106 Brown Hall

PROFESSORS WHITAKER, BAUMER (EMERITUS), BORCHERS, G. M. CLARK, PETERSON, RONAN (EMERITUS), AND WILSON, ASSOCIATE PROFESSORS CODDINGTON, CONNELL, AND TILLEY, ASSISTANT PROFESSORS BOWERS AND DIPNER, INSTRUCTORS BIDDLE, LECTURERS BURKHALTER, IGUCHI, MACIOCE, MACCOY, PASSE, SEITZ, AND YOUNG

FOR UNDERGRADUATES

411 (4) A. 412 (4) W. 413 (4) S. Introductory Architectural Design. 12 lab hrs. Req'd first year architecture and second year landscape architecture. Mr. Bowser and Staff. An introduction to architectural design, through exercises in graphics, delineation, techniques and space organization. Library research and individual criticism.

511 (5) A. 512 (5) W. 513 (5) S. Elementary Architectural Design. 18 lab hrs. Prereq: all preceding courses in Architectural Design. An introduction to second year architecture and third year landscape architecture. Mr. Tilley, Mr. Biddle, and Staff. Elementary problems in architectural design dealing with organization of space for human occupancy. Library research, individual criticism, and lectures.
ARCHITECTURE

[521] (3) A. [522] (3) W. [523] (3) S. Elementary Architectural Construction. 1 cl, 6 lab hrs. Prereq: Eng Mech 513. Reqd third yr architecture. Mr. Dipner and Staff
Composition, manufacture, physical properties, standards, and uses of basic building materials. Theory, methods, codes, and specifications of architectural construction, preparation of contract drawings.

571 (1-5) A. 572 (1-5) W. 573 (1-5) S. Special Studies in Architecture.
All Instructors
These courses are open by permission of the School for students not majoring in Architecture who desire to pursue special studies in the field of Architecture.

FOR ADVANCED UNDERGRADUATES
According to University regulations, courses in this group are not open to freshmen or sophomores.

[604] (3) A. History of Ancient Architecture. 3 cl. Reqd Arch majors 2nd yr. Mr. Borchers
Analysis of primitive structures and ancient architecture before the Christian era to illustrate basic principles of shelter, natural building techniques, and organization of space.

[605] (3) W. History of Medieval and Renaissance Architecture. 3 cl. Reqd Arch majors 2nd yr. Mr. Borchers
Analysis of architecture from the early Christian era through the Baroque, related to the spirit of the age, social organization, and increasing structural knowledge.

[606] (3) S. History of Contemporary Architecture. 3 cl. Reqd Arch majors 2nd yr. Mr. Borchers
Analysis of architecture from the Industrial Revolution to the present reflecting changes in society, fashion and architectural practice, new materials and structural techniques.

611 (5) A. 612 (5) W. 613 (5) S. Intermediate Architectural Design. 15 lab hrs. Prereq: all preceding courses in Architectural Design. Reqd third yr architecture. Mr. Clark and Staff
Intermediate problems in architectural design dealing with space analysis and site planning: presented in an integrated and related series of building types.

621 (4) A. 622 (4) W. 623 (4) S. Intermediate Architectural Construction. 1 cl, 8 lab hrs. Prereq: 513, 523 and 661, 662, 663 concur. Reqd third yr architecture. Mr. Clark and Staff
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.

631 (2) S. Inspection Trip. Reqd Arch majors third or fourth yr. All Instructors
Taken between Winter and Spring Quarters. Trip to inspect architect’s office and buildings in Ohio and neighboring states. Written report required.

661 (4) A. 662 (4) W. 663 (4) S. Architectural Building Equipment. 3 cl, 3 lab hrs. Prereq: 513 and 523. Reqd third yr architecture. Mr. Passe, Mr. Dipner
Fundamentals of building services; installation of approved equipment; application of building, fire prevention, and safety codes; specifications and preparation of working drawings.

671 (1-5) A. 672 (1-5) W. 673 (1-5) S. Special Studies in Architecture.
All Instructors
These courses are open by permission of the School for students not majoring in Architecture who desire to pursue special studies in the field of Architecture.

[707] (3) A. Allied Arts. 3 cl. Reqd Arch majors fifth yr. Mr. Borchers
Analysis of arts related to architecture and the expression of the nature of materials in architectural ornament, furniture and furnishings, and the garden.

708 (3) W. Community Patterns. 3 cl. Reqd Arch and Land Arch majors fifth yr. Mr. Tobey, Mr. Sutton
Analysis of architecture and the urban landscape from ancient to modern times.
ARCHITECTURE

709 (3) S. Urbanism and City Planning. 3 cl. Reqd Arch and Land Arch majors fifth yr. Not open to graduate planning students. Mr. Stillman
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.

711 (5) A. 712 (5) W. 713 (5) S. Advanced Architectural Design. 15 lab hrs. Prereq: all preceding courses in Architectural Design. Reqd fourth yr architecture. Mr. Phelan and Staff
Advanced problems in architectural design dealing with space organization in relation to group composition and community patterns. Library research and individual criticism.

714 (8) A. 715 (8) W. 716 (8) S. Advanced Architectural Design and Thesis. 24 lab hrs. Prereq: all preceding courses in Architectural Design. Reqd fifth yr architecture. All Instructors
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.

754 (2) A. Professional Practice: Theory of Working Drawings and Specifications. 2 cl. Prereq: senior standing. Reqd fifth yr architecture. Mr. Wilson
Study of the methods and current practices in delineation and description of the document required for building construction.

755 (2) W. Professional Practice: Building Costs, Contracts, Supervision. 2 cl. Prereq: senior standing. Reqd fifth yr architecture. Mr. Wilson
Building costs, bidding procedures, procedures, forms of construction contracts and bonds and supervision of building construction, including study of current construction projects.

756 (2) S. Professional Practice: Public, Professional Relations, and Office Management. 2 cl. Prereq: senior standing. Reqd fifth yr architecture. Mr. Borchers
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.

Theory and methods, codes and specifications pertaining to basic parts of advanced architectural construction, and preparation of working drawings.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen-sophomores.

771 (1-5) A. 772 (1-5) W. 773 (1-5) S. Special Studies in Architecture. All Instructors
These courses are open by permission of the School to students majoring in Architecture desiring to pursue special studies not offered in the fixed curriculum.

ASTRONOMY

Office, Emerson McMillan Observatory and 121 Physics Building
Office, Perkins Observatory, Delaware, Ohio

PROFESSORS BOBOVNIKOFF, KEENAN, KRAUS AND SLETTEBAK, DIRECTOR
ASSOCIATE PROFESSORS KO AND MENON, ASSISTANT PROFESSORS MITCHELL AND BONSACK

FOR UNDERGRADUATES

401 (5) A. General Astronomy I. 4 cl, 1 2 hr lab. Prereq: passing O.S.U. Math Entrance Test, or Math 400 or 401 concur. Not open to students who have credit for Astron 500. Mr. Bobrovnikoff
A continuation of Astron 401 with emphasis on the stellar universe and physical aspects. Astron 401 deals with the solar system and the earth as an astronomical body.
402 (5) W. General Astronomy II. 4 cl, 1 2 hr. lab. Prereq: Astron 401.
Not open to students who have credit for Astron 500. Mr. Bobrovnikoff
A continuation of Astron 401 with emphasis on the stellar universe and physical astronomy.

500 (5) Su.A.S. Descriptive Astronomy. 5 cl. Not open to students who
have credit for Astron 401 and 402. Mr. Bobrovnikoff
An introductory course emphasizing the place of astronomy in man's cultural and scientific
development.

#503 (3) W. Solar System. 3 cl. Prereq: 401 or 500 and Math 418 or 440.
Mr. Bobrovnikoff
The physical nature of the solar surface, planets, satellites, comets, asteroids, meteors, and
diffuse matter in the solar system. Cosmogony of the solar system.

#504 (3) W. Stellar Astronomy. 3 cl. Prereq: 402 or 500 and Math 418
or 440. Mr. Bonsack
The motions and distribution of stars and interstellar matter in space. The structure of the
Milky Way, other galaxies, and the universe.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or
sophomores.

#605 (3) W. Introduction to Celestial Mechanics. Prereq: Math 538 or
543 and Physics 412-413 or 532-533. Mr. Bobrovnikoff
Application of the laws of motion to planets, satellites, and stars. The two, three, and n-body
problems. Introduction to orbit and perturbation theory.

651 (3) S. Introduction to Astrophysics. 3 cl. Prereq: Physics 614 or equiv
and Math 538 or 543. Mr. Keenan
Study of radiation from stars and nebulae to determine the composition and physical condi-
tions of matter in and between the stars. Stellar nuclear energy sources.

700 (1-15) Su.A.W.S. Minor Problems in Astronomy. Prereq: 10 qtr hrs
of Astron, Math 538 or 543, and Physics 412-413 or 532-533. A student may
repeat this course and may spend all or any part of his time on it during a qtr.
Perkins Observatory Staff
Independent library or laboratory work on a special problem in observational or theoretical
astronomy at the Perkins or McMillan Observatory.

751 (3) A. 752 (3) W. 753 (3) S. Observational Techniques. Prereq: 651.
Physics 606 and 718. Mr. Bonsack, Mr. Mitchell
Elec E 784 (3) Radio Astronomy Instrumentation.
(see Electrical Engineering)

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the 600 or 600 group
except by permission of the Graduate Council.

801 (1) A. 802 (1) W. 803 (1) S. Seminar in Astronomy. Prereq: 10 qtr
hrs each in 600 courses or higher in Astron, Physics, and Math, or permission
of instructor. Req'd of all candidates for advanced degree in Astron. Repeat-
able. Perkins Observatory Staff
Seminars conducted on astronomical topics of current interest. Students will participate
actively in the presentation and discussion of materials.

#821 (3) A. #822 (3) W. #823 (3) S. Stellar Atmospheres and
Diffuse Matter in Space. 3 cl. Prereq: 651, Physics 702, 718, Math 601, 611. Mr.
Keenan, Mr. Mitchell, Mr. Slettebak
Stellar classification and spectra of peculiar stars. Interpretation of continuous and line
spectra of stars. Diffuse matter in space. Magnetohydrodynamics.

#841 (3) A. #842 (3) W. #843 (3) S. Dynamical Astronomy. 3 cl.
Prereq: 651, Math 601, 611. Mr. Keenan, Mr. Mitchell, Mr. Bonsack
Stellar statistics and kinematics. Galactic structure. External galaxies, cosmology, and
cosmogony.
[859] (3) W. Current Topics in Astronomy. Prereq: 651. Repeatable with permission of staff. Perkins Observatory Staff

This course is designed to permit staff members and visiting lecturers to present material on their current research problems.

#651 (3) A. #852 (3) W. #853 (3) S. Stellar Interiors and Stellar Evolution. 3 cl. Prereq: 651, Physics 614, 702, Math 601, 611. Mr. Keeney, Mr. Slettebak.


896 (2) W. Radio Astronomy Theory I. 3 cl. Prereq: 651 and Physics 302 or Elect 482 or permission of instructor. Mr. Kraus, Mr. Ko, Mr. Menon

Fundamental theory of radio astronomy and interpretation of basic radio observations. Given in collaboration with the Department of Electrical Engineering.

897 (3) S. Radio Astronomy Theory II. 3 cl. Prereq: 896 or permission of instructor. Mr. Kraus, Mr. Ko, Mr. Menon

Advanced theory of generation, propagation and absorption of cosmic radio waves. Given in collaboration with the Department of Electrical Engineering.

(See under Interdepartmental Seminars)


Research for thesis or dissertation purposes only.

AVIATION
Ohio State University Airport

ASSISTANT PROFESSOR, EGGSPUEHLER, MR. BILLING, MR. CHAPMAN, MR. RASER, MR. GALIPAULT, MR. HUBBARD, MR. JONES, MR. KENNY, MR. LARSON, MR. MEERK, MR. PETERSON

505 (4) Su,A,W,S. Elements of Aviation. 3 cl, 2 lab. Prereq: Math 418 or 439, Physics 411.

Problems in fundamentals of flight and aircraft operation. Objective studies of aviation laws and regulations.

506 (1) Su,A,W,S. Primary Flight. 5 lab. Prereq: 505 or concur, and permission.*

A laboratory course provided for students to achieve greater understanding of 505.

507 (3) Su,W. Introduction to Aviation. 3 cl, 1 field trip. Prereq: permission.*

A comprehensive study of our air transportation system.

600 (1-4) Su,A,W,S. Advanced Flight. 5 lab. Prereq: 506 and permission.*

The student must register for specific studies in areas indicated below, and may register for more than one at a time. He cannot accumulate more than four (4) credits for entire course.

(a) Precision Flight Maneuvers
(b) Flight Navigational Procedures
(c) Performance Evaluation
(d) Flight Safety

601 (3) A. Aircraft Performance. 3 cl. Prereq: 505.

Studies of airframe components, performance and design characteristics, power plant, and federal certification of aircraft equipment.

603 (3) W. Air Traffic Control and Flight Meteorology. 3 cl. Prereq: 505, Physics 420.

Precision navigational techniques for position control, flight planning and cruise control, aids to navigation, fundamentals of meteorological analysis, and effects of weather on flight.

605 (3) S. Analysis of Problems in Aviation Safety. 3 cl. Prereq: 601, 602.

Psych 627.

Detailed analysis of standard and proposed procedures relating to safety, studies in plane behavior, accident investigation and safety programs.

*Secure permission slip at University Airport prior to scheduling.
BIOPHYSICS
Office, 241 Graduate School Building

ADVISORY COMMITTEE: PROFESSORS N. A. COULTER, JR., PHYSIOLOGY; J. E. GANDER, AGRICULTURAL BIOCHEMISTRY; L. E. LIPETZ, PHYSIOLOGY; R. A. NELSON, PHYSICS; C. A. SWANSON, BOTANY; QUENTIN VAN WINKLE, CHEMISTRY; AND ASSOCIATE DEAN EDWARD MOULTON, GRADUATE SCHOOL, CHAIRMAN.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

645 (3) S. Principles of Biophysics.
(See under Physiology)

648 (3) S. Physical Instrumentation for Biologists.
(See under Physiology)

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the 600 or 900 group except by permission of the Graduate Council.

700 (1) Su,A,W,S. Seminar in Biophysics. 1 cl. Prereq: permission of instructor. Repeatable. Staff

701 (1-5) Su,A,W,S. Minor Problems in Biophysics. Prereq: permission of instructor. Repeatable to a maximum of 10 cr hrs. Staff

702 (1-3) Su,A,W,S. Advanced Experimental Methods in Biophysics. Prereq: permission of instructor. Repeatable to a maximum of 9 cr hrs. Staff

800 (3) A,W,S. Advanced Topics in Biophysics. Prereq: permission of instructor. Repeatable to a maximum of 18 cr hrs. Staff

Research for thesis and dissertation purposes only.

BOTANY AND PLANT PATHOLOGY
Office, 102 Botany and Zoology Building

PROFESSORS MEYER, SAMSON (EMERITUS), BLAYDE, ALLISON, TAFT, WILSON, ALEXANDER, GRY, SWANSON, LEBEN, AND BONNING, ASSOCIATE PROFESSORS WALLER, POPE, PADDOCK, ELLETT, WEISHAUP, SCHMITZHENNER, WILLIAMS, GILBERT, FISHER AND SCHMITZ, ASSISTANT PROFESSORS LAMPE, JONES, FLATT, TROXEL, HESS, BART, RUDOLPH, MCCORMICK, JOHNSON, SMITH, HURLEY, AND GIESY, MR. HUMPHREY, MR. WOODRUFF, MR. ESSEY AND MRS. DECKER, AND ASSISTANTS

FOR UNDERGRADUATES

401 (5) Su,A,W,S. General Botany. 5 cl. Open only to freshmen and sophomores except by special permission. Staff
An observation and discussion course in basic processes and structures of plants, their relation to the environment, and their importance to other organisms, especially man.

402 (5) Su,A,W,S. General Botany. 5 cl. Open only to freshmen and sophomores except by special permission. Staff
Continuation of 401. Reproduction, heredity, variation and evolution in plants; the plant groups; importance of non-green plants; plant distribution; plants in relation to conservation.

406 (5) Su,S. Local Flora. 4 2 hr cl; several Saturday field trips required. Prereq: 401-402 or 672. Mr. Humphrey, Miss Weishaupt, Mr. Fisher
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.

505 (5) W. Introduction to Ecology. 5 cl, two Saturday field trips. Prereq: 10 hrs Biol Sc. Mr. McCormick, Mr. Stansbery
An introduction to basic communities, inter-relations of a community with its physical environments, and the application of ecological principles to human affairs.
519 (5) A.S. General Plant Pathology. 3 cl, 2 2 hr lab. Prereq: 401-402 or 672. Not open to students who have credit for Bot 419. Mr. Ellett, Mr. Troxel, Mr. Smith
An introduction to disease of plants.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

601 (5) A. Plant Ecology. 3 cl, 1 3 hr lab, several Saturday field trips, 1 day field trip. Prereq: 401-402 or 672, 20 additional hrs Biol Sc. Mr. Gilbert, Mr. McCormick
Ohio plant communities and their successions: regional and continental patterns of vegetation; historical, climatic, soil, and biotic factors that limit plant communities.

602 (5) S. Plant Geography. 3 cl, 1 3 hr lab, 1 4 day field trip. Prereq: 601. Mr. McCormick
A consideration of present and past distribution of plants throughout the world and the pattern and structure of modern vegetation with emphasis on North America.

605 (3 or 5) Su,A.W. Plant Physiology. 3 cl, 2 2 hr lab. Prereq: 401-402 or 672, 10 hrs Chem. Mr. Meyer, Mr. Swanson, Mr. Bohning, Mr. Platt, Mr. Burley
A fundamental course in plant physiology: solutions, colloidal systems, diffusions, energy materials, respiration, absorption and translocation of water, enzymes, photosynthesis.

606 (3 or 5) Su,W.S. Plant Physiology. 3 cl, 2 2 hr lab. Prereq: 605. Mr. Meyer, Mr. Swanson, Mr. Bohning, Mr. Platt, Mr. Burley
A continuation of 605; photosynthesis, respiration and metabolic synthesis, absorption and utilization of mineral salts, digestion, translocation of solutes, growth, reproduction, dormancy.

614 (5) W. Bryophytes, Pteridophytes, and Gymnosperms. 4 2 hr lab. Prereq: 401-402 or 672, 10 additional hrs Biol Sc. Miss Lampe
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.

615 (5) W. Plant Microtechnic. 2 cl, 3 2 hr lab. Prereq: 401-402 or 672, 10 additional hrs Biol Sc. Mr. Blaydes
Principles and methods of preparing permanent plant tissue microscopic preparations. Student has opportunity to prepare a personal slide collection suitable for teaching or research.

635 (5) A. Plant Genetics. 3 cl, 2 2 hr lab. Prereq: 401-402 or 672, Zool 604. Mr. Paddock
Effects of lethals, linkage, heterozygosity, introgression, polyploidy, self-incompatibility, etc. Cytoplasm. Laboratory experience with aceto-carmine smears, colchicine, proway tests, random number tables, and herbarium specimens.

640 (5) S. Development Plant Anatomy. 4 2 hr cl. Prereq: 401-402 or 672, 10 additional hrs Biol Sc. Mr. Popham
The initiation, differentiation, and development of tissues, tissue systems and organs of vascular plants, and a comparative study of the various structures.

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

650 (3) A. Diseases of Fruit Crops. 3 2 hr cl. Prereq: 519 or 671. Mr. Allison
A detailed study of important tree and small fruit crop disease; their cause, distribution, severity, and specific control measures.
#651 (3) W. Diseases of Cereal and Forage Crops. 3 2 hr cl. Prereq: 519 or 671. Mr. Ellett
A detailed study of important cereal and forage crop diseases; their cause, distribution, severity, importance, and specific control measures.

#652 (3) S. Diseases of Vegetable Crops. 3 2 hr cl. Prereq: 519 or 671. Mr. Allison
A detailed study of important vegetable crop disease; their cause, distribution, severity, importance, and specific control measures.

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

655 (3) S. Industrial Mycology. 2 cl, 1 2 hr lab. Prereq: 605-606, or 10 hrs Organic Chem. Mr. Gray
The relation of fungi, especially saprophytic fungi, to human affairs, with emphasis upon their actual and potential applications in industry.

658 (5) A. Medical Mycology. 3 cl, 2 2 hr lab. Prereq: 15 hrs Biol Sc, including Microbiol 607. Mr. Schmitt
The fungi pathogenic to man, their structure and distribution, and the importance of human mycotic diseases.

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

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

665 (4 or 5) Su. S. Algae. 4 2 hr cl. Prereq: 401-402 or 672, 10 additional hrs Biol Sc. In the Summer Qtr given only at Franz Theodore Stone Laboratory. Mr. Taft
A general course covering identification, growth, reproduction, evolution, distribution and economic importance of the algae.

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

667 (4) Su. Physiology of Aquatic Plants. Second term. Prereq: 401-402 or 672 or equiv and 10 hrs of Chem. Given only at Franz Theodore Stone Laboratory. Not open to students who have credit for Hydrobiol 667.
Lectures, discussions, laboratory and field work on basic topics in the physiology of aquatic plants.

#669 (4) Su. Higher Aquatic Plants. Second term. Prereq: 401-402 or 672 or equiv and 10 additional hrs of Biol Sc. Given only at Franz Theodore Stone Laboratory. Not open to students who have credit for Hydrobiol 669. Mr. Fisher
The aquatic plants of the Lake Erie region other than the algae. Field and laboratory work on their identification and ecological relations.

#670 (4) Su. Aquatic Mycology. First term. Prereq: 401-402 or 672 or equiv and 10 hrs additional Biol Sc. Given only at Franz Theodore Stone Laboratory. Mr. Schmitt
A lecture, laboratory, and field course designed to acquaint the student with the fungi found in aquatic habitats, including soil water.
44 BOTANY AND PLANT PATHOLOGY

671 (5) Su. W. Plant Pathology. 3 cl, 2 2 hr lab. Prereq: 401-402 or 672. 15 additional hrs Biol Sc. Not open to students who have credit for Bot 718. Not open to students majoring in plant pathology. Mr. Troxel, Mr. Ellett. Representative plant diseases are studied with emphasis on general principles of disease development and control.

672 (5) Su. A.W.S. Basic Concepts in Botany. 5 cl. Prereq: 10 hrs Chem. Not open to students with credit for 401. Open for graduate credit only to participants in the Academic Year Institute. Mr. Taft. An advanced course in the basic concepts of botany for students with a fundamental knowledge of chemistry.

#673 (5) A. Taxonomy of Vascular Plants. 4 2 hr lab. Several Saturday field trips. Prereq: 406 or 664. Mr. Fisher. A laboratory, field, and discussion course in the classification and identification of vascular plants. Several Saturday field trips.

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

690 (5) W. Topics in Biological Sciences. 5 cl. Prereq: Math 418, Chem 405, and Physics 412, or equiv. Not available for grad cr. Mr. House, Mr. Moore, Mr. Myser, Mr. Plaine, Mr. Platt, Mr. Swanson, Mr. Tidd. Lectures and demonstrations intended for students of junior standing: cells, metabolism, photochemical phenomena, chemical genetics, physiology or reproduction, population genetics, speciation, and evolution.

701 (1-5) Su. A.W.S. Special Problems. Prereq: 401-402 or 672 and 10 hrs additional Biol Sc. Staff. Problems may be selected in the fields of taxonomy, morphology, anatomy, physiology, ecology, genetics, cytology, plant pathology, mycology or economic botany.

718 (5) W. Physiology of Fungi. 3 cl, 2 2 hr lab. Prereq: 606-606, 608. Mr. Gray. The physiology of the nutrition, growth, and reproduction of fungi.

725 (3) A. Physiological Methods. 6 lab hrs. Prereq: or concur: 605-606. Not open to students who have credit for 638. Mr. Burley, Mr. Platt, Mr. Swanson. Selected research techniques dealing primarily with respiration, photosynthesis and associated metabolic phenomena.

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


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

#737 (3) S. Plant Cytology. 3 2 hr lab. Prereq: 605-606, Miss Lampa. Colloidal chemistry and structure of cell organs living and fixed. Ontogeny, structure, function, and fusion of plant cells. Chromosome behavior, structure, and mutation; the gene.
#740 (3 or 5) S. Cytogenetics. 3 cl, 2 2 hr lab. Prereq: 401-402 or 672, Zool 403 or 603, and Zool 618 or Bot 737. Mr. Paddock
Origin, transmissibility, and effects of chromosomal aberrations; their usefulness in practical breeding and in attacks on fundamental cytogenetic problems.

#750 (3) S. Ecological Methods. 2 cl, 1 2 hr lab, several Saturday field trips. Prereq: 601 or equiv. Mr. Gilbert, Mr. McCormick
Field measurement of edaphic and climatic factors in plant habitats and analysis of the data; statistical analysis of vegetation; sources of climatic data; paleoecological techniques.

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

#754 (3) S. Advanced Mycology. 3 2 hr lab. Prereq: 653. Mr. Gray
Advanced detailed study of specific groups of fungi, with emphasis on their morphology, cytology and genetics.

#757 (5) A. Experimental Taxonomy. 3 cl, 2 2 hr lab, some Saturday field trips. Prereq: 406 or 664 and Zool 403 or 603. Mr. Fisher
Biological categories, population analysis of mass collections, individual variations, hybridization, and introgression are studied in relation to the methods and materials of experimental taxonomic research.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

810 (1) Su,A,W,S. Botanical Colloquium. Req'd of all graduate students majoring in Bot; elective for other qualified students. Repeatable.

815 (2) Su,A,W,S. Seminar in Plant Pathology. Req'd of all graduate students majoring in Plant Path; elective for other qualified students. Repeatable. Mr. Allison, Mr. Ellett, Mr. Troxel

820 (1) A,W,S. Seminar in Plant Physiology. Req'd of all graduate students majoring in Plant Physiol; elective for other qualified students. Repeatable. Mr. Meyer, Mr. Swanson, Mr. Platt, Mr. Burley

825 (2) A.W. Seminar in Plant Ecology. Prereq: 601. Req'd of all graduate students majoring in Plant Ecol; elective for other qualified students. Repeatable. Mr. Gilbert, Mr. McCormick

830 (2) S. Seminar in Lichenology. 2 cl. Repeatable. Mr. Rudolph
Current problems in lichen symbiosis, morphology, taxonomy, ecology, and physiology.

850 (3) W. Principles of Plant Pathology. 3 2 hr cl. Prereq: 650 or 651, or 652. Mr. Allison
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.

#860 (3) A. History of Botany. 3 cl. Prereq: 401-402 or 672, 10 additional hrs Biol Sc.
A brief survey of the fundamental discoveries that have led to modern concepts in plant science.

897 (1) A,W,S. Interdepartmental Seminar in Natural Resources.
(See under Interdepartmental Seminars)

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

Research for thesis and dissertation purposes only.
BUSINESS ORGANIZATION
Office, 352, 354 Hagerty Hall

PROFESSORS WEIDLER (EMERITUS), HOAGLAND (EMERITUS), DICE (EMERITUS), VAN CLEEF (EMERITUS), DUFFUS (EMERITUS), MINNER, BECKMAN, R. C. DAVIS, DONALDSON, FUCHS, LEY, BARTEL, J. M. DAVIS, HICKS, DAVIDSON, GRIFF, STODDILL, CULLMAN, SCHLENKER, AND STONE, ASSOCIATE PROFESSORS CORDELL (EMERITUS), RIDDLE, TUTTLE, QUANTUS, ALLEN, STEELE, BONNES, MUESSEL, PFAHL, HICKERHAUPT, HOWELL, ABRAMOWITZ, GOODILL, VEYMAN AND WILKINS, ASSISTANT PROFESSORS LEATHERMAN, BLACK, HAMMOND, FLETCHER, HOUSE, HESKETT, DOODY, FOSTER, MORGENTHÖR, SMITH, MEYER, MR. BRUNNER, LECTURERS, ASSISTANT INSTRUCTORS

FOR UNDERGRADUATES

401 (5) Su,A,W,S. Introduction to Business. 5 cl. Open only to freshmen and sophomores. Mr. Goodell and others
Introduction to principles of marketing, finance, management, and other business subjects. Designed to provide a broad background for advanced courses.

500 (1) A,W. Personal Adjustment to Business. 1 cl. Open to seniors. Mr. Steele
Basic principles and procedures relating to preparation of job campaigns and career blueprints; factors facilitating the adjustment from school to business.

504 (3) Su,A,W,S. Business Communications. 3 cl. Prereq: Econ 402 or 404 or 406 or 507, and junior standing. Mr. Hicks and others
Principles of writing in business letters and reports and internal communications. Selling, buying, collecting, adjusting, credit granting, etc., by mail.

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

551 (3) Su,A,W,S. Personal Finance. 3 cl. Prereq: Econ 402 or 404 or 406 or 507. Not open to students who have credit for or are taking 655. Mr. Donaldson, Mr. Pfahl, Mr. Goodell, Mr. Foster
Credit, borrowing money, saving money, bank relationships, buying government bonds; insurance, annuities, real estate, corporate bonds and stocks, and problems of taxation and wills.

725 (1-3) Su,A,W,S. Field Work in Business Organization. Prereq: permission of instructor. Repeatable to a maximum of 6 cr hrs. Not for graduate credit.
Internships may be approved in the following fields of business enterprise:
(a) Finance. Mr. Donaldson and others
(b) Real Estate. Mr. Stone, Mr. Smith
(c) Insurance. Mr. Ley, Mr. Bielshoeho
(d) Marketing. Mr. Beckman, and others
(e) Banking. Mr. Goodell
(f) Industrial Management. Mr. R. C. Davis, and others
(g) Personal Management. Mr. Jucius, and others
(h) Transportation. Mr. Heslet
(i) Advertising. Mr. Cullman, and others
(j) Retailing. Mr. Donaldson, Mr. Doody, and others
(k) Secretarial Service. Mr. Hicks

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

614 (4) Su,W. Business Statistics. 3 cl, 1 2 hr lab. Prereq: Econ 522 or 542 or Soc Work 511. Mr. Tuttle
Price and production indexes. Analysis of time series. Linear correlation applied to economic and business problems.

615 (3) A,S. Industrial Statistics. 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.
BUSINESS ORGANIZATION

621 (3) Su,A,W,S. Business Law: Contractual Relationships. 3 cl. Prereq: Econ 402 or 404 or 406 or 507. Not for graduate credit for majors in Bus Org or Acc. Mr. Craig, Mr. Ley, Mr. Howell, Mr. Velman, Mrs. Wilkins
Role of law in business. Analysis of legal principles and decisions relating to business agreements, their formation, performance and enforcement.

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

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

625 (3) Su,A,W,S. Business Law: Commercial Paper and Sales. 3 cl. Prereq: 621. Mr. Ley, Mr. Howell, Mr. Velman
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.

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

[633] (3) W. Governmental Agencies and Business. 3 cl. Prereq: Econ 402 or 404 or 406 or 507 and junior standing. Mr. Ley
A study of the policies and procedures of the various agencies created by federal, state, and local governments to promote and regulate business enterprise.

640 (3) W. Corporate Organization and Control. 3 cl. Prereq: Econ 402 or 404 or 406 or 507. Not open to students who have credit for or are taking 650. Mr. Stone, Mr. Donaldson
Types of business enterprise: the corporation; rights, duties, obligations, and liabilities of stockholders, directors, and officers.

642 (3) A,W,S. Real Estate Principles. 3 cl. Prereq: Econ 402 or 404 or 406 or 507. Mr. Stone, Mr. Velman, Mr. Smith
Fundamentals of land economics. A survey of the principles of real property ownership and real estate practice.

643 (3) A. Real Estate Finance. 3 cl. Prereq: 642. Mr. Stone
Methods of financing various types of real estate. Analysis of real estate financial institutions.

[645] (3) S. Trade Associations. 3 cl. Prereq: Econ 402 or 404 or 406 or 507. Mr. Miner
The nature and functions of trade associations and their relation to business and government.

646 (3) W. Real Estate Appraisals. 3 cl. Prereq: 642. Mr. Smith
Real estate appraisal as to a guide to business decisions; market forces which affect value; appraisal methods; selection and analysis of data.

647 (3) S. Real Estate Development and Management. 3 cl. Prereq: 642. Mr. Smith
Selection and utilization of sites for residential, commercial, and industrial purposes; property management policies and practices. Economic and social significance of housing problems.

648 (3) S. Real Estate Brokerage. 3 cl. Prereq: 642. Mr. Smith
Organization of brokerage offices, methods of selection, training, and supervising real estate personnel. Special, economic, and legal responsibilities of brokers.
650 (5) Su.A.W.S. Corporation Finance. 5 cl. Prereq: Econ 402 or 404 or 406 or 507 and Acc 402 or 406 or 412. Not open to students who have credit for 640 except with permission of instructor. Mr. Donaldson, Mr. Riddle and others

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.

651 (3) A.S. Financial Management. 3 cl. Prereq: 650. Mr. Pfahl, Mr. Stone

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.

652 (3) A.S. Problems in Business Finance. 3 cl. Prereq: 650. Mr. Donaldson, Mr. Pfahl

Specific problems which involve the financial policies and operations of industrial companies.

655 (3) Su.A.W.S. Principles of Investment. 3 cl. Prereq: 650. Mr. Donaldson, Mr. Riddle, Mr. Stone

Nature and types of investments; objectives and programs; prices and yields; timing; taxes; supervision.

657 (4) W.S. Security Analysis. 4 cl. Prereq: 650. Mr. Pfahl, Mr. Stone

Objectives of security analysis; analysis of financial statements; principles and standards for selecting bonds and preferred stocks; appraisals and selection of common stocks.

659 (3) S. Investment Banking and the Capital Market. 3 cl. Prereq: 650. Mr. Riddle

The capital market; security offerings; the investment banking business—function, organization, operation; regulation of security issues; institutional investment policies and practices.

660 (3) A.S. The Stock Market. 3 cl. Prereq: 650 and Econ 520. Mr. Donaldson

Practices, procedures, and regulations relating to listing and to buying and selling securities in the organized security markets.

662 (3) S. The Money Market. 3 cl. Prereq: Econ 520. Miss Quantum

Mr. Goodell

The functioning of short-term money markets. Practical techniques through which Federal Reserve credit controls are brought to bear on the economy.

665 (3) W. Foreign Exchange. 3 cl. Prereq: Econ 520. Miss Quantum

Theory and practices of foreign exchange from the standpoint of both bankers and foreign traders. Relationship of foreign exchange to international trade and financial problems.

670 (3) A. Bank Organization and Management. 3 cl. Prereq: 650 and Econ 520. Mr. Goodell

Functions of banking, loan and investment policy, bank organization, operation, regulation and supervision.

674 (3) W. Savings and Trust Institutions. 3 cl. Prereq: 650 and Econ 520. Mr. Goodell, Mr. Foster

Operations, regulation, and economic significance of savings and loan associations, savings banks, trust companies, and other financial institutions.

676 (3) Su.A.W.S. Principles of Management. 3 cl. Prereq: Econ 402 or 404 or 406 or 507 and Acc 402 or 412. Not open to students who have credit for 680. Mr. R. C. Davis, Mr. Jucius and others

An intensive examination of the basic fundamentals of organization and management underlying the solution of management problems.

677 (3) Su.A.W.S. Industrial Organization and Management. 3 cl. Prereq: 676, Econ 542. Not open to students who have credit for 680. Mr. R. C. Davis, Mr. Jucius and others

Plant location, product and process planning, materials handling, physical facilities, production control, quality control, inventory control, utilization of materials and personnel in industrial organization.
682 (3) A.W. Supervisory Management. 3 cl. Prereq: 677. Mr. Jucius, Mr. Schlender, Mr. Leatherman, Mr. House
Managerial, technical, and human relations functions and responsibilities of the first level of management as exemplified by the foreman and supervisor.

685 (3) A.W. Purchasing, Stores, and Inventory Control. 3 cl. Prereq: 615, 677. Mr. R. C. Davis, Mr. Hicks, Mr. Schlender, Mr. Leatherman
Objectives, principles, and methods of managing the function of procurement and of supply. Planning of materials requirements, purchasing, receiving, storing, and disbursing.

686 (4) Su,A,W,S. Personnel Organization and Management. 4 cl. Prereq: 676. Not open to students who have credit for 688. Mr. Jucius, Mr. R. C. Davis, Mr. Schlender, Mr. House
Principles and practices of line and staff executives in managing the procurement, development, maintenance, and utilization of an effective and satisfied working force.

687 (4) A,W,S. Production Organization and Management. 4 cl. Prereq: 655 or concur. Mr. R. C. Davis, Mr. Albramowitz, Mr. Black
Examines the problem of coordinating sales, finance, and various technical staff services with the line function of production and its requirements.

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

692 (3) W.S. Problems in Personnel Organization and Management. 3 cl. Prereq: 686 or 689. Mr. Jucius, Mr. Schlender, Mr. House
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.

693 (3) Su,W. Wage and Salary Administration. 3 cl. Prereq: 686. Mr. Jucius, Mr. R. C. Davis, Mr. Schlender, Mr. House
Examination of problems of equitable compensation plans, alternative methods of compensation, wage and salary differentials, staff relationships, and administrative methods of compensation.

695 (3) W,S. Industrial Relations Management. 3 cl. Prereq: 686. Mr. Jucius, Mr. Schlender
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.

698 (3) S. Problems in Industrial Organization and Management. 3 cl. Prereq: 685, 687 or concur. Mr. R. C. Davis, Mr. Leatherman, Mr. Black
Case approach to problem-solving thought in the area of industrial organization and management.

700 (5) Su,A,W,S. Marketing. 5 cl. Prereq: Econ 402 or 404 or 406 or 507. Mr. Beckman and others
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.

702 (3) A,S. Managerial Marketing. 3 cl. Prereq: 700. Mr. J. H. Davis
Marketing policies and strategy. Product planning, pricing, distribution, promotion, and service from the marketing manager's viewpoint.

704 (4) Su,A,W. Marketing Research. 4 cl. Prereq: 700 and Econ 522 or 542. Mr. Miner, Mr. Morgenroth
The role of research in the solution of marketing problems. Emphasis is on available data analysis and methods of the field investigation.

705 (4) A,W,S. Retailing. 4 cl. Prereq: 700 and Acc 402 or 405 or 412. Mr. Davidson, Mr. Doody
Principles and methods of management as applied to retailing, including location, organization, personnel, buying, inventory control, selling and advertising, services, expenses, and profits.
50 BUSINESS ORGANIZATION

706 (4) A.W.S. Wholesaling. 4 cl. Prereq: 700 and Acc 402 or 405 or 412. Mr. Beckman, Mr. Davidson, Mr. J. H. Davis, Mr. Doody
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.

707 (3) S. Retail Merchandising and Control. 3 cl. Prereq: 705, and Econ 522 or 542. Mr. Davidson
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.

708 (3) S. Problems in Marketing Research. 2 cl, 1 2 hr lab. Prereq: 704. Mr. Miner, Mr. Morgenroth
Intensive problem-oriented study of selected areas of marketing research to meet the needs of students having a professional interest in such research.

709 (4) A.W.S. Credits and Collections. 4 cl. Prereq: 700 and Acc 402 or 405 or 412. Mr. Beckman, Mr. Bartels, Mr. Miner, Mr. Morgenroth

712 (4) A.W.S. Sales Management. 4 cl. Prereq: 676, 700, Acc 402 or 405 or 412. Mr. J. H. Davis, Mr. Culman
Management of sales function of a firm. Organization, forecasting, sales planning, setting territories and quotas, management of sales force, sales and cost analysis.

716 (4) Su A.W.S. Principles of Advertising. 4 cl. Prereq: 700. Mr. Culman, Mr. Bartels
Management of advertising by clients and agencies. Budgeting, research, media selection, preparation of advertisements, economic and social effects of advertising.

720 (3) A. 721 (3) W. International Marketing. 3 cl. Prereq: 700 Mr. Bartels, Mr. Heskett

722 (3) W.S. Advertising Management and Policies. 3 cl. Prereq: 716. Mr. Culman
Critical analysis of perennial problems such as advertising budgets, client-agency relationships, advertising account management, administration and control, media planning.

751 (3) S. Motor Carrier Organization and Management. 3 cl. Prereq: 677 or Econ 619 or 648 or 672 or 676. Mr. Heskett
Management principles applied to the organization and operation of motor carrier enterprises. Current problems of customer relationships, competitive transportation agencies, and administrative law.

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

755 (3) A. Air Transport Management. 3 cl. Prereq: Econ 619 or 677. Mr. Heskett, Mr. Fletcher
Airl ine management in a regulatory and competitive environment. Current problems of organization, operations, finance, labor relations, public relations, and marketing in the industry.

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

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

The development of sound risk and insurance programs for business, including proper
case study analysis and treatment of property, liability, life and health risks.

765 (3) S. Life Underwriting, Group Insurance, and Pensions. 3 cl. Prereq:
760. Mr. Hammond
Critical analysis of the problems of professional life underwriting and estate planning,
and employee benefit programs through group insurance and pensions.

799 (1-3) Su,A,W,S. Special Problems in Business Organization. Prereq:
graduate standing or senior standing with a 2.5 point average in the field of
specialization and permission of the instructor. Repeatable.
(a) Finance, Mr. Donaldson, and others
(b) Real Estate, Mr. Stone, Mr. Smith
(c) Finance, Mr. Bickelhaupt, Mr. Loy
(d) Marketing, Mr. Beckman, and others
(e) Banking, Mr. Goodell
(f) Industrial Management, Mr. C. R. Davis, and others
(g) Personnel Management, Mr. Justus, and others
(h) Transportation, Mr. Heiskell
(i) Advertising, Mr. Cullman, and others
(j) Retailing, Mr. Davidson, Mr. Doody, and others

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900
group except by permission of the Graduate Council.

729 (3) A.S. Marketing. 3 cl. Prereq: permission of instructor. Open only
to students preparing for graduate work in business. Mr. J. H. Davis, Mr. Doody
A critical study of the field of marketing institutions and functions primarily from a
social point of view.

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

800 (3) A.S. Principles and Techniques of Research. Prereq: 650, 676,
700, Econ 522 or 542. Not open to students who have credit for 703. Mr. Miner,
Mr. Heiskell, Mr. Morgenroth
Principles of research methods in business and the use of research by management. The
scientific method in business, sampling theory, variable analysis, research cases.

802 (3) S. Applications of Quantitative Methods in Business. 3 cl. Prereq:
800 and permission of instructor. Mr. Abramowitz, Mr. Black, Mr. Morgenroth
Applications of quantitative tools to the solution of recurring business management prob-
lems such as break-even points, forecasting, capital budgeting, inventory control, and product
mix.

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

804 (3) S. Seminar in Finance. Prereq: 650. Repeatable by permis-
sion of instructor. Mr. Donaldson, Mr. Stone, Mr. Pfahl
A critical study of current practices, trends and problems in the field of finance.

812 (3) A. Physical Distribution Management. Prereq: 677, 700, Econ
522 or 542. Mr. Heiskell
Management of movement services and coordination of demand and supply patterns for
optimisation of physical systems in terms of cost and customer service.

813 (3) Su,W. Advanced Marketing. Prereq: 700. Mr. Davidson, Mr. J. H.
Davis, Mr. Doody
A critical study of management of marketing activities in business enterprises, based
primarily on comprehensive case analyses.
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815 (3) A. 816 (3) W. Seminar in General Marketing. Prereq: 700. Mr. Beckman
A critical study of fundamental principles of marketing. Special emphasis on the historical and theoretical aspects of the subject.

817 (3) S. Seminar in Contemporary Marketing Problems. Prereq: 700. Repeatable. Mr. Beckman, Mr. Bartels, Mr. J. H. Davis, Mr. Davidic
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.

818 (1-3) W.S. Seminar in Specialized Areas of Marketing. Prereq: 700. Repeatable.
INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD
Regular class meetings and group discussions of the subject matter embodied by one of the following areas in the field of marketing:
818 A Advertising. Mr. Culkin
818 B Credits and Collections. Mr. Beckman, Mr. Bartels
818 C Marketing Research. Mr. Miner
818 D Retailing. Mr. Davidson
818 E Sales Management. Mr. J. H. Davis
818 F Wholesaling. Mr. Beckman
818 G Marketing Theory. Mr. Bartels

819 (3) A. History of Marketing Thought. Prereq: 700 and permission of instructor. Mr. Bartels
Evolution of marketing concepts, terminology, principles, and theory. Environmental and personal influences. Analysis of marketing literature. Marketing thought related to other sciences.

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

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

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

830 (3) S. Seminar in Property and Liability Insurance. Mr. Bickelhaup
Investigation through class discussion and reports of the current literature on significant topics in property and liability insurance.

833 (3) A. General Administrative Management. Prereq: 676, 677. Mr. R. C. Davis, Mr. Jucius
A seminar dealing with certain management problems of top executives in business organization, such as business objectives, ethics, policy, functions, and executive leadership.

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

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

836 (3) S. Advanced Office Organization and Management. Prereq: 681. Mr. Hicks, Mr. R. C. Davis
A critical survey and examination of current trends and advanced problems in the field of office organization and management.

838 (3) A.S. Personnel Relations. Prereq: 678. Mr. Jucius, Mr. Schieter
Analysis of interpersonal relations, personnel programs and policies, communication practices, and morale factors relative to the effect upon productivity, organizational effectiveness, and personal objectives.
BUSINESS ORGANIZATION

839 (3) A. History of Management Thought. Prereq: 676, 677. Mr. R. C. Davis, Mr. Jucius
Seminar in the historical evolution of fundamental concepts underlying the theory and practice of modern management. Pioneers in the management fields are discussed.

840 (3) A.S. Administrative Principles. Prereq: 656, 676, 700. Mr. R. C. Davis, Mr. Schliender, Mr. Hicks
An examination of management fundamentals underlying decision-making with respect to the utilization of basic performance factors in the accomplishment of business objectives.

841 (3) Su.A.S. Business Policy. 3 cr. Prereq: admission to MBA program or 650, 676, 700, Acc 403 or 412, Econ 522 or 542 and permission of Graduate Committee. Senior Staff
Examination of fundamental factors in organization and management. Major policy decisions are analyzed. Effects of policy decisions on sales, production, personnel, and finances are investigated.

#845 (3) S. Advanced Transportation and Public Utilities. Prereq: Econ 628 or 648 and permission of instructor. Mr. Haskett
Analysis of leading problems arising from private ownership and operation of transportation and public utility enterprises. Emphasis is on functions of the administrative executive.

899 (1-5) A.W.S. Interdepartmental Seminar.
(See under Interdepartmental Seminars)

950 (arr) Su.A.W.S. Research in Business Organization
Research for thesis or dissertation purposes only.

CERAMIC ENGINEERING
Office, 126 Lord Hall
PROFESSORS EVERHART, CARRUTHERS (EMERITUS), WACTS (EMERITUS), KING (EMERITUS), BLAY, AND RUSSELL, ASSISTANT PROFESSOR SHOOK, AND LECTURERS KOENIG, KING, AND ALEXANDER

FOR UNDERGRADUATES

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

521 (5) A. Fundamentals of Ceramic Engineering. 4 cr, 1 3 hr lab. Mr. Everhart
Nature of the ceramic industry. Occurrence of materials, property exploration and evaluation, recovery, beneficiation, and mineral economics. Unit operations in preparation and forming processes.

630 (2) S. Junior Inspection Trip. One week between W and S Qtr. Mr. Everhart, Mr. Russell
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.

640 (3) S. Fundamentals of Ceramic Materials. 3 cr. Mr. Russell
Survey of raw materials, their properties, functions, thermal behavior, and application. Introduction to the concept of glassy and crystalline states.

650 (5) W. Ceramic Heat Processes. 5 cr. Mr. Everhart
Drying processes including vaporization, moisture transport, cryometry, and fluid flow. Firing, sintering, melting, cooling, tempering, and annealing processes.

719 (4) S. Ceramic Process and Product Control. 4 cr. Prereq: 718. Mr. Everhart
The application of control methods for processes and products.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.
715 (4) A. Ceramic Materials Science I. 4 cl. Prereq: Chem 683, Mineral 605. Mr. Blau
Crystalline bonds, atomic structure, coordination, defect and silicate structures. Glass properties. Glass structure and composition related to plastic, optical, elastic, and mechanical properties.

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

726 (3) W. The Chemistry and Chemical Processes of Glass Technology. 3 cl. Prereq: 715, 731. Mr. Blau
The practical processes and equipment for producing commercial melt glasses, including the selection and handling of raw materials, processes in the furnace, types of furnaces, furnace design, and operation.

727 (4) S. The Physics and Physical Processes of Glass Technology. 4 cl. Prereq: 715, 731. Mr. Blau
The development of machine processes for forming containers, tubes, float glass, etc. Theories and processes of annealing, heat treatment, and decoration. Emphasis on the relation of processes to properties.

731 (4) S. Ceramic Technology. 2 cl, 2 3 hr lab. Mr. Blau
The technology of glass.

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

733 (4) A. Ceramic Technology. 2 cl, 2 3 hr lab. Mr. Everhart
The technology of refractories, structural clay products, and abrasives.

734 (4) A. Ceramic Technology. 2 cl, 2 3 hr lab. Mr. Russell
The technology of fine textured ceramics in the area of whitewares, electrical techniques and nuclear materials, and glass coatings.

740 (5) S. Ceramic Plant Design. 4 cl, 1 2 hr lab. Prereq: 719, Eng Mech 602. Mr. Everhart
The basic concepts of ceramic plant layout and process equipment selection. Kiln, dryer, and structure requirements. Manufacturing economics.

750 (1-7) Su.A,W,S. Special Problems. Conference, library, and laboratory work. Prereq: fundamental ceramic engineering courses and consent of department. Repeatable to a total of 15 hours. Staff

765 (3) A. Ceramic Research Methods. 1 cl, 2 2 hr lab. Prereq: 718. Mr. Everhart, Mr. Russell, Mr. Blau
Introduction to research experience. Organization and planning. Initiating specific research. Designed in combination with Cer E 766 to give experience in individual and group research.

766 (3) W. Ceramic Research Methods. 2 3 hr lab. Prereq: 765. Mr. Everhart, Mr. Russell, Mr. Blau
Continuation of Cer E 766 with accent on the conduct of specific research problems.

775 (3) S. Ceramic Case Histories. 3 cl. Mr. Everhart, Mr. Blau
The study of selected case histories in ceramic technological and industrial problems. Designed to give experience in individual and group thinking in problem solution.

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

781 (4) A. Advanced Ceramic Materials Science I. 4 cl. Prereq: 718 or permission of instructor. Mr. King
Materials science in the areas of crystal chemistry, colloids, surface phenomena, and the behavior of plastic and solid states. Thermal and optical properties.
CERAMIC ENGINEERING  55

782  (4) A. Advanced Ceramic Materials Science II. 4 cl. Prereq: 716 or permission of instructor. Mr. Russell, Mr. Alexander
Materials science in the area of electrical, magnetic, and semiconductive ceramics. Behavior of special ceramics in nuclear environment. Solid state systems.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

815  (1-5) A.W.S. Seminar in Ceramic Engineering. Prereq: permission of instructor. Mr. Everhart, Mr. Russell, Mr. Blau, Mr. Koenig, Mr. King, Mr. Alexander
The course consists of conference and reports on problems in ceramic science technology and engineering. Topics are chosen to cover the development of the ceramic industry.

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

822 (4) S. Advanced Ceramic Physics and Chemistry. 4 cl. Prereq: permission of instructor. Mr. Alexander
Special properties of crystals; organic chemistry, ultrasonics, and thermodynamics applied to ceramics; non-oxide ceramics.

#831 (4) W. Advanced Glass Science. 2 cl, 2 5 hr lab. Prereq: 781, Chem 683, Mr. Blau
The coordination of composition and physical treatment for attaining desired properties in glass. Detailed consideration is given to special glasses.

#832 (4) S. Physical Vitrology. 4 cl. Prereq: 781, Chem 683, Mr. Blau
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.

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

842 (4) S. Advanced Ceramic Science. 4 cl or conf. Prereq: 716 or equiv. Mr. King
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.

950 (arr) Su,A.W.S. Research in Ceramic Engineering. Staff
Research for thesis or dissertation purposes only.

CHEMICAL ENGINEERING

Offices, 121, 122 Chemical Engineering Building

PROFESSORS KOPFOLT, DRYDEN, GEANKOFLIS, KAY, KRUMIN, O’ROURKE (EMERITUS), AND SYVERSON, ASSOCIATE PROFESSORS BRODKEY, CORRIGAN, SLIDER, AND E. E. SMITH, RESEARCH ASSOCIATE PROFESSOR SHEETS, MR. HAERING, AND MR. WILCOX

FOR UNDERGRADUATES

501 (5) A. Chemical Engineering Practice Work. To be done between 3rd and 4th yr in Chem E. Mr. Koppolt
The equivalent of ten weeks spent in a factory, or the engineering department of an industrial plant or organized industrial work.

593 (3) A,W. 594 (3) W. Chemical Engineering and Process Calculations. 2 cl, 2 comp lab hrs. Prereq: Physics 532, Math 542, and Chem 422, or permission of instructor. Elective for students in the College of Arts and Sciences. Mr. Koppolt, Mr. Geankoplis, Mr. Haering, and Instructors
The application of physico-chemical principles to problems of chemical industry. The emphasis is on graphical methods, stoichiometry, heat, and material balances.
CHEMICAL ENGINEERING

691 (3) A.W. Elements of Chemical Engineering—Transport Phenomena. 1 cr. 2 cl, 2 comp lab hrs. Prereq: 593, 694, concur. Math 544, Physics 592 or permission of instructor. Mr. Brodkey, Mr. E. E. Smith

Introduction to momentum, mass, and heat transfer with emphasis on the analogies between the transports. Numerous computation problems illustrate applications to chemical engineering practice.

692 (3) W.S. Elements of Chemical Engineering—Transport Phenomena. II. 2 cl, 2 comp lab hrs. Prereq: 691, Math 544, Math 609 or permission of the instructor. Mr. Dryden, Mr. Brodkey, Mr. Smith

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.

704 (2) S. Inspection Trip. One week between W and S Qtr. Repeatable.

Mr. Koffolt

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.

755 (3) S. Chemical Engineering Kinetics. 2 cl, 2 comp lab hrs. Prereq: 720, 754, and Chem 683. Mr. Corrigan

Kinetics of simple homogeneous systems and introduction to heterogeneous catalysis.

777 (1) A. The Profession of Chemical Engineering. 1 cl. Prereq: 5th yr in Chem E. Mr. Koffolt, supervisor

The code of ethics of the chemical engineer, professional registration, responsibilities to societies of the profession, to management, to labor, and as an administrator.

790 (2) W. Analysis and Organization of Special Project Problem Investigations. Conf and lab 6 hrs. Prereq: 6th yr in Chem E curriculum. Mr. Syvarson, Mr. Haering

Analysis of definite problems having the theoretical and practical application to the chemical industry; individual effort guided by a chemical engineering staff member.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

693 (2-8) Su. A.W.S. Problems in Chemical Engineering Operations. 1 cr. 5-23 lab hrs. Prereq: 692. Repeatable. Not available for graduate credit for students majoring in Chem E. Mr. Koffolt, Mr. Haering

Individual or group conferences, library, and laboratory work dealing with fundamental chemical engineering operations.

719 (3) A.S. Elements of Chemical Engineering—Transport Phenomena. III. 2 cl, 2 comp lab hrs. Prereq: 692 or equiv. or permission of instructor. Mr. Geankoplis, Mr. Brodkey, Mr. Smith

Continuation of study of transport theory. Emphasis is laid on mass transfer and stagewise operations with applied computational problems.

720 (4) W.S. Chemical Engineering Operations. 3 cl, 2 comp lab hrs. Prereq or concur: 719, Chem 682 or permission of instructor. Mr. Koffolt, Mr. Smith

The application of the transport phenomena as fluids, heat, and mass transfer to the chemical engineering operations of evaporation, distillation, drying, etc.

740 (3) S. Chemical Process Control. 2 cl, 4 lab hrs. Prereq: 720 or equiv. or permission of instructor. Elective in the Graduate School. Mr. Geankoplis

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.

741 (4-8) Su. Chemical Engineering Operations Laboratory. Su Qtr following the 4th yr. 6 conf. 7-19 lab hrs. Prereq: 720-740 or permission of instructor. Mr. Koffolt, Mr. Smith, Mr. Haering

The fundamental laboratory course in the chemical engineering operations laboratory investigation of the operating characteristics and efficiency of chemical engineering equipment—distillation, drying, filtration, etc.
753 (3) A.S. 754 (3) Su,W. Chemical Engineering Thermodynamics. 2 cl, 2 comp lab hrs. Prereq: Chem 690 or permission of instructor. Elective for students in the Colleges of Arts and Education and in the Graduate School. Mr. Kay, Mr. E. E. Smith
Application of the fundamental concepts and laws of thermodynamics to problems of the chemical industry. Stress is laid on computational problem work.

760 (3) A. Chemical Engineering Economy. 2 c, 2 comp lab hrs. Prereq: 741 or permission of instructor. Elective for students in the College of Arts and Education and in the Graduate School. Mr. Corrigan
Economic consideration in research, development design, and manufacturing in the chemical process industry. Cost estimation and economic optimisation of chemical engineering operations and chemical processes.

761 (3) A. Chemical Engineering Processes. 2 cl, 2 comp lab hrs. Prereq: 720, 754, concur 755 and 780 or permission of instructor. Mr. Dryden, Mr. Brodkey, Mr. Corrigan
Integration of fundamentals of chemistry, chemical engineering operations, thermodynamics, reaction kinetics, and economics for optimum design and operation of chemical process plants.

763 (3) A. Applied Electrochemistry. 2 cl, 4 lab hrs. Prereq: Chem 683 or permission of instructor. Elective for students in the Graduate School. Mr. Syverson
The relationship between electrical and chemical energy as applied to chemical industries will be discussed and illustrated by laboratory work.

765 (3) W. Introduction to Nuclear Chemical Engineering. 3 cl. Prereq: Physics 602 or 615 or permission of instructor. Elective in the Graduate School. Mr. Dryden
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.

766 (4) S. Nuclear Chemical Engineering. 3 cl, 3 hr lab. Prereq: 765 or permission of instructor. Mr. Dryden Continuation of Chemical Engineering 765 and application of chemical engineering principles to chemical problems in the nuclear field; illustrated by laboratory work with reactors and radioisotopes.

770 (4) W. Chemical Engineering Process Development. 1 cl, 11 lab hrs. Prereq: 741, 760, 761 or equiv. Mr. Dryden, Mr. Corrigan, Mr. Syverson 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.

772 (3) S. Chemical Engineering Process Design. 1 cl, 2 4 hr lab. Prereq: 770, Mr. Syverson, Mr. Wilcox
Based on processes developed in Chem E 770; equipment design, process control, plant location studies, economic evaluation of project. Work coordinated with Engr Dr 755.

791 (5 or 6) Su,A,W.S. Special Project Problem Investigations. Conf and lab 15 hrs. Prereq: 790 or by special permission. Repeatable. Department Staff Solution of study problems, either new or continued from Chem E 780. Extensive theoretical and/or experimental work is followed by a comprehensive report.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

801 (arr) Su,A,W.S. Advanced Special Problems in Chemical Engineering. Conf, library and/or lab. Prereq: satisfactory courses in the field of the problem undertaken. This course may be repeated. Graduate Staff
A minor problems course covering the chemical engineering operation, instrumentation, thermodynamics, kinetics, the transport fields and chemical technology.
58 CHEMICAL ENGINEERING

515 (3) A.W.S. Advanced Chemical Engineering Science and Applications. 3 cl. Prereq: 720, 721, Math 609 or permission of instructor. Repeatable to a maximum of 21 cr hrs. Mr. Koffolt, Mr. Syverson, Mr. Geankoplis, Mr. Dryden, Mr. Brodkey, Mr. Corrigan

This series of courses presents advanced concepts in science and engineering as applied to the chemical engineering field under the following topics:

- **INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD**
- S15A Advanced mass transfer—I
- S15B Advanced mass transfer—II
- S15C Advanced binary and multicomponent distillation
- S15D Extraction, azotropic and extractive distillation
- S15E Advanced heat transfer—I, conduction, radiation and convection
- S15F Advanced heat transfer—II, condensation, boiling, design applications
- S15G Drying, humidification and dehumidification
- S15H Advanced momentum transfer—I, basic theory and laminar flow
- S15I Advanced momentum transfer—II, turbulence
- S15J Advanced momentum transfer—III, two phase phenomena
- S15K Advanced combustion principles
- S15L Advanced instrumentation and process control of chemical plants
- S15M Design of experiments, data handling and analysis, quality control, linear programming
- S15N Advanced process and plant design
- S15O New or unusual chemical engineering operations such as adsorption, atomization, distillation, ion exchange, sublimation

520 (3) W. 821 (3) S. Advanced Chemical Engineering Thermodynamics. 3 cl. Prereq: 720, 754 or permission of instructor. Mr. Kay

Detailed discussion of the thermodynamic properties of pure compounds and mixtures. Computational problem work emphasizes the application of thermodynamics in industrial problems.

530 (3) W. 831 (3) S. Advanced Chemical Engineering Kinetics. 3 cl. Prereq: 720, 754, 755, or permission of instructor. Mr. Corrigan

A course in chemical engineering kinetics dealing with kinetics from the viewpoint of industrial chemical processes.

561 (3) A. Advanced Chemical Engineering Processes. 2 cl. 2 comp lab hrs. Prereq: 720, 754, 755, 880 and/or 760 conc or equiv. Mr. Corrigan, Mr. Dryden, Mr. Syverson

Study of selected chemical engineering processes which involve the application of chemical thermodynamics, reaction kinetics, and heat and mass transfer, oxidation, hydrogenation, polymerization, esterification, chlorination.

570 (5) W. Advanced Chemical Engineering Process Development. 1 cl. 14 lab hrs. Prereq: 755, 780, 880. Mr. Corrigan, Mr. Dryden, Mr. Syverson

Original work on development of a new process. Basic data for process design and preliminary cost estimate required.

580 (2-4) Su,A,W,S. Advanced Chemical Engineering Operations Laboratory. 1 conf, 5-17 lab hrs. Prereq: 720, 754 and/or conc or permission of instructor. Repeatable to a maximum of 15 hrs. Mr. Koffolt

An advanced course dealing with the chemical engineering fundamentals and operations.

905 (2) Su,A,W,S. Seminar in Chemical Engineering. 2 conf hrs. Prereq: graduate standing in Chem E. Repeatable. Mr. Koffolt, Mr. Kay, Mr. Geankoplis, Mr. Dryden, Mr. Brodkey, Mr. Corrigan, Mr. Syverson

Formal reports, lectures and discussions of fundamentals and new developments in science and technology as related to chemical engineering.

950 (arr) Su,A,W,S. Research in Chemical Engineering.

Research for thesis or dissertation purposes only.
CHEMISTRY

OFFICES, EVANS CHEMISTRY LABORATORY

GENERAL CHEMISTRY OFFICE, 155 MCAHEARN CHEMICAL LABORATORY

PROFESSORS GARRETT, BORD (EMERITUS), WOLFROM, HENNE, NEWMAN, HASKING (EMERITUS), HARRIS, VERHOEK, CALEY, WATTERS, VANWINKLE, CALVERT, SIEGEL (EMERITUS), TAYLOR, LIPPINCOTT, DAVID WHITE, AND CAYA, ASSOCIATE PROFESSORS KURAAKOV (EMERITUS), MACWOOD, RUBIN, SWEET, BUSCH, WILLIAM WHITE, FIRESTONE, AND SHORE, ASSISTANT PROFESSORS COLLAT, FAZIO, KENNEDY, GASSMAN, REEVE, WOJCIECH, LEUSING, GERINI, RICKTEN, AND ASSISTANTS

FOR UNDERGRADUATES

404 (4) A.W. 405 (4) W.S. General Chemistry. 3 cl, 3 lab hrs. Prereq: one unit of high school chem and/or conc. in College of Engineering. Chem 404 not open to students who have credit for Chem 407 or 411. Chem 405 not open to students who have credit for Chem 408 or 412. Mr. Verhoek, Mr. Shore, General Chem Staff and Assistants

A general course in the principles of chemistry intended for students in engineering; metallic elements; applications to qualitative analyses.

406 (4) A.S. General Chemistry. 2 cl, 6 lab hrs. Prereq: 405. Req'd of all 1st yr students in College of Engineering. Not open to students who have credit for Chem 408, 409 or 413. Mr. Verhoek, Mr. Busch, General Chem Staff and Assistants

A continuation of Chemistry 405; elementary organic chemistry; non-metallic elements.

407 (5) A.W.S. 408 (3) A.W.S. Elementary Chemistry. 4 cl, 3 lab hrs. Prereq: Math 400 or its equiv. Chem 407 not open to students who have credit for Chem 404 or 411. Chem 408 not open to students who have credit for Chem 405 or 412. General Chem Staff and Assistants

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.

409 (5) A.S. General Chemistry and Qualitative Analysis. 3 cl, 6 lab hrs. Prereq: 408. Not open to students who have credit for Chem 409 or 413. General Chem Staff, and Assistants

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

411 (5) S.A.W.S. 412 (5) S.S.A.W.S. 413 (5) S.S.A.W.S. General Chemistry. 3 cl, 4 lab hrs (6 in 413). Prereq: one unit of high school Chem and Math 401 or its equiv (Math 400 or 401 for 411). Chem 411 is not open to students who have credit for Chem 404 or 407. Chem 412 not open to students who have credit for Chem 405 or 408. Chem 413 not open to students who have credit for Chem 406 or 409. Mr. Calvert, Mr. Lippincott, General Chem Staff and Assistants

A general course in fundamental chemical principles (411), the chemistry of the most important metals and non-metals (412), and qualitative analysis dealing with the separation and identification of the cations and anions (413).

511 (5) A. 512 (5) W. 513 (5) S. General Chemistry. 3 cl, 4 lab hrs (5 in 513). Prereq: superior performance on placement examination. Math 401 or its equiv (Math 400 or 401 for 411). Mr. Lippincott and Assistants

An honors course. The principles of chemical measurement (511), the properties of matter and qualitative analysis (512), systematic chemistry of the elements (513).

521 (3 or 4) S (1st term), A.W. 522 (3 or 4) S (2nd term), W.S. 523 (3 or 4), S. Quantitative Analysis. 2 cl, 5 to 8 lab hrs. Prereq: 406, 409 or 413, or equiv. Not open to students who have credit for 421, 422, or 423 respectively. Mr. Calvey, Mr. Watters, Mr. Sweet, Mr. Collat, Mr. Leussing, and Assistants

A general course in quantitative analysis. Chem 521 and 522 are devoted to gravimetric and volumetric analysis. Chem 523 is largely instrumental methods of analysis.
524 (2) S. Problems in Quantitative Analysis. 2 cl. Prereq: 422 or 432, or equiv. Mr. Watters
Calculations in quantitative analysis and the interpretation of analytical data.

531 (5) A. 532 (5) W. 533 (5) S. Quantitative Analysis. 3 cl, 8 lab hrs. Prereq: 406, 409 or 413 or equiv. Not open to students who have credit for 431, 432, or 433 respectively. Mr. Watters and Assistants
The fundamental course in quantitative chemical analysis for students majoring in chemistry.

551 (5) A.S. 552 (5) Su.W. Organic Chemistry. 3 cl, 6 lab hrs. Prereq: 406, 409, or 413, or equiv. Not open to students who have credit for 451 or 452 respectively. Mr. Newman and Assistants
A general introductory course in organic chemistry, including laboratory preparations, arranged for students preparing for dentistry, optometry, veterinary medicine, medical technology, and pharmacy.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

630 (5) Su.A. Recent Advances in Chemistry. 5 cl. Prereq: 30 qtr hrs of Chem. Not open for graduate credit for students majoring in chemistry. Open only to students registered in the Academic Year Science Institute. Mr. Lippincott
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 photosynthesis.

631 (3) S. Radiochemistry. Summer Institute only. 4 cl each week. Prereq: 1 yr college Math, 1 yr college Chem, 1 yr college Physics. Open only to students registered in the Academic Year Science Institute. Not open for credit to students majoring in Chem. Mr. Sweet
The properties of nucleus, selection and preparation of isotopes for tracer work, the application of radioactive isotopes to chemical problems.

647 (3) A.S. 648 (3) Su.W. Organic Chemistry 3 cl. Prereq: 413 or 409. Arts-medicine, pre-medical and education groups. Not available for graduate credit for students majoring in Chem. Designed for students preparing for medicine or high school teaching. Not open to students who have credit for Chem 451-452 or 551-552. Mr. Cava
A fundamental course in organic chemistry to be taken in sequence.

649 (3) A.S. 650 (3) Su.W. Organic Chemistry Laboratory. 9 lab hrs. Prereq: 409 or 413 and 412-414 respectively. Not available for graduate credit for students majoring in Chem. Not open to students who have credit for Chem 451-452 or 551-552. Mr. Cava and Assistants
A preparation of a series of typical organic compounds, such as are studied in 647-648, their purification and a study of their properties.

655 (3) 657 (3) W. 659 (3) S. Organic Chemistry. 3 cl. Prereq: 406 or 409. Chem 655-657 are not open to students who have credit for 451-452, 551-552 or 647-648. Not available for graduate credit for students majoring in Chem. Mr. Henne
A fundamental course in chemistry designed for chemistry majors and chemical engineers.

656 (2 or 3) A. 658 (2 or 3) W. 660 (2 or 3) S. Organic Chemistry Laboratory. 6 or 9 hrs lab. Prereq or concurr: 655-657 respectively. Not open to students who have credit for Chem 451-452 or 648-650. Not available for graduate credit for students majoring in Chem. Mr. Henne
The preparation, purification, characterization, and study of the properties of typical organic compounds.

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

681 (3) A. 682 (3) W. 683 (3) S. Physical Chemistry. 3 cl. Prereq: Chem 423 or 438 or equiv. Physics 411-412-413 or 531, 532, 533 and Math 538 or 543. It is recommended that Chem 691, 692 and 693 be taken concurrently. Not available for graduate credit to students majoring in Chem. Mr. Calvert, Mr. Harris, Mr. VanWinkle, Mr. MacWood, Mr. D. White

The fundamental course in Physical Chemistry.

689 (4) S. Introduction to the Theory of Chemical Equilibrium. 4 cl. Prereq: 406 or equiv, Math 543 and 568 or equiv, and Physics 614. Not available for graduate credit for students majoring in Chem. Mr. MacWood

An introduction to the thermodynamic and statistical theory of chemical equilibrium with applications to ideal gas and pure liquid and solid phases.

690 (3) A.S. Physical Chemistry Laboratory. 1 cl, 8 lab hrs. Prereq or concur: 670 or 683 or equiv. Mr. Rubin, Mr. MacWood and Assistants

This course is a duplicate of parts of 691-692-693 offered especially for students in the five-year program in Chemical Engineering.

691 (2) A.W.S. 692 (2) A.W.S. 693 (2) A.W.S. Physical Chemistry Laboratory. 6 lab hrs. Prereq or concur: 681-682-683, respectively. Mr. D. White, Mr. MacWood, and Assistants

Quantitative measurements of phenomena of chemical interest and the application of chemical principles to their interpretation. These courses are designed to accompany 681, 682 or 683 respectively.

701 (1-15) Su.A.W.S. Minor Problems in Chemistry. Conf. library and lab. Prereq: satisfactory courses in field of the problem and permission of instructor. A student may repeat this course and may spend all or a part of his time on it during a quarter. Department Staff

A qualified student may conduct a minor investigation in Chemistry.

721 (3) A. Advanced Analytical Chemistry. 3 cl. Prereq: 423, 648, 683 or equiv. Mr. Caley

The principle topics are standards, sampling, special gravimetric methods, new titration methods, and separations, with special reference to the exact analysis of complex inorganic materials.

722 (4) W. 723 (4) S. Advanced Instrumental Analysis. 2 cl, 6 lab hrs. Prereq: 433, 683 or equiv. Mr. Watters, Mr. Collat, Mr. Sweet

722. Potentiometric and conductometric titration, pH determinations and the application of high frequency oscillator systems to chemical analysis.

723. A continuation of Chem 722 and including electrolytic analysis, conductometric analysis, and polarography.

726 (4) W. Inorganic Micro Analysis. 2 cl, 6 lab hrs. Prereq: 423 or 433, 683, or equiv. Mr. Watters, Mr. Sweet, Mr. Leussing

Application of micro and microscopic methods to common chemical problems.

728 (4) A. Spectroscopic Analysis. 2 cl, 6 lab hrs. Prereq: Physics 412 or equiv. Mr. Watters

Application of the emission spectrograph to qualitative and quantitative analysis for the elements in metallurgical and biological materials.

729 (4) W. Chemical Spectrophotometry. 2 cl, 6 lab hrs. Prereq: Physics 412 or equiv. Mr. Watters

Application of infrared, visible and ultraviolet spectrophotometers to problems involving inorganic and organic molecular structure, analysis, equilibria, and reaction rates.

742 (4) A. Organic Micro Quantitative Analysis. 1 cl, 9 lab hrs. Prereq: 423 or 433, 648-650, or 657-668, or equiv. Mr. Sweet and Assistants

This is primarily a course in quantitative organic analysis using micro methods. The common determination of organic quantitative analysis are studied.

751 (3) A. 752 (3) W. Nuclear, Radio, and Radiation Chemistry. 3 cl. Prereq: 683 or equiv. Mr. Firestone

Nuclear properties, nature of radioactivity, radioactive decay and growth, interactions of radiation with matter, applications.
CHEMISTRY

752 (or 3) W. Nuclear Chemistry Laboratory. 6 or 9 lab hrs. Prereq: 751 and prereq or concur: 752. Mr. Firestone, Mr. Sweet
Techniques of handling radioactive tracers, the detection and measurement of different types of radiation, neutron activations, and other related laboratory techniques.

754 (A) X-rays and Crystal Structure. 3 cl. 3 lab hrs. Prereq: Math 538 or 543, Physics 413 or 535, or equiv. Mr. Harris and Assistants
An introduction to the methods of X-ray crystal analysis. Theory of symmetry of crystals and of diffraction will be discussed and applied.

761 (3) Su.A. 762 (3) W. Advanced Inorganic Chemistry. 3 cl. Prereq: 683 or permission of instructor. Mr. Shore, Mr. Busch, Mr. Meek
An introduction to the concepts and chemical systems of inorganic chemistry, including the periodic table, atomic structure, bonding, acid-base theories, co-ordination compounds, ionic solid state, hydrides, organometallic compounds, etc.

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

#769 (3) W. Solutions of Electrolytes. 3 cl. Prereq: 683. Not open to students who have credit for Chem 768. Mr. Verhees
Electrolytic solutions, the Debye-Huckel theory, the strength of acids and bases in various solvents, solubility of electrolytes in various solvents, and conductivity of solutions of electrolytes.

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

773 (3) Su. Advanced Inorganic Chemistry Laboratory. 1 cl. 3 lab hrs. Prereq: 691 and 692 and 693 or equiv, 761 or permission of instructor. Mr. Meek, Mr. Wojcicki
Advanced methods for the synthesis, purification, identification and characterization of inorganic substances.

#775 (3) W. The Phase Rule. 3 cl. Prereq: 683, or equiv. Mr. MacWine
The phase rule and its application to chemical problems.

#777 (3) S. Photochemistry. 3 cl. Prereq: 683, or equiv. Mr. Calen
An advanced course covering the experimental techniques used in photochemistry. A detailed discussion will be given to the mechanisms of representative gas reactions which can be initiated by light.

782 (1) A. Chemical Bibliography. 1 cl. Prereq: 423 or 433, 452, 648 or 658 or equiv. Mr. Caley
The use of chemical library including journals, dictionaries, reference books, and other sources of chemical research.

784 (2) W. History of Chemistry. 2 cl. Prereq: 423 or 433, 452, 648 or 658, or equiv. Mr. Caley
A general course in the history of chemistry with special reference to the development of the theories of the science.

#794 (3) A. Chemistry of the Carbohydrates. 3 cl. Prereq: 648 or 658, or equiv. Mr. Wolfman
The occurrence, structure, syntheses, and reactions of the more important mono-, di-, and polysaccharides and their derivatives.

795 (3) W. Colloid Chemistry. 3 cl. Prereq: 683. Mr. Van Winkle

796 (3) W. Theoretical Electrochemistry. 3 cl. Prereq: 683. Mr. Rubin
A fundamental course in theoretical electrochemistry.

797 (3) S. Oxidation-Reduction Systems. 3 cl. Prereq: 683 or equiv. Mr. Rubin
A study of the mechanisms and equilibria of oxidation-reduction systems in water solutions.
FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

802 (3) W. 893 (3) S. Systematic Course in Experimentation. 9 lab hrs. Designed for graduate students intending to become candidates for the Ph.D. degree. Mr. White, Mr. Harris, Mr. Taylor, Mr. MacWood, Mr. D. White and Department Staff

A training in the fundamental techniques of chemical research.

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

[824] (2 or 3) A. Seminar in Analytical Chemistry. 2 cl.

825 (2) W. Seminar in Analytical Chemistry. 2 cl. Mr. Sweet

[826] (2) S. Seminar in Analytical Chemistry. 2 cl.

899 (3) S. High Polymers. Mr. Verhoek, Mr. Van Winkle

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.

841 (3) A. 842 (3) W. 843 (3) S. Advanced Organic Chemistry. 3 cl. To be taken in sequence. Mr. Schechter, Mr. Cava, Mr. W. White

An advanced course in the fundamental principles of chemistry covering (841) the aliphatic hydrocarbons and their derivatives; (842) alicyclic, hydroaromatic and aromatic compounds; and (843) a survey of heterocyclic compounds, carbohydrates, proteins and enzymes.

844 (3) S. Advanced Organic Chemistry Laboratory. 9 lab hrs. Prereq or conc: 841 and 842. Mr. Newman, Mr. Gasman

An advanced course in fundamental reactions and procedures with emphasis on recent advances in technique.

847 (3) A. 848 (3) W. 849 (3) S. Theoretical Organic Chemistry. 3 cl. Prereq: one year of graduate study including 841-842. Mr. W. White, Mr. Schechter

A sequence of courses in advanced theoretical Organic Chemistry.

850 (3) A. 851 (3) W. 852 (3) S. [853] Su. Seminar in Organic Chemistry. 3 cl. Prereq: one year of graduate work in chemistry including 841 and 842 or equiv.

Topics to be announced.

[860] (3) S. Chemistry of Organic Catalysis. 3 cl. Prereq: 841-842-843 and 881 or equiv.

Structure or catalytic catalysts and the mechanism of their reactions.

861 (3) A. Quantum Chemistry. 3 cl. Prereq: 887 or equiv. Mr. Taylor

Introduction to quantum theory of molecular energy states.

862 (3) W. 863 (3) S. Quantum Chemistry. 3 cl. Prereq: 861 or equiv. Quantum theory of the chemical bond and the structure of molecules and solids.

[864] (3) S. X-ray and Electron Diffraction. 3 cl. Prereq: 754. Mr. Harris

An advanced consideration of the theory of X-rays and electron diffractions and their applications including Fourier Methods of parameter determination in crystals, etc.

#866 (2 or 3) A. Seminar in Inorganic Chemistry. 2 cl. Prereq: 761 and Mr. Meek

The chemistry of non-aqueous solutions and the Lewis acid-base concept.

# [867] (2 or 3) W. Seminar in Inorganic Chemistry. 2 cl. Prereq: 761 and Mr. Meek

or equiv.

868 (3) A. Advanced Inorganic Chemistry. 3 cl. Prereq: 683, 762, or permission of instructor. Mr. Wojciechowski

A survey of modern theories of valence and their application to the problems of structural inorganic chemistry.

869 (3) W. Advanced Inorganic Chemistry. 3 cl. Prereq: 868. Mr. Meek

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.
CHEMISTRY

881 (3) A. Chemical Kinetics. 3 cl. Prereq: 681-682-683. Mr. Verhoeck
A study of the velocity of chemical reactions, with emphasis on reactions taking place in solution.

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

884 (3) A. Atomic Structure and Spectra. 3 cl. Prereq: 683 and Physics 726 and 727. Mr. MacWood
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.

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

887 (3) W. 888 (3) S. Thermodynamics. 3 cl. Prereq: 881 or equiv. Mr. MacWood
Introduction to thermodynamics. The main objective is training in the use of thermodynamics as a tool for solving chemical problems.

889 (3) A. Advanced Thermodynamics. 3 cl. Prereq: 861 or equiv. Mr. D. White
An introduction to Statistical Thermodynamics, including quantum statistics, entropy and the third law, statistical-spectroscopic calculation of thermodynamic functions of gases, chemical equilibria, and vapor pressure.

890 (3) A. Seminar in Colloid Chemistry and Electrochemistry. 3 cl. Mr. Van Winkle

891 (3) A. 892 (3) W. 893 (3) S. Seminars in Physical Chemistry. 3 cl. Prereq: 881, 887-888 or equiv. Mr. MacWood (A), Mr. Taylor (W), Mr. Harris (S)

898 (3) A. Seminar in Nuclear Chemistry. 3 cl.

910 (0) A.W.S. Colloquium in Analytical Chemistry. 1 cl. Graduate students specializing in Analytical Chemistry are expected to attend. Staff in Analytical Chemistry
A discussion of current research in analytical chemistry.

911 (0) A.W.S. Colloquium in Organic Chemistry. 1 cl. Graduate students specializing in Organic Chemistry are expected to attend. Staff in Organic Chemistry
A discussion of current research in organic chemistry.

912 (0) A.W.S. Colloquium in Physical and Inorganic Chemistry. 1 cl. Graduate students specializing in Physical and Inorganic Chemistry are expected to attend. Mr. D. White and Staff in Physical and Inorganic Chemistry.

950 (arr) Sn.A.W.S. Research in Chemistry.
Research for thesis or dissertation purposes only.

CHINESE
(Division of East Asian Languages and Literature)
Office, 405-D University Hall

ASSISTANT PROFESSORS WANG, CHING, FILLMORE, INSTRUCTORS HASEHITO
LYELL

401 (5) A. Elementary Chinese. 5 cl. Staff
402 (5) W. Elementary Chinese. 5 cl. Prereq: 401. Staff
403 (5) S. Intermediate Chinese. 5 cl. Prereq: 402. Staff
404 (5) A. Intermediate Chinese. 5 cl. Prereq: 403. Staff
NOTE: The sequence 401, 402, 403 and 404 satisfies the language requirements for the B.A. and B.Sc.

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

505 (3) A.S. Chinese Composition. 3 cl. Prereq: 404 or permission of instructor. Staff
Practice in composing simple writings. Review of vocabulary and grammar.

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

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

FOR ADVANCED UNDERGRADUATES AND GRADUATES

624 (5) A. Chinese Phonetics. 3 cl. Prereq: Chinese 401 and Linguistics 401 or permission of instructor. Staff
A detailed analysis of the sound structure of Chinese dialects, especially Mandarin, and
relation to the sound structure of English.

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

627 (3) S. The History of the Chinese Language. 3 cl. Prereq: 626 or permission of instructor. Staff
An investigation of the relations between modern Chinese and its earlier stages, Ancient
and Archaic Chinese.

651 (3) W. Modern Chinese Literature. 3 cl. Prereq: 404. Staff
A survey of Chinese literature of the past half-century. Reading of influential authors such as
Lo Yuen, Ba Chin, and others.

652 (3) S. Classical Chinese Literature. 3 cl. Prereq: 404. Staff
Selected readings from representative authors of classical times.

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

695 (2-5) A,W,S. Private Reading. Prereq: permission of department. Repeatable for a maximum of 10 hrs. Staff

CITY AND REGIONAL PLANNING
(School of Architecture and Landscape Architecture)
Office, 107 Brown Hall

ASSOCIATE PROFESSORS STOLLMAN AND CONNELL, MR. J. W. CLARK

721 (3) A. 722 (3) W. 723 (3) S. City Planning Seminar. 3 cl. Prereq:
Evolution to graduate planning curriculum or permission of instructor. Reqd
in graduate planning curriculum. Mr. Stollman
admission to graduate planning curriculum or permission of instructor. Reqd
in graduate planning curriculum. Mr. Stollman
Evolution of modern city planning. Problems and issues in contemporary city and regional
development. Planning principles and theory. Methods of preparing and implementing plans.

731 (5) W. 732 (5) S. City and Regional Planning Laboratory I. 1 cl, 12
lab hrs. Prereq: admission to graduate planning curriculum. Reqd in graduate
planning curriculum. Mr. Connell
City and regional planning problems: individual and team projects. Regional development,
new town design, planning in existing communities. Research, analysis, and design with indi-
vidual criticism.
CITY AND REGIONAL PLANNING

741 (1-5) Su,A,W,S. Special Studies in City and Regional Planning. Pre-req: permission of instructor.
Individual study of special problems in city and regional planning. Conferences and written reports.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 level except by permission of the Graduate Council.

831 (5) A 832 (5) W. City and Regional Planning Laboratory II. 12
lab hrs. Prereq: 731-732. Req'd in graduate planning curriculum. Mr. Connell
Continuation of 731-732 with problems of greater complexity.

899 (1-5) Su,A,W,S. Interdepartmental Seminar.
(See under Interdepartmental Seminars.)

959 (arr) Su,A,W,S. Research in City and Regional Planning.
Research for thesis only.

CIVIL ENGINEERING
Office, 228 Civil and Aeronautical Engineering Building

PROFESSORS GRAY, BAKER, KARRER, LARGE, MORRIS (EMERITUS), PRIOR (EMERITUS), SHANK (EMERITUS), SMITH, AND VANDERGRIFT (EMERITUS). ASSOCIATE PROFESSORS CHEIM, COFFMAN, COSENS, HANNA, MINTZER, MONTZ (EMERITUS), MOULJON, OJALVO, AND PURTZ. ASSISTANT PROFESSORS BLETZACHER, CORKLEY, MOAVENZADEH, PERLOFF, SCHWARZ, AND YAO. INSTRUCTORS LOTTMAN, MIRANDA, SHUMATE, AND TAYLOR

FOR UNDERGRADUATES

412 (5) S. Elementary Surveying. 3 cl. 2 3 hr lab. Prereq: Math Mr. Puritz
Use and adjustment of instruments, land surveying, leveling, profiles, use of plane table mapping, and computations.

502 (5) A,W Surveying I. 3 cl. 2 3 hr lab. Prereq: Physics 531. Mr. Puritz
Theory and practice of measurements. Orientation by celestial observations.

504 (4) W. Photogrammetry. 3 cl. 1 3 hr lab. Prereq: 502. Mr. Minton
Fundamental geometry and photogrammetric applications to engineering.

506 (5) S. Surveying II. 3 cl. 2 3 hr lab. Prereq: 502, Eng Mech 552 Mr. Puritz
Topographic mapping, curves, and earthwork.

604 (5) W. Stress Analysis I. Prereq: Eng Mech 521. Mr. Smith, Mr. Ojalvo, Mr. Chen
Stresses in statically determinate frames and trusses. Influence lines, moving loads, space frames.

Fluid properties; fluid statics; viscous and turbulent fluid flow; dimensional analysis and similarity. Required in Civil Engineering, Agricultural Engineering, and Mining Engineering.

613 (5) S. Structural Design I. 3 cl. 2 2 hr lab. Prereq: 604, Eng Mech 602. Mr. Smith
The design of simple steel structures.

615 (3) A. Structural Detailing. 2 cl. 2 2 hr lab. Prereq: 613 or 711. Eng Dr 422. Mr. Smith
Calculations and representation of structural connections, both riveted and welded, for detail drawings.

620 (3) W. Public Health Engineering. 3 cl. Prereq: Chem 406 or equiv. Mr. Cosens
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.
622 (4) S. Civil Engineering Materials I. 3 cl, 1.3 hr lab. Prereq or concur: Eng Mech 602, Mr. Gray, Mr. Perloff
Fundamental physical properties of mineral aggregates. Introduction to soil mechanics.

623 (4) A. Civil Engineering Materials II. 3 cl, 1.3 hr lab. Prereq: 622, Mr. Moavenzadeh
Composition, properties, and production of portland cement concrete, bituminous materials and bituminous mixtures.

624 (4) A. Transportation I. 3 cl, 1.2 hr lab. Prereq: 506, Mr. Karrer
A study of the development, location, geometric design, economics, finance, and operation of transportation systems.

650 (3) S. City Surveying. 2 cl, 1.3 hr lab. Prereq: Geod Sc 640. Not open to students who have credit for Geod Sc 650.
City control surveys, coordinates of lot and block corners. Measurement of details, computation of areas. Setting out city plans.

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

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

744 (4) W. Advanced Civil Engineering II. 3 cl, 3 1 hr lab. Prereq: 743.
Staff
Continuation of 743.

745 (4) S. Advanced Civil Engineering III. 3 cl, 3 1 hr lab. Prereq: 744.
Staff
Continuation of 744.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

609 (3) W. Observational Analysis. 2 cl, 2 2 hr lab. Prereq: 502, Math 543. Mr. Puritz
Theory and applications of observational analysis.

701 (5) W. Structural Design II. 3 cl, 2 2 hr lab. Prereq: 623, 741, Eng Mech 605. Not open for graduate credit to students majoring in Civil E. Mr. Large
Basic theory and design of reinforced concrete structures.

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

705 (4) A.S. Reinforced Concrete Structures. 4 cl. Prereq: 623, 701. Not open for graduate credit to students majoring in Civil E. Mr. Large
Application of principles of structural engineering to the design of footings, retaining walls, and other reinforced concrete structures.

710 (5) A. Transportation Planning. 4 cl, 2 hr seminar. Prereq: permission of instructor. Not open for credit to students in Civil E. Mr. Karrer
An analysis of engineering factors affecting location, geometric design, operation, maintenance, and management of coordinated transportation systems.

711 (3) W. Elementary Structural Engineering. 3 cl. Prereq: Eng Mech 602. Not open to students majoring in Civil E. Mr. Puritz
Design of simple steel structures. Introduction to reinforced concrete.
CIVIL ENGINEERING

715 (3) W. Timber Design. 3 cl. Prereq: 613, Eng Mech 605. Mr. Scallen
Basic properties of and design practice for timber when used as a construction
in engineering structures.

716 (5) S. Principles of Sanitary Engineering II. 5 cl. Prereq: 703. Mr. Coens
Not open for graduate credit to students majoring in Civil E. Mr. Coens
Unit operations in water supply and waste water recovery including selection, treatment
ods and equipment, and water quality criteria.

722 (3) A. Traffic Engineering. 2 cl, 1 3 hr. lab. Prereq: 624. Mr. Schwar
Mr. Schwar
Fundamentals of highway traffic engineering. Application of control devices as signals,
marking, parking and speed control.

723 (3) S. Construction Methods and Equipment. 2 cl, 1 3 hr. lab. Prereq: 724.
Mr. Karrer
Selection and management of construction equipment in building of highways, dams,
ports, bridges, and structures.

725 (3) W. Soil Mechanics. 3 cl. Prereq: 623. Not open for graduate credit to students majoring in Civil E. Mr. Gray, Mr. Perloff
Stress distribution, shear phenomena, lateral earth pressure, settlement, soil stability.

728 (3) A. Applied Hydraulics. 3 cl. Prereq: Eng Mech 610, concur Mech E 672. Mr. Moulton, Mr. Hanna
Civil engineering applications of fundamental fluid mechanics principles including pipe
open channel flow, masonry and earth dams, and pumps, with laboratory studies to support the
above topics.

731 (4) W. Soil Stabilization. 2 cl, 2 3 hr. lab. Prereq: 725. Mr. Coens
Study of principles of soil stabilization for highway surfaces. Design, durability, modulus
properties, construction.

733 (3) A. Rigid Frame Structures. 3 cl. Prereq: 613, 701, Eng Mech 605.
Mr. Large, Mr. Chen
Analysis and design of rigid frame concrete structures. Wind stress analysis.

734 (3) S. Advanced Bridge Design. 3 cl. Prereq: 613, 701, 741. Mr. Scallen
Stresses in and design of arch bridges.

738 (3) W. Highway Location and Design. 2 cl, 1 3 hr. lab. Prereq: 724.
Mr. Karrer
Geometric design of roads and streets. Determination of alignment, grade, intersection
and traffic capacity of rural roads.

739 (3) S. Bituminous Roads and Streets. 2 cl, 1 3 hr. lab. Prereq: 724.
Mr. Mouzennad
Study of bituminous pavement and road surfaces. Laboratory tests of density
and durability of aggregate-bituminous mixtures.

741 (3) A.S. Stress Analysis II. 3 cl. Prereq: 613 or 711, Eng Mech 605.
Mr. Purtsch, Mr. Chen
Deflection of trusses, beams and frames. Solution of indeterminate structures by
method of consistent deformations, conjugate beam, moment distribution.

742 (3) W. Applied Hydrology. 3 cl. Prereq: 728 or equiv. Mr. Hanna
Mr. Hanna
Basic principles of the hydrologic cycle; precipitation, hydrographs, unit graphs,
basin characteristics, infiltration, ground water hydraulics, run-off, flood and drought:
probability, flood routing.

746 (4) A. Civil Engineering Applications of Photo-Interpretation. 2 cl.
2 2 hr. lab. Prereq: 504, 724, 1 course in Geol. Mr. Mintzer
Principles of photo interpretation, geology, and geomorphology applied to
topographic and hydraulic problems. Studies of air-photo indices of soils, aggregate
and construction problems.
748 (3) A. Sanitary Engineering Laboratory. 2 3 hr cl and lab. Prereq: T25, Chem 405 or equiv, Microbiol 607 or equiv. Mr. Cosens, Mr. Hanna
A laboratory study of the sanitary engineering indices pertinent to the control of water, sewage, streams, and industrial waste quality.

749 (3) S. Sanitary Engineering Design. 3 cl. Prereq: 716. Mr. Cosens, Mr. Hanna
The design of unit operations and processes employed in the field of water supply and waste water including data collection and control instrumentation.

799 (3-5) Su,A,W,S. Advanced Civil Engineering. Prereq: senior or graduate standing and permission of department chairman. Repeatable to a total of 20 cr hrs, not more than 10 of which shall be in any one of the following subdivisions. Elective for graduate students and students in Civil E who have a point average of 2.5 or better. Staff
This course is intended to give the advanced student opportunity to pursue advanced study. Work undertaken may be elected in the following fields of civil engineering:
(a) Structural Engineering
(b) Soil Mechanics and Foundations
(e) Sanitary Engineering
(d) Highway and Transportation Engineering

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

Triangulation reconnaissance, use and computation of geographic coordinates, study of various systems of plane coordinates, the more common map projections, geodetic astronomy and other problems involving the figure of the earth.

810 (5) W. Seepage in Porous Materials. 5 cl. Prereq: 623. Mr. Gray
Analysis of seepage volume and stresses in connection with excavation, dams, wells, slopes, and subsurface drainage.

815 (5) A. Advanced Soil Properties. 3 cl, 2 3 hr lab. Prereq: 725. Mr. Gray
Detailed study and analysis of the mechanical properties of various soils. Settlement analysis, stability of foundations, pile driving.

816 (5) Su,S. Theories of Subgrade and Structure Interaction. 5 cl. Prereq: 725, 815. Mr. Baker
Theories of load and subgrade interaction and evaluations of current research. Emphasis on pavements.

817 (3) W. Slope Stability Theory. 3 cl. Prereq: 725, 810. Mr. Baker

818 (5) Su,S. Advanced Foundation Analysis. 5 cl. Prereq: 815. Mr. Gray
Thermal properties, frost action, permafrost. Theory of beams and struts in elastic foundation, Cofferdams and bulkheads, silos and buried culverts.

820 (5) W. Advanced Traffic Engineering. 4 cl, 1 3 hr lab. Prereq: 722. Mr. Karrer
Analysis of characteristics of highway traffic inefficiencies such as accidents and congestion. Control, enforcement, and administration.

825 (5) S. Highway Administration. 5 cl. Prereq: 722. Mr. Karrer
A study of organisation for planning, constructing, maintaining, and operating systems of roads and streets.

826 (5) A. Advanced Structural Engineering I. 4 cl, 1 3 hr lab. Prereq: 741 or equiv. Mr. Smith
Analysis and design of statically indeterminate beams, frames and trusses, using classical methods of analysis.
CIVIL ENGINEERING

827 (5) W. Advanced Structural Engineering II (Reinforced Concrete). 5 cl. Prereq: 733, Mr. Large
Effect of shrinkage and creep upon stress and deflections. Ultimate strength design of sections, and moment redistribution. Prestressed beam design theory and practice.

828 (5) Su,S. Advanced Structural Engineering III. 5 cl. Prereq: 741 or equiv. Mr. Ojalvo
Behavior of steel structures loaded in the inelastic range. Predictions of collapse load. Structural design in steel according to the plastic method.

831 (5) A. 832 (5) W. 833 (5) S. Principles of Advanced Sanitary Engineering. 3 cl, 2 3 hr. lab. Prereq: 620, 716, 748. Mr. Cosens, Mr. Moulton, Mr. Hanna
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.

835 (3) S. Vibration of Continuous Structures. 3 cl. Prereq: 827, Eng Mech 607.
Structural dynamics. Application of the theory of vibrations to the prediction of the performance of continuous beams, and bridges. Composite action.

899 (3-5) A,W,S. Advanced Civil Engineering. Prereq: graduate standing and permission of department chairman. Repeatable to a total of 20 cr. not more than 10 of which shall be in any one of the following subdivisions.
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
(b) Soil Mechanics and Foundations
(c) Sanitary Engineering
(d) Highway and Transportation Engineering

949 (1) A. Research Seminar. 1 cl. Prereq: graduate standing. Each graduate student will be required to take this hr of credit during his first A Quarter in Graduate School. Staff
Introduction to research activity.

950 (arr) Su,A,W,S. Research in Civil Engineering. Staff
Research for thesis or dissertation purposes only.

CLASSICAL LANGUAGES AND LITERATURE
Office, 217 Derby Hall

PROFESSORS TITCHENER, BOLLING (EMERITUS), ABBOTT, AND FORBES, ASSOCIATE PROFESSORS HOLZINGER AND LENAZ, INSTRUCTOR C. W. FORNARA, AND ASSISTANTS

Courses in the Department of Classical Languages fall into two groups, those for novices, no knowledge of Latin or Greek is required and those which require some previous knowledge. In the first group are the Classical Language courses in English 510, 520, 521, 522; Latin 441; All other courses assume a certain amount of previous study in Latin or Greek. See also Greek and Latin courses.

CLASSICAL LANGUAGE COURSES IN ENGLISH
(SEE ALSO COURSES LISTED UNDER GREEK AND LATIN)

No prerequisites in Latin or Greek.

510 (3) A,W,S. Classical Background of Scientific Terminology. 3 cl. Mr. Forbes, Mr. Fornara
Study of technical and scientific terms from Greek and Latin sources: roots, word formation, analysis. Helpful in medical, biological, and kindred studies.
CLASSICAL LANGUAGES AND LITERATURE

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

521 (5) Su,W. The Latin Contribution to European Literature. 5 cl. Mr. Forbes, Mr. Formara
The major poets and dramatists, with brief study of prose, historical, oratorical, and philosophical. Emphasis will be placed on classicism in Classical Literature.

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

524 (3) W. Classical Civilization: Greece. 3 cl. No prereq: Undergraduates only. Mr. Lenardon
An introduction to ancient Greek civilization, concentrating upon important facets of the literature, history, art and archaeology.

[697] (3) W. Roman Private Life. 3 cl. Not open for graduate credit to majors in the Department of Classical Languages.
Lectures, illustrated with slides on the daily life and customs of the Romans, their business and family relations, their amusements, dress, homes, and household furniture.

COMPARATIVE LITERATURE AND LANGUAGES
Office, 112 Derby Hall
HARRY ROGERS, CHAIRMAN OF COMMITTEE

COMPARATIVE LITERATURE

401 (3) A. 402 (3) W. 403 (3) S. Introduction to Western European Literature. Not open to juniors and seniors. Mr. Abbott, Mr. Haber, Mr. Kane, Mr. Meiden, Mr. Rogers, Mr. Jones, Mr. Lenardon, Mr. Burkhardt, Mr. Maurer
A course in great books of the western world and the part they play in the development of modern European and American culture.
401 The Greek Contribution. Development of Greek ideas and ideals from Homer to Plato.

CONSERVATION
Office, 101 Townshend Hall
FOR UNDERGRADUATES

401 (3) A.S. Introduction to Conservation of Natural Resources. 3 cl and 1 2-day field trip. Mr. Johnson, Mr. Good, Mr. Dambach
An orientation on the nature and scope of natural resources and the technical, economic, social, and political aspects of conservation.

514 (3) W. Conservation Agencies. 3 cl. Mr. Johnson
Representatives of governmental agencies, private organizations, and university departments present programs and problems in their areas of conservation work.

551 (5) Su,A,W,S. Field Experience in Conservation. 10 weeks work experience or equiv with report the following qtr. Prereq: permission of adviser. Staff or cooperating departments
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.

Agr Econ 697 (4) Natural Resources Problems, Programs, and Policies.
(See Agricultural Economics.)
DAIRY SCIENCE
Office, 105 Plumb Hall
PROFESSORS ELY, GILMORE, LUDWICK, AND SUTTON, ASSOCIATE PROFESSORS
BRAKEL, E. F. BAUMER, FECHHEIMER, ASSISTANT PROFESSORS KAASER, BART,
AND ASSISTANTS

FOR UNDERGRADUATES

401 (5) A.W.S. Fundamentals of Dairy Science. 3 cl, 2 2 hr lab. Not open
to students who have credit for Dairy Sc 501 or 512. Mr. Barr, Mr. Ely, Mr.
Kaasemer, Mr. Rausch
A general survey of the production phases of the dairy industry covering the dairy breed,
breeding, selection, and management factors important in milk production.

501 (5) A.S. Dairy Cattle Production. 3 cl, 2 2 hr lab. Prereq: Animal Sc
402. Not open to students who have credit for Dairy Sc 401 or 512. Mr. Braekel
Problems encountered by teachers of vocational agriculture and agricultural education workers, such as selection, feeding, breeding, management, herd health, quality milk production, milking, and showing.

504 (5) W. Dairy Herd Management. 3 cl, 2 2 hr lab. Prereq: Animal Sc
402 or 580, Mr. Brakel
Problems and practices concerned with efficient production of milk and successful operation of a dairy herd.

507 (3) S. Dairy Cattle Selection and Judging. 1 2 hr lab, 1 4 hr lab
Prereq: 401 and 15 cr hrs Biol Sc. Mr. Kaasemer, Mr. Ely
Comparative selection, ring technique, classification, dairy breed, standards and their application to the breeders problem of herd improvement. Visit to leading herds.

512 (5) S. Milk Production. 3 cl, 2 2 hr lab. Prereq: Agr Bio 610. Not
open to students who have credit for Dairy Sc 401 or 501. Mr. Barr
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.

520 (5) A.W.S. Principles of Animal Improvement. 5 cl. Prereq: 401 or
Animal Sc 401 or Poul Sc 401 or equiv and Zool 400. Not open to students who have credit in Dairy Sc 520, 620. Mr. Fechheimer, Mr. Jaap, Mr. Parker. (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.

530 (5) A.W.S. Principles of Animal Nutrition. Mr. Cline, Mr.
Naher, Mr. Tyznik. (Offered in cooperation with the Departments of Dairy Sc
and Poul Sc)
(See under Animal Science)

FOR ADVANCED GRADUATES AND GRADUATES

According to the University regulation, courses in this group are not open to freshmen or sophomores.

610 (3) A. Physiology of Growth and Milk Secretion. 2 cl, 1 2 hr lab
Prereq: Vet Physiol 416 and 417 or their equiv, or permission of instructor.
Mr. Ely

612 (3) A.S. Physiology of Reproduction and Artificial Insemination. 2 2
hr lab. Prereq: Vet Physiol 416 and 417 or their equiv or permission of instruc-
tor. Mr. Barr
Anatomy and physiology of the reproductive system. Organization, operation, and techniques involved in artificial insemination. Factors in improved reproductive performance.

Agr Sc 626 (3) W. Marketing of Dairy Products. Mr. Daumner. (Offered
in cooperation with the Department of Dairy Sc)
(See under Agricultural Economics)
Animal Sc 631 (5) A.S. Nutrition and Feeding of Ruminant Animals. Mr. Conrad, Mr. Cline, Mr. Tyznik. (Offered in cooperation with the Department of Dairy Sc)

(See under Animal Science)

701 (2-5) Su,A,W,S. Special Problems. Prereq: permission of instructor.

Staff
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 (5) S. Research Methods and Techniques. 3 cl and 1 4 hr lab. Prereq: 20 hrs in Animal Sc and Dairy Sc courses and permission of instructor. Mr. Gilmore

Survey and analysis of research work in Dairy Sc and Animal Sc. Literature reviews, collection of data, preparation of bibliographies, and presentation of reports.

720 (5) W. Genetics of Animal Populations. 4 cl, 1 2 hr lab. Prereq: 520 or Zool 604 and 10 hrs of Math. Mr. Fechheimer, Mr. Jaap. (Offered in cooperation with the Departments of Animal Sc and Pou Sc)

Theory and practice of analyzing and altering the genetic composition of animal populations.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the 890 or 900 group except by permission of the Graduate Council.

801 (1-3) A.W.S. Seminar in Dairy Science. Reqd of all graduate students in Dairy Sc. Mr. Ely

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

Topics for 1964-65:
Winter Quarter: "Monte-Carlo" and Pilot Organism Methodology.
Spring Quarter: Selection limits for pure lines and crosses.

Animal Sc 830 (3) A.W.S. Advanced Studies in Nutrition. Graduate Nutrition Staff. (Offered in cooperation with the Departments of Dairy Sc and Pou Sc)

(See under Animal Science)

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

(See under Interdepartmental Seminars).


Research for thesis or dissertation purposes only.

DAIRY TECHNOLOGY

Office, 122 Vivian Hall

PROFESSORS GOULD, BURGWALD (EMERITUS), HARPER, AND SLATTER, ASSOCIATE PROFESSOR KRISTOFFERSEN, ASSISTANT PROFESSORS ARMSTRONG (EMERITUS), KLEYN, MIKOLAJCIC, AND MORR, MR. HARTLEY, AND ASSISTANTS

FOR UNDERGRADUATES

401 (3) A.S. Survey of Industrial Dairying. 2 cl, 1 2 hr lab. Mr. Slatter

Survey of the dairy products industry dealing with composition, properties, quality, production and distribution of dairy products; introduction to certain practical analytical methods.

415 (3) Su,A,W,S. Dairy Industry Apprenticeship. Ten weeks practical experience or its equiv in an approved dairy processing plant. Written reports covering this work are required. Graduation credit limited to students completing the curriculum in Dairy Tech. Mr. Kristoffersen
Concepts of heat transfer; elementary thermodynamics of refrigeration systems and application of refrigeration equipment to dairy processing; dairy heat exchangers.

515 (3) S. Dairy Industry Apprenticeship. Ten weeks practical experience or its equiv in an approved dairy processing plant. Written reports required. Graduation credit limited to those students completing the curriculum in Dairy Tech. Mr. Kristoffersen

529 (3) S. Evaluation and Selection of Dairy Products. 1 cl, 2 2 hr lab. Mr. Slatter
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.

606 (3) A. Dairy Plant Equipment and Buildings. 3 cl. Prereq: 511, and Agr E 510. Not open for graduate credit. Mr. Heldman

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

601 (3) A. Dairy Products Standards and Analysis. 3 cl. Prereq: 401 or sophomore standing, and/or concur Chem 561. Reqd Dairy Tech. Not open for graduate credit for majors in Dairy Tech. Mr. Kristoffersen
Function of the laboratory in a modern dairy organization; product composition, characteristics and legal standards; principles and evaluation of analytical methods.

602 (3) A. Dairy Products Standards and Analysis: Laboratory. 1 cl. 2 2 hr lab. Prereq or concur 506. Reqd Dairy Tech. Not open for graduate credit for majors in Dairy Tech. Mr. Kristoffersen
Application of modern analytical methods to dairy products; comparison and interpretation of results; laboratory project studies and report preparation.

603 (3) W. Market Milk Industry. 3 cl. Prereq: 506, 507 Microbiol 520 and 511 or equiv with permission of instructor. Reqd Dairy Tech. Mr. Harper
Science, engineering, and business of the fluid milk industry; procurement, processing, and distribution; process and quality control; nutrition and public health aspects.

604 (3) W. Market Milk Industry: Laboratory. 1 rec, 2 3 hr lab. Prereq 603 or concur. Reqd Dairy Tech. Mr. Harper
Unit processes in the fluid milk industry; equipment use and production, planning, processing and production control; special products.

605 (3) W. Management of Dairy Plants. 2 2 hr cl. Prereq: senior standing. Mr. Gould, Mr. Slatter
Dairy plant management: operational practices, their relationship to efficiency, and product waste, and water utilization; personnel management; and analysis of current industry problems.

609 (3) S. Concentrated Milk Products. 2 cl and 1 3 hr lab. Prereq: 604, 606. Reqd Dairy Tech.
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.

610 (5) A. Ice Cream Industry. 3 cl and 2 3 hr labs. Prereq: 603, 604. Reqd Dairy Tech.
The technical, engineering, and business aspects of modern-day commercial manufacturing methods; quality control; sales and distribution.

626 (3) S. Butter and Cheese Industries. 3 cl. Prereq: 603, 604. Reqd Dairy Tech. Mr. Kristoffersen
Industrial cheese and butter operations with application of chemistry and bacteriology to the products involved and with emphasis on modern management practices.
627 (3) S. Butter and Cheese Industries: Laboratory. 1 rec, 1 6 hr lab. Prereq: 603, 604, 625 or concur. Req'd Dairy Tech. Mr. Kristoffersen
Project studies and experiences with commercial methods of manufacturing, with product control practices, and with butter and cheese plant operation.

651 (1) A. Junior Seminar. 1 cl. Prereq: 603, 604, and senior standing in Dairy Tech. Not open for graduate credit for Dairy Tech majors. Mr. Harper
Research literature review and interpretation; preparation and oral presentation of technical abstracts and papers.

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

701 (2-5) S, A, W, S. Special Problems. Prereq: senior standing in Dairy Tech or its equiv and permission of instructor. Staff
Designed to permit students to make special studies of current problems and to obtain experience in planning and conducting project research.

710 (3) S. Technical Control of Dairy Products. 2 cl, 1 3 hr lab. Prereq: senior or graduate standing in Dairy Tech. Mr. Harper
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.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

800 (1) A, W, S. Seminar. 1 cl, 1 hr conf. Prereq: graduate standing in Dairy Tech or special interest in this field. Students and faculty members will report on problems of special interest. Staff

810 (3 or 5) S, A, W, S. Research Methods in Dairy Technology. 1 cl, 6-12 lab hrs. Prereq: 15 cr hrs of Organic Chem or equiv and 15 cr hrs of biochemistry. The course is repeatable to a maximum of 15 cr hrs. Mr. Harper
Technical aspects of advanced knowledge in Dairy Technology; interpreting physical, chemical, biochemical, physical-chemical, and microbiological phenomena as revealed by modern instrumental procedures.

888 (1) S. Interdepartmental Seminar in Nutrition and Food Technology.
(See under Interdepartmental Seminars.)

Research for thesis or dissertation purposes only.

DENTAL HYGIENE
Office, 346 Dentistry Building

PROFESSORS ALLISON, BOUCHER, DEW, McBRIDE, McCONNELL, NEWTON, PETTIT, W. D. POSTLE, AND WILSON, ASSOCIATE PROFESSORS BRUCE, KAISER, KOLAS, PERMAR, WILTON, WILLIAMS, WISE, AND WOELFEL, ASSISTANT PROFESSORS DEEDS, HARPER, HULL, MICHEL, H. POSTLE, REYNOLDS, H. SNYDER, INSTRUCTORS D. COOK, DIERKEN, FAPPAS, AND WEISENSTEIN, ASSISTANT INSTRUCTORS BIRKIMER, CRAWFORD, HARVEY, ROLLE, SCHULTZ, SINAY, SNAVELY, STEINER

OPEN ONLY TO STUDENTS REGISTERED IN THE DENTAL HYGIENE CURRICULUM

FOR UNDERGRADUATES

401 (3) A. Dental Anatomy. 1 cl, 6 lab hrs. Dent Hyg only, 1st yr. Miss Fennar
A study of human teeth and their surrounding structures.

402 (2) S. Dental Anatomy. 1 cl, 3 lab hrs. Dent Hyg only, 1st yr. Miss Fennar
A continuation of 401.
403 (5) S. Dental Prophylaxis. 2 cl, 7 lab hrs. Dent Hyg only, 1st yr. Mrs. Wise, Mrs. Reynolds and Staff
The demonstration of and the application of technical procedures for the removal of hard and soft deposits from the surfaces of teeth.

404 (1) S. Oral Hygiene. 1 cl. Dent Hyg only, 1st yr. Mr. Wilson
A study of the formation of deposits on teeth, the maintenance of good oral hygiene, and the prevention of periodontal disease.

405 (1) A. Materia Medica. 1 cl. Dent Hyg only, 2nd yr. Mrs. Reynolds
A study of drugs commonly used in dental practice and correct methods for their use.

501 (2) S. General Pathology. 2 cl. Dent Hyg only, 1st yr. Mr. Bruce
An introduction to general pathology including degenerative changes, inflammation, and repair. A discussion of the more common diseases affecting the human body.

502 (2) A. Dental Nursing. 2 cl. Dent Hyg only, 2nd yr. Mrs. Wise and Staff
A discussion of ways in which the dental hygienist may assist the general practitioner or Dentistry or one specializing in any field of Dentistry.

503 (2) W. Dental Nursing. 2 cl. Dent Hyg only, 2nd yr. Mrs. Wise and Staff
The clinical application of procedures taught in 502.

504 (1) S. Dental Nursing. 1 cl. Dent Hyg only, 2nd yr. Mrs. Wise and Staff
A continuation of 503.

505 (3) W. Dental Materials. 1 cl, 6 lab hrs. Dent Hyg only, 2nd yr. Mr. Woolf
A study of the composition, chemical and physical properties, manipulation and use of various materials employed in the practice of Dentistry.

506 (1) S. Oral Histology and Embryology. 1 cl. Dent Hyg only, 1st yr. Miss Fennar
A study of the microscopic anatomy of the teeth and surrounding structures; the development of teeth, oral cavity, and face.

507 (1) A. Oral Pathology. 1 cl. Dent Hyg only, 2nd yr. Mr. Bruce
A study of the clinical manifestations of the common diseases affecting the teeth and their supporting structures.

508 (3) A. Dental Prophylaxis. 9 clinic hrs. Dent Hyg only, 2nd yr. Mrs. Wise and Staff
Clinical application of principles taught in 503.

509 (5) W. Dental Prophylaxis. 15 clinic hrs. Dent Hyg only, 2nd yr. Mrs. Wise and Staff
A continuation of 508.

510 (5) S. Dental Prophylaxis. 15 clinic hrs. Dent Hyg only, 2nd yr. Mrs. Wise and Staff
A continuation of 509.

511 (2) A. Nursing Techniques for Dental Hygienists. 2 cl. Dent Hyg only, 2nd yr. Miss Newton and Staff
A study of the principles of nursing as they apply to the Dental Hygienist.

512 (2) A. Oral Radiography. 2 cl or 6 lab hrs. Dent Hyg only, 2nd yr. Mr. Pappas
The theory and technical procedures of oral radiography.

513 (2) W. Oral Hygiene in the Schools. 2 cl. Dent Hyg only, 2nd yr. Mrs. Wise and Staff
A study of the dental education of school children and its application through visits to schools.
514 (2) S. Oral Hygiene in the Schools. 2 cl. Dent Hyg, 2nd yr. Mrs. Wise and Staff
A continuation of 515.

515 (1) A. Anesthesia. 1 cl or 3 lab hrs. Dent Hyg only, 2nd yr. Mr. Snyder
The role of the Dental Hygienist as an assistant in Anesthesia. Premedication; physiological responses to and pharmacological actions of anesthetic agents; emergency treatment.

516 (2) S. Office Practices and Economics. 2 cl. Dent Hyg only, 2nd yr. Mr. Weisenstein
The role of the Dental Hygienist in dental practice and the economics involved.

DENTISTRY
Office, 120 Dentistry Building

PROFESSORS ALLISON, BOUCHER, DEW, KAISER, McBRIDE, McCONNELL, PETTIT, W. B. POSTLE, STEFFEL, AND WILSON. ASSOCIATE PROFESSORS BRUCE, DIETZ, HEINTZ, KAMPER, KOLAS, KREIDER, MARSHALL, FERMA, RUSSELL, SPAENGEB, WADE, WATSON, WILLIAMS, WISE, AND WOELFEL. ASSISTANT PROFESSORS ALDRICH, BAZLER, BECKWITH, BITONTE, BLUFF, CARNES, CHANDLER, CHAPMAN, CONROY, COOK, CROW, CRUMP, DEEDES, GUMP, HOLL, JEFFERS, JOHANNES, LARRIMER, LONG, LUCKHART, MICHIE, O'BRIEN, K. POSTLE, REYNOLDS, ROEN, RYAN, B. SNYDER, G. SNYDER, TAYLOR, TRIPPY, WINTER, AND INSTRUCTORS

ALL COURSES IN DENTISTRY ARE OPEN ONLY TO STUDENTS REGISTERED IN THE COLLEGE OF DENTISTRY

301 (2) A. Dental Anatomy. 1 cl, 3 lab hrs. Dent only, 1st yr. Mr. Trippy and Staff
The morphology of human teeth and surrounding structures.

302 (5) W. Dental Anatomy. 1 cl, 11 lab hrs. Dent only, 1st yr. Mr. Trippy and Staff
The physiology of human teeth and surrounding structures.

305 (1) W. Dental Materials. 1 cl. Dent only, 1st yr. Mr. Dew
A study of the chemical and physical properties of the materials used in restorative dentistry, and their use and manipulation.

306 (1) S. Dental Materials. 1 cl. Dent only, 1st yr. Mr. Dew
A continuation of 305.

320 (1) A. Orientation in Dentistry. 1 cl. Dent only, 1st yr. Mr. W. Postle, Mr. Harper

381 (4) A. Complete Prosthodontics. 1 cl, 6 lab hrs. Dent only, 1st yr. Mr. Boucher and Staff
The foundation principles in restoration of lost teeth by means of artificial dentures. Laboratory work correlates with didactic instruction.

382 (4) W. Complete Prosthodontics. 1 cl, 8 lab hrs. Dent only, 1st yr. Mr. Johannes and Staff
A continuation of 381.

386 (1) S. Fixed Partial Prosthodontics. 1 cl, Dent only, 1st yr. Mr. McBride
Principles and technical procedures involved in the construction of crowns and bridges.

389 (5) S. Removable Partial Prosthodontics. 1 cl, 8 lab hrs. Dent only, 1st yr. Mr. Heintz and Staff
Principles and technical procedures of removable partial denture restorations.

404 (1) A. Dental Materials. 1 cl. Dent only, 2nd yr. Mr. Dew
A continuation of 306.

413 (1) S. Endodontics. 1 cl. Dent only, 2nd yr. Mr. Kaiser
Basic techniques and procedures used in the treatment of pulpless teeth.
431 (2) A. Operative Dentistry. 1 cl, 3 lab hrs. Dent only, 2nd yr. Mr. H. Postle and Staff
An introduction to the principles of operative dentistry.

432 (3) W. 433 (3) S. Operative Dentistry. 1 cl, 6 lab hrs. Dent only, 2nd yr. Mr. H. Postle and Staff
The theory and technical procedures used in the restoration of carious and defective teeth.

452 (3) W. Pedodontics. 2 cl, 2 lab hrs. Dent only, 2nd yr. Mr. Pettit and Staff
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.

453 (2) S. Pedodontics and Interceptive Orthodontics. 1 cl, 3 lab hrs. Dent only, 2nd yr. Mr. Pettit, Mr. Hull and Staff
Preparation of study casts. Construction of orthodontic bands, using different materials and techniques. Designing appliances for prevention, interception, or correction of incipient malocclusion.

462 (1) W. Periodontics. 1 cl. Dent only, 2nd yr. Mr. Wilson
Fundamental methods of periodontal treatment and the prevention of periodontal disease.

463 (1) S. Periodontics. 1 cl. Dent only, 2nd yr. Mr. Wilson and Staff
A consideration of the effects, treatment, and prevention of the diseases affecting the supporting structures of the teeth.

482 (2) W. Complete Prosthodontics. 1 cl, 3 lab hrs. Dent only, 2nd yr. Mr. Larrimer and Staff
A continuation of 482.

483 (3) S. Complete Prosthodontics. 1 cl, 6 lab hrs. Dent only, 2nd yr. Mr. Boucher and Staff
A continuation of 482.

484 (2) A. Fixed Partial Prosthodontics. 1 cl, 3 lab hrs. Dent only, 2nd yr. Mr. McBride, Mr. Long and Staff
Principles and technical procedures of fixed partial restorations.

485 (3) W. 486 (3) S. Fixed Partial Prosthodontics. 1 cl, 6 lab hrs. Dent only, 2nd yr. Mr. McBride, Mr. Long and Staff
A continuation of 484.

487 (3) A. Removable Partial Prosthodontics. 1 cl, 6 lab hrs. Dent only, 2nd yr. Mr. Heintz and Staff
A continuation of 486.

489 (1) S. Removable Partial Prosthodontics. 1 cl. Dent only, 2nd yr. Mr. Steffel and Staff
Principles and clinical procedures of removable partial dentures.

501 (1) A. 502 (1) W. 503 (1) S. Local Anesthesia and Exodontics. 1 cl. Dent only, 3rd yr. Mr. Hiatt, Mr. B. Snyder

511 (1) A. Endodontics. 1 cl. Dent only, 3rd yr. Mr. Kaiser
Clinical applications of the principles and technical procedures in endodontics.

512 (1) W. 513 (1) S. Endodontics. 2 clinic hrs. Dent only, 3rd yr. Mr. Kaiser and Staff
Clinical applications of the theory and technique of restoring carious and defective teeth.

531 (4) A. 532 (4) W. 533 (4) S. Operative Dentistry. 1 cl, 6 clinic hrs. Dent only, 3rd yr. Mr. Taylor and Staff
Clinical applications of the theory and technique of restoring carious and defective teeth.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Lecture Hours</th>
<th>Lab Hours</th>
<th>Prerequisites</th>
<th>Notes</th>
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<tbody>
<tr>
<td>540 (4)</td>
<td>A. Oral Histology and Embryology. 2 cl, 6 lab hrs.</td>
<td>4</td>
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<td>Dent only, 2nd yr, or students doubly registered in Dentistry and the Graduate School. Mr. Melf and Staff.</td>
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<td>Embryology and histology of teeth and surrounding structures and their correlation to the practice of dentistry.</td>
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<td>541 (4)</td>
<td>A. Oral Pathology. 3 cl, 3 lab hrs. Prereq: 540 and Path 555.</td>
<td>4</td>
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<td>Dent only, 3rd yr, or students doubly registered in Dentistry and the Graduate School. Mr. Kolas and Staff.</td>
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<td></td>
<td>The study of pathologic lesions of the teeth and the surrounding structures, with clinical demonstrations.</td>
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<tr>
<td>542 (1)</td>
<td>W. Oral Pathology. 1 cl. Dent only, 3rd yr, or students doubly registered in Dentistry and the Graduate School. Mr. Kolas.</td>
<td>1</td>
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<td>A continuation of 541.</td>
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<tr>
<td>543 (1)</td>
<td>W. 546 (1) S. Oral Diagnosis and Treatment Planning. 1 cl. Dent only, 3rd yr. Mr. Bruce and Staff</td>
<td>1</td>
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<td></td>
<td>A series of lectures and demonstrations which discuss principles and methods of diagnosis, including dental and medical history, signs and symptoms, medical laboratory aids, and treatment planning for the dental patient.</td>
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<tr>
<td>551 (1)</td>
<td>A. Pedodontics. 1 cl. Dent only, 3rd yr. Mr. Pettit.</td>
<td>1</td>
<td></td>
<td></td>
<td>Detailed study of materials presented in 462. Restorative materials used in pedodontics.</td>
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<tr>
<td>552 (1)</td>
<td>W. 553 (1) S. Pedodontics. 2 clinic hrs. Dent only, 3rd yr. Mr. Pettit and Staff.</td>
<td>1</td>
<td></td>
<td></td>
<td>The use of X-ray in pedodontic practice.</td>
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<tr>
<td>555 (1)</td>
<td>W. Orthodontics. 1 cl. Dent only, 3rd yr. Mr. Williams and Staff.</td>
<td>1</td>
<td></td>
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<td>The etiology and classification of malocclusion, physiology of tooth movement, character of tissues involved.</td>
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<tr>
<td>556 (2)</td>
<td>S. Orthodontics. 2 cl. Dent only, 3rd yr. Mr. Williams and Staff.</td>
<td>2</td>
<td></td>
<td></td>
<td>Methods and appliances for the correction of malposed teeth. A continuation of 555.</td>
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<tr>
<td>560 (1)</td>
<td>A. Periodontics. 1 cl. Dent only, 3rd yr. Mr. W. Walton.</td>
<td>1</td>
<td></td>
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<td>A continuation of 463.</td>
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<td>561 (1)</td>
<td>A. 562 (1) W. 563 (1) S. Periodontics. 3 clinic hrs. Dent only, 3rd yr. Mr. Wilson and Staff.</td>
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<td>572 (2)</td>
<td>W. Pharmacology. 2 cl. Dent only, 3rd yr. Mr. Kampfer.</td>
<td>2</td>
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<td>A study of the materia medica of drugs commonly used in dentistry and their applications.</td>
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<td>581 (2)</td>
<td>A. Complete Prosthodontics. 1 cl, 2 clinic hrs. Dent only, 3rd yr. Mr. Boucher and Staff.</td>
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<td></td>
<td>Principles and techniques of complete prosthodontics and the clinical applications.</td>
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<td>582 (2)</td>
<td>W. 583 (3) S. Complete Prosthodontics. 1 cl, 4 clinic hrs. Dent only, 3rd yr. Mr. Boucher and Staff.</td>
<td>1</td>
<td></td>
<td></td>
<td>Lectures and clinical practice in advanced complete prosthodontics.</td>
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<tr>
<td>584 (1)</td>
<td>A. Fixed Partial Prosthodontics. 1 cl, Dent only, 3rd yr. Mr. McBride and Staff.</td>
<td>1</td>
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<td></td>
<td>Clinical applications of the principles and technical procedures of fixed partial prosthodontics.</td>
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<tr>
<td>585 (2)</td>
<td>W. Fixed Partial Prosthodontics. 1 cl, 3 clinic hrs. Dent only, 3rd yr. Mr. McBride and Staff.</td>
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<td>A continuation of 584.</td>
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<tr>
<td>586 (3)</td>
<td>S. Fixed Partial Prosthodontics. 1 cl, 6 clinic hrs. Dent only, 3rd yr. Mr. McBride and Staff.</td>
<td>1</td>
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<td>A continuation of 585.</td>
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</tbody>
</table>
587 (1) A. Removable Partial Prosthodontics. 1 cl. Dent only, 3rd yr. Mr. Steffel
A continuation of 489.


601 (2) A. 602 (2) W. 603 (2) S. Anesthesia. 1 cl, 2 clinic hrs. Dent only, 4th yr. Mr. Allison and Staff
A study of the pharmacological action and physiological effect of premedicating drugs, anesthetic drugs, and analgesics and the techniques of administration.

604 (2) A. 605 (2) W. 606 (2) S. Oral Surgery. 1 cl, 2 clinic hrs. Dent only, 4th yr. Mr. Allison and Staff
Surgical treatment with clinical demonstrations of pathologic conditions of the face, jaws, oral cavity, and related structures.

612 (2) W. 613 (1) S. Endodontics. 2 clinic hrs. Dent only, 2nd yr. Mr. Kaiser and Staff

621 (1) A. 622 (1) W. 623 (1) S. Ethics, Economics, History, and Jurisprudence. 1 cl. Dent only, 4th yr. Mr. W. Postle and Mr. Harper
Business training, ideals, history of dentistry, and standards of professional conduct.

631 (5) A. 632 (5) W. 633 (5) S. Operative Dentistry. 1 cl, 8 clinic hrs. Dent only, 4th yr. Mr. Taylor and Staff
Advanced procedures in Operative Dentistry.

645 (1) W. 646 (1) S. Oral Diagnosis and Treatment Planning. 2 clinic hrs. Dent only, 4th yr. Mr. Bruce
Clinical experience in history taking, diagnosis, and treatment planning for the dental patient.

647 (1) A. 648 (1) W. 649 (1) S. Oral Radiography. 2 clinic hrs. Dent only, 4th yr. Mr. O'Brien and Staff
Clinical applications of the principles of oral radiography.

651 (2) A. Pedodontics. 1 cl, 3 clinic hrs. Dent only, 4th yr. Mr. Pettit and Staff
Diagnosis of pulp conditions of primary and permanent teeth. Techniques for treatment. Growth and development pertaining to pedodontics. Care of handicapped patients.

652 (1) W. 653 (1) S. Pedodontics. 2 clinic hrs. Dent only, 4th yr. Mr. Pettit and Staff

661 (1) A. 662 (1) W. 663 (1) S. Periodontics. 2 clinic hrs. Dent only, 4th yr. Mr. Wilson and Staff

672 (2) W. 673 (2) S. Pharmacology. 1 cl. 2 clinic hrs. Dent only, 4th yr. Mr. O'Brien
An advanced study of the general medi caments related to the practice of dentistry.

681 (3) A. Complete Prosthodontics. 1 cl, 4 clinic hrs. Dent only, 4th yr. Mr. Boucher and Staff
A continuation of 683.

682 (2) W. 683 (2) S. Removable Prosthodontics. 4 clinic hrs. Dent only, 4th yr. Mr. Boucher, Mr. Steffel and Staff

684 (2) A. 685 (2) W. 686 (2) S. Fixed Partial Prosthodontics. 4 clinic hrs. Dent only, 4th yr. Mr. McBride and Staff

FOR GRADUATES

690 (1-3) Su,W,S. Histologic Laboratory Technique. Prereq: permission of instructor. Miss Permar
The preparation of oral and dental tissues for microscopic study.
DENTISTRY 81

693 (1-5) Su, A.W.S. Individual Studies in Dentistry. Prereq: permission of the instructor. Staff. Special assignments in advanced phases of dentistry problems. Students will elect to work in desired subjects after a conference with the instructor in charge.

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

800 Special Problems in Dentistry.


800C (1-5) Su, A.W.S. Advanced Periodontics. Req'd of all students majoring in Periodontics. Mr. Wilson. Diagnosis and treatment of periodontal disease. Correlation between the diseases of the periodontium and probable systemic maladjustments, and maladjustments of a purely dental nature.

800D (1-5) Su, A.W.S. Advanced Prosthodontics. Mr. Boucher, Mr. McBride. The diagnosis, treatment, and replacement of missing or lost teeth and parts of the mouth by prosthetic appliances; complete removable partial, or fixed partial restorations.

800E (1-6) Su, A.W.S. Advanced Oral Pathology and Diagnosis. Req'd of all students majoring in Oral Pathology. Mr. Kolos. The interrelationships of gross, microscopic, and clinical pathology. Current advances in the field of oral pathology and diagnosis.

800F (1-5) Su, A.W.S. Advanced Endodontics. Req'd of all students majoring in Endodontics. Mr. Kaiser. Clinical problems in endodontics and their correlation with the problems in related fields of dentistry and medicine. Surgical methods will receive attention.

800G (1-5) Su, A.W.S. Advanced Pedodontics. Req'd of all students majoring in Pedodontics. Mr. Petitt. A study and clinical application of diagnosis and treatment of problems occurring in the various areas of pedodontics.


800I (1-5) Su, A.W.S. Advanced Oral Histology and Embryology. Mr. Wilson. The principles of histology and embryology applied to the structures in the oral region—their development, morphology, functions, and clinical relationships.

805 (1) A.W.S. Seminar in Dentistry. 1 cl. Req'd of all graduate students in Dentistry. Mr. Wilson, Miss Pernar, and Staff. A discussion of recent advances in all branches of dental science. Review of original literature.

950 (arr) Su, A.W.S. Research in Dentistry. Research for thesis purposes only.

ECONOMICS
Office, 239 Hagerty Hall

PROFESSORS BOWERS, WOLFE (EMERITUS), HAYES (EMERITUS), DICE (EMERITUS), SALZ (EMERITUS), HERBST (EMERITUS), JAMES, PATTON, COONS, MILLER, PARNEZ, HARRISON, LOVENSTEIN, CONDOIDE, CRAIG, LYNN, OSTER, SHERMAN, TYTOUT, BODENHORN, AND LEY, ASSOCIATE PROFESSORS TUTTLE, QUANTUS, KELLEY, WARNE, AND BICKEL HA UPT, ASSISTANT PROFESSORS STEVENS, FLETCHER, RICKMON, McCALMONT, MICHAEL, MRS. CAMERON, BATECHENBERG, WOODARD, AND LEVINE, MISS FUNDABURK, MR. SMITH, MRS. STITT, MR. ZELLER, MR. DRUGGE

FOR UNDERGRADUATES

400 (5) Su, A.W.S. Development of Modern Economic Society. 5 cl. Open only to freshmen and sophomores. Not open to students who have credit for Hist 421-422-423. Mr. Patton, Mr. Warne, Miss Fundaburk, Mr. Smith and others. Study of dominant historic forms of economic organization to provide an understanding of role of capitalism in evolutionary development of society.
401 (5) Su, A.W.S. 402 (5) Su, A.W.S. Principles of Economics. 5 cl. Not open to freshmen, nor to students who have credit for 403-404, or 406. Mr. Oster, Mr. Lovenstein, Mr. Coons, Mr. Batchelder, and others

Study of organization and operation of our economic system, with objective of developing an understanding of our present economic problems. National income; cost and price relationships; money and banking; taxation; labor problems; agricultural economics; international trade and finance; and public control of business.

403 (3) A.W.S. 404 (3) A.W.S. Principles of Economics for Engineers. 3 cl. Not open to freshmen nor to students who have credit for 401-402, or 406. Mr. Fletcher, Mr. Michael, Mr. Zeller, Mr. Druggge and others

Basic principles of economics from viewpoint of engineers. Analytical study of characteristics, processes and institutions of the economic system.

406 (5) Su, A.W.S. Outlines of Economics. 5 cl. Not open to freshmen nor to students who have credit for 401-402, or 403-404. Mr. Harrison, Mr. Lovenstein, Mr. McCalmond and others

Analysis of basic characteristics of American economic system; study of significant problems arising in its operation and an appraisal of proposed solutions.

507 (3) Su, A.W.S. Fundamentals of Economics. 5 cl. Prereq: Hist 228. Not open to students who have credit for 401, 402, 403, 404 or 406. Mr. Lovenstein, Mr. Parnes, Mr. Bodenborn, Mr. McCalmond, Mr. Batchelder and others

Study of basic characteristics, processes, and institutions of the economic system; significant problems arising in its operation; proposed solutions.

520 (5) Su, A.W.S. Money and Banking. 5 cl. Prereq: 402 or 404 or 406 or 507. Mr. Craig, Miss Quantius, Mr. Stevens, Mr. Michael and others

Organization, operation, and economic significance of our monetary and banking system are discussed with special reference to current conditions and problems.

530 (5) Su, A.W.S. Outlines of Public Finance. 5 cl. Prereq: 402 or 404 or 406 or 507. Not open to students who have credit for 509 or 631 and 682. Mr. Oster, Mr. Lynn, Mrs. Cameron, Mr. Woodard and others

Survey of field of public finance; expenditures, revenues, and debt. Special attention will be given to taxation.

542 (4) Su, A.W.S. Elementary Economic Statistics. 3 cl, 1 hr lab. Prereq: 402 or 404 or 406 or 507. Not open to students who have credit for 511. Mr. Tuttle, Mr. Bodenborn, Mrs. Cameron and others


560 (3) Su, A.W.S. International Economic Relations. 3 cl. Prereq: 402 or 403 or 406 or 507. Not open to students who have credit for 515. Mr. Coons

Survey of international economic relations; the basis of world trade; commercial and financial policy, particularly of the United States; and recent international economic organizations.

561 (3) W. Economic Problems of Latin America. 3 cl. Prereq: 402 or 404 or 406 or 507

Economic problems of Latin America with emphasis on monocultures, population, industrialization, inflation, investments and regional economic blocs.

580 (3) Su, A.W.S. Problems of Labor. 3 cl. Prereq: 402 or 404 or 406 or 507. Not open to students who have credit for 510 or 641 or 686. Mr. Miller, Mr. Parnes, Mr. Levine, Mr. Spitz, Mr. Zeller and others

Survey of problems of American wage earners and of principal methods used by employers, and government in dealing with these problems.

687 (3) A.W.S. Field Work in Labor Economics. Prereq: 687 or 253 or permission of instructor. Not for graduate credit nor for students who have credit for 642.

Students will be assigned work in a labor organization, an industry, or a government agency. Supervision in charge will arrange placements, conferences, lectures, discussions.
700 (1-5) A. 701 (1-5) W. 702 (1-5) S. Honors Courses. Open only to students enrolled in the Honors Program of the College of Arts and Sciences. Mr. Patton, Mr. Craig with the cooperation of other members of the department.

Program of readings, conferences and reports arranged for the student who is a candidate for "Degree with Distinction" in Econ. (See section on "Departmental Honors and Degrees with Distinction" in the Bulletin of the College of Arts and Sciences.) Courses must be taken for at least two quarters.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

600 (3) S. Ideas of the Great Economists. 3 cl. Prereq: 402 or 404 or 406 or 507. Mr. Patton

Critical analysis of ideas of great economists, factors which influenced those ideas; their impact upon social and economic development of the modern world.

606 (3) Su,W. Current Economic Problems. 3 cl. Prereq: 402 or 404 or 406 or 507. Not open to students who have credit for 604-605. Mr. Coons, Mr. Miller, Mr. Craig, Mr. Batchelder

Examination of current economic problems; optimum levels of employment; conditions underlying consumer expenditures; savings; investments; inflation; deflation; agriculture, public works, housing; regional development.

610 (3) S. Economic Development. 3 cl. Prereq: 402 or 404 or 406 or 507.

Not open to students who have credit for 628.

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

611 (3) W. American Capitalism Since the Civil War. 3 cl. Prereq: 402 or 406 or 507. Not open to students who have credit for 629. Mr. Harrison

Emphasis given to rise of big business and organized labor, significance of increasing price rigidities, and growing importance of government intervention.

#612 (3) S. Economic and Business History of Selected American Firms, 3 cl. Prereq: 402 or 404 or 406 or 507. Not open to students who have credit for 630. Mr. Harrison

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

621 (3) W.S. Problems of Monetary-Fiscal Policy. 3 cl. Prereq: 520 or equiv. Not open to students who have credit for 613. Miss Quantius

Monetary-fiscal policies for stabilization at high levels of production, employment, and income. Emphasis on contemporary problems of policy.

624 (3) Su,A,W.S. Risk and Insurance. 3 cl. Prereq: 402 or 404 or 406 or 507. Mr. Bowers, Mr. Ley, Mr. Bickelhaupt, Mr. Hammond, Mr. Hashmi and others

Economic theory of risk, its significance and treatment; theory and practice of property, liability, life and health insurance.

631 (3) A. Governmental Expenditures. 3 cl. Prereq: 402 or 404 or 406 or 507. Mr. Oster

Growth of public expenditures. Factors leading to such growth. Classification and control of public expenditures. Public debt.

632 (3) W. Governmental Revenues. 3 cl. Prereq: 402 or 404 or 406 or 507. Mr. Oster

Sources of governmental revenue. Tax and revenue system of the State of Ohio and its political subdivisions.

633 (3) S. Governmental Fiscal Administration. 3 cl. Prereq: 509 or 530 or 631 or 632. Mr. Oster

ECONOMICS

644 (3) A. Mathematical Economics Theory. 3 cl. Prereq: 402 or 404 or 406 or 507, college algebra and permission of instructor. Not open to students who have credit for 675. Mr. Tuttle
Application of essentials of calculus in deriving principal theorems of economic marginal analysis. Problems and examples.

651 (3) W. Consumption Economics. 3 cl. Prereq: 402 or 404 or 406 or 507. Not open to students who have credit for 645. Mr. Warne
Consumption from the standpoint of the individual and society; cost of living; standards and levels of living; consumer budgets; influences determining consumer choice.

653 (3) A. Population. 3 cl. Prereq: 402 or 404 or 406 or 507, or the equiv, with permission of instructor. Not open to students who have credit for 660. Mr. Harrison
Impact of world population growth upon resources, productive capacity, scales of living, national defense, and international economic relations. Critical consideration of population theories and policies.

655 (3) S. Income Distribution and Public Policy. 3 cl. Prereq: 402 or 404 or 406 or 507. Mr. Craig
Trends in income distribution; analysis of measures of income distribution; policies influencing distribution; effects of income distribution on the economy.

656 (3) Su.A. National Income and Flow of Funds Analysis. 3 cl. Prereq: 520 or 542 and Acc 402 or Acc 405 or Acc 412. Mr. Coons
Theory and practice of social accounting as applied to national income and flow of funds.

657 (3) S. Analysis and Control of Business Fluctuations. 3 cl. Prereq: 520. Not open to students who have credit for 627. Mr. Coons, Mr. Craig
Study of changes in levels of income and output. Current and past theories of the business cycle. Public policy proposals for controlling economic fluctuations.

663 (3) W. Economic Problems of Western Europe. 3 cl. Prereq: 402 or 404 or 406 or 507. Not open to students who have credit for 679. Mr. Condole
Impact of World War II and problems of reconstruction; economic unification of Europe role of Europe in the world economy.

664 (3) A. 665 (3) W. 666 (3) S. International Trade and Finance. 2 cl. Prereq: 520. Mr. James
Theories of international trade; United States and major industrial countries as related to world economy in terms of their balance of payments; economic development in developing areas; international economic policy; types of trade restrictions; new organizations for stabilization of international trade and finance.

670 (3) W. Competition and Public Policy. 3 cl. Prereq: 671 or 20 cr hr of Econ. Not open to students who have credit for 609. Mr. Lynn, Mr. Fletcher
Nature, role, and regulation of competition; market structure and social performance of antitrust laws; current economic, legal, and policy problems in the antitrust area.

671 (5) A,S. Government and Business. 5 cl. Prereq: 402 or 404 or 406 or 507. Mr. Fletcher, Mr. Lynn
Economic and legal aspects of Government regulation of business in the United States: philosophies and concepts of public control; contemporary problems.

672 (3) S. Public Utility Economics. 3 cl. Prereq: 671 or 20 cr hr of Econ. Not open to students who have credit for 648. Mr. Tybout, Mr. Fletcher
Study of general economic characteristics and regulation of water, gas, electric, communications, and related industries, including atomic power. Government regulation versus private ownership.

676 (5) A,W,S. Transportation Economics. 5 cl. Prereq: 671 or 20 cr hr of Econ or permission of instructor. Not open to students who have credit for 618, 622-628, or 771-773. Mr. Tybout, Mr. Fletcher
Study of general economic characteristics and government regulation of rail, motor, water, air, and pipeline carriers. Consideration of competitive relations between modes of transportation.
677 (3) S. Air and Water Transportation. 3 cl. Prereq: 618 or 676. Not open to students who have credit for 619. Mr. Tybout, Mr. Fletcher
Economic aspects of air and water transportation including costs, demand, pricing, government promotion and regulation, and international problems.

678 (3) W. Highway Transportation. 3 cl. Prereq: 618 or 676 or permission of instructor. Not open to students who have credit for 620. Mr. Tybout, Mr. Fletcher
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.

680 (3) A.S. Social Insurance. 3 cl. Prereq: 402 or 404 or 406 or 507. Not open to students who have credit for 659. Mr. Bowers, Mr. Parnes
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.

681 (2) A. Collective Bargaining. 1 2 hr. Prereq: 580 or permission of instructor. Mr. Miller, Mr. Parnes
Economic and legal aspects of collective bargaining. Techniques and procedures used. Major issues and problems of collective bargaining.

682 (2) S. Mediation and Arbitration. 1 2 hr. Prereq: 580 or permission of instructor. Mr. Miller, Mr. Parnes
Handling and settlement of industrial disputes. Roles of the federal, state, and local government in adjusting disputes, and activities of private organizations and individuals.

683 (5) Su.A. The American Labor Movement. 5 cl. Prereq: 402 or 404 or 406 or 507. Not open to students who have credit for 637 or 694-695 or 780-781. Mr. Miller, Mr. Parnes
History and theory of American labor movement. Evolution of public toward collective bargaining. Trade union policies, programs, organization, and administration.

684 (3) W. Labor and the Government. 3 cl. Prereq: 402 or 404 or 406 or 507. Not open to students who have credit for 638. Mr. Miller, Mr. Parnes
Role of legislative, judicial, and executive branches of government with respect to labor problems and labor relations. State and federal protective legislation.

685 (3) S. Foreign Labor Movements. 3 cl. Prereq: 402 or 404 or 406 or 507. Not open to students who have credit for 640. Mr. Parnes
Development of labor movements in selected countries. Political, legal, economic and social foundations of industrial relations to these countries. The international labor movement.

686 (3) S. The Labor Market. 3 cl. Prereq: 510 or 580 or 641 or 637 or 683 or 686. Not open to students who have credit for 650. Mr. Parnes
Materials and methods of labor market analysis. Labor force definition, measurement, and trends. Workers' and employers' labor market behavior. Wage determination and labor allocation.

690 (3) S. Contemporary Economic Systems. 3 cl. Prereq: 402 or 404 or 406 or 507, Mr. Lovenstein
Comparative study of development and operation of economic institutions and principles in capitalistic, socialist, communist, and fascist economic systems.

697 (3) W. Economics of Socialism. 3 cl. Prereq: 402 or 404 or 406 or 507. Not open to students who have credit for 652 or 669 or 671. Mr. Lovenstein
Survey of socialist thought and movements; relation of socialist thought to the economic and practice of socialist economics; planning, allocation, pricing, controls.

698 (3) Su.A. Soviet Economic System. 3 cl. Prereq: 402 or 404 or 406 or 507. Not open to students who have credit for 525 or 654. Mr. Condoile
Survey of Soviet economics with major emphasis on planning; allocation of resources; spending, saving and investing; agriculture; public finances; and international trade.

COURSES IN THE 700 GROUP ARE OPEN ONLY TO SENIORS AND GRADUATE STUDENTS

Nat Sec Pol S 702 (3) A. 703 (3) W. 704 (3) S.
(See National Security Policy Studies)
ECONOMICS

707 (3) A. 708 (3) W. 709 (3) Su,S. Intermediate Economic Analysis. 3 cl. Prereq: 520. Not open to students who have credit for 601-602-603. Mr. James
Review of the scope and nature of economic analysis; competitive and monopolistic markets in allocation of consumers' goods and inputs of the factors of production; coordination of basic economic processes at different output-levels.

731 (3) S. Central Government Finance. 3 cl. Prereq: 509 or 580 or 652. Mr. Lynn, Mr. Oster
Fiscal structure, practice and policies of central government; relation of fiscal policies to national economic objectives; legal and administrative limitations affecting fiscal programs.

740 (2) A. 741 (2) W. 742 (2) S. Statistical Analysis. 1 2 hr cl. Prereq: 4 cr hrs of statistics. Not open to students who have credit for 703-704 or 743-744 or 710-711-712. Mr. Tuttle

745 (3) A. Linear Programming and Economic Analysis. 3 cl. Prereq: 402 or 404 or 507, Math 417 or 422, or permission of instructor. Mr. Tybout
Techniques of linear programming applied to economic problems of allocation and valuation within the firm.

760 (3) S. Soviet International Economic Policies. 3 cl. Prereq: 550 or 666 or permission of instructor. Mr. Condoide
Survey of the scope and nature of Soviet international economic policies; relations with satellites; economic aid and expansion of influence.

770 (3) A. Economics of National Security. 3 cl. Prereq: 402 or 404 or 406 or 407. Not open to students who have credit for 601. Mr. Lovenstein, Mr. Sherman
Analysis of economic problems arising from defense and war. Emphasis on implications of defense and war economy and on economic theory and institutions.

798 (1-3) A,W,S. Special Studies in Economics. 1-3 cr hrs each qtr in any one field. For seniors, not more than 5 cr hours may be taken in this course. For graduate students, not more than 3 cr hrs may be received in any one field nor a total of more than 12 hrs in the course. Prereq: advanced courses in Econ and related fields. Senior Staff
Group study of special topics in various fields of economics. The fields within economics are listed under 799.

799 (1-3) Su,A,W,S. Special Problems in Economics. 1-3 cr hrs each qtr in any one field. Prereq: advanced courses in Econ and related fields. For seniors, to a maximum of 5 cr hrs; for graduate students, to a maximum of 3 cr hrs in any one field; repeatable to a total of 12 hrs. Senior Staff
Individual study of special topics in various fields of economics.
(a) Economic study of special topics in various fields of economics
(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) Socialism and Central Planning
(k) National Security Economics

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the 800 or 900 area except by permission of the Graduate Council.
Prerequisites must include foundation courses of collegiate grade in the principles of economics, political science, psychology, European and American history.
806 (2) A.W. Research Methods in Economics. 1 2 hr cl. Mr. Bowers, Mr. Sherman, Mr. Parnes, Mr. Bodenhorn, Mr. Craig
Methods of economic research, choice of research topics, and presentation and evaluation of results obtained. Required of all new graduate students in Economics.

801 (3) A. 802 (3) Su.W. 803 (3) S. History of Economic Thought. 3 cl.
Mr. Patton
The early development of economic ideas in the Western World; Mercantilism and Capitalism; Physiocratic doctrines (801). The economic analysis of the classical school (802). Later classicism and devatations from classical economic doctrine; socialist doctrines; the historical school; other inorthodoxes (803).

804 (3) Modern Economic Analysis. Not open to students who have credit for 816-817-818 taken prior to 1958-1959 or who have credit for 804-805-806 taken prior to 1962-1963.
To be taken in sequence; c and d may be taken concurrently.
(a) (3) A. Advanced micro-economic theory. Mr. Bodenhorn
(b) (2) W. Advanced micro-economic theory. Mr. Craig
(c) (3) S. Contemporary economic theory. Mr. James
(d) (3) S. Critical evaluation of theoretical systems in economics. Mr. Patton

807 (3) S. Theories of Welfare Economics. 3 cl. Prereq: 708. Mr. Tybout
Study of economic standards and their application to economic welfare, or well-being. Mathematical techniques are employed.

812 (3) A. #813 (3) W. #814 (3) S. The Economic History of Western Europe. 3 cl Recommended prereq: or concur: 801-802-803. Mr. Harrison
General survey from ancient to modern times. Interrelations between economic institutions, general culture, and economic thought. Modern capitalism. Agricultural, commercial and industrial revolutions in modern times.

816 (3) A. #817 (3) W. #818 (3) S. Economic History of the United States. Not open to students who have credit for 804-805-806 taken prior to 1958-1959. Mr. Harrison

820 (3) W. Monetary Theory. 3 cl. Prereq: 820 or equiv. Not open to students who have credit for 853. Mr. Craig
Role of money in theoretical analysis of forces determining and influencing level of income, employment, and prices.

821 (3) S. Central Banking and Monetary Policy. 3 cl. Prereq: 820 or permission of instructor. Not open to students who have credit for 864. Miss Quantaus
The Federal Reserve System; its objectives, techniques, and probable effectiveness. Problems of coordinating monetary policy, fiscal policy, and debt management.

830 (2) W. Seminar in Current Taxation Problems. 1 cl. Not open to students who have credit for 825. Mr. Oster
Critical analysis of taxation problems now before federal, state and local governments.

831 (3) A. Legal and Economic Problems in State and Local Taxation.
(Jointly with the College of Law.) Mr. Lynn, Mr. Glander
Legal, economic and administrative problems of state and local taxation with particular attention to the State of Ohio and its local governments.

848 (2) Su. Seminar in Econometrics. 1 cl. Prereq: differential and integral calculus, and permission of instructor. Mr. Tuttle
Examination of economic problems whose solutions may advantageously be sought by use of the methods of mathematics and mathematical statistics.

849 (2) A. Seminar in Economic Statistics. Prereq: 12 cr hrs in Econ and statistics and permission of instructor.
Recent developments in statistical methods, particularly sampling, and their application to economic and business problems.
851 (2) S. Seminar in Business Fluctuations and National Income Accounting. Not open to students who have credit for 844. Mr. Coons
Current business cycle theory and national income accounting; evaluation of statistical measures of these phenomena; consideration and appraisal of recent literature in the field.

852 (3) A.W.S. General Business Conditions Analysis. Prereq: 20 or 330 in Econ and/or Bus Org and permission of instructor. Not for graduate credit for majors in Economics. Mr. Craig, Mr. Bodenhorn
Theoretical and applied analysis of general economic conditions and their relation to decisions of the firm.

860 (2) W. Seminar in International Economic Problems. Prereq: 665-666. Not open to students who have credit for 838. Mr. James
Seminar in analytical problems, theoretical and applied, of international economic adjustments; development of techniques for implementation of policies.

#870 (2) W. Seminar in Public Control. Prereq: 670 or 672 or 676 or 773. Not open to students who have credit for 834. Mr. Tybout
An analysis of the leading problems involved in government promotion and regulation of economic enterprise. Appraisal of existing and alternative public economic policies.

871 (3) W.S. Problems in National Security Economics. 1 2 hr cl. Prereq: 770 or permission of instructor. Repeatable to a total of 6 hrs. Mr. Sherman, Mr. Lovenstein
Seminar designed to analyze in depth selected economic problems of national defense and defense-related activities.

879 (3) W. Anti-Trust Law and Economics. (Jointly with the College of Law.) Mr. Strong, Mr. Lynn
An evaluation of anti-trust law on the basis of current economic thinking.

#880 (2) S. Seminar in Problems of the Labor Movement. Prereq: 637 or 683 or 685 or 684 or equiv or permission of instructor. Not open to students who have credit for 843. Mr. Miller, Mr. Parnes
Major problems in present-day unionism. Critical analysis of impact of the labor movement upon the economy.

#881 (2) S. Seminar in Wage Determination. Prereq: 637 or 683 or 685 or 684 or equiv or permission of instructor. Not open to students who have credit for 874. Mr. Miller, Mr. Parnes
Seminar designed to analyze the economics of wage determination. Wage practices and wage theories.

882 (2) S. Social Insurance Problems. Not open to students who have credit for 877. Mr. Bowers
Analysis of federal and state social insurance measures and economic problems raised by them; the place of social insurance in the economic system.

888 (1) A. 889 (1) W. 890 (1) Su. Seminar in Current Economic Literature. Mr. Lovenstein
Contributions of current economic literature. Reading assignments according to student's interests and fields of specialization. Conference, reports, criticisms.

891 (2) S. Seminar in Socialism and Central Planning. Prereq: 690 or 697 or 698 or equiv or permission of instructor. Mr. Lovenstein, Mr. Condoise
Analysis of experience and theoretical problems in socialism, central planning, and administered economies.

898 (3) W. Seminar in Soviet Economic Problems. 3 cl. Prereq: 690 or permission of instructor. Mr. Condoise
Current problems of the Soviet economy; economic growth, price policies, changing structure of the economy.

899 (1-5) A.W.S. Interdepartmental Seminars.
(See under Interdepartmental Seminars)

950 (arr) Su. A.W.S. Research in Economics.
Research for thesis or dissertation purposes only.
EDUCATION

Office, 149 Arps Hall

PROFESSORS ALBERTY (EMERITUS), ALLEN, ANDERSON, ARISMAN, BURNETT, BUIER, CAHOON (EMERITUS), CASSIDY, CONRAD, COON, CORBALLY, DARE, EBERHART, ECKELBERGER (EMERITUS), EIKEBERGER (EMERITUS), FAWCETT, GOOD (EMERITUS), GRIFFIN, GUBA, HANNA, HARDING, HAWK, HECK (EMERITUS), HENDRICKSON, HIXON, HUELSMAN, HUCK, JENSEN, JEWETT, KIRCHER, KLOHR, LANDSTILGE (EMERITUS), LAUGHLIN, LAZAR, LIVINGSTON, LOGAN, MCBRIDE, MENDENHALL, MOONEY, PETERS, PHELPS, RAMSEYER, REES, RICHARDSON, ROSEBROOK (EMERITUS), SANDERSON, SEELY (EMERITUS), STAUB, STEINZEL, THARP (EMERITUS), TOMLINSON, TRIMBLE, TYLER, WARNER, WELLS, WOLFF, ZUBER (EMERITUS), ASSOCIATE PROFESSORS E. ALBERTY, BRODELL, CYPHERT, FOTHERINGHAM, FRYMIER, GIBBON, HACK, HELLER, HUNT, JOHN- KEMP, KING, LARMER, LEWIS, G. MACCIA, E. MACCIA, MEHL, RAMSEY, RAY, REYNARD, SCHLESSINGER, SESSIONS, SUTTON, TOWERS, WILLIAMS, WOLF, ASSISTANT PROFESSORS HOWE, KOSTE, MILLER, RICCO, SCHOEDER, SUESS, TEWABURSEY, ZIDONIS, COORDINATOR STUDENT FIELD EXPERIENCE, L. O. ANDREWS

AREAS

Adult Education—600B, 770, 771, 774, 800B, 835B, 898, 950
Audio Visual Materials—600S, 602, 800S, 835S, 950
Curriculum and Supervision—K12, 600Y, 649, 704, 710, 800Y, 802, 950
Dental Hygiene Education—537A
Educational Administration—600M, 709, 727, 800M, 823, 835M, 836, 837, 838, 838, 870, 871, 872, 873, 875, 876, 880, 899, 950
Exceptional Children—537L, 600T, 666, 667, 764, 766, 772, 799T, 800T, 835T, 849, 950
Fine Arts—520C, 536C
Guidance—537D, 660D, 661, 750, 752, 754, 755, 756, 800D, 817, 818, 835D, 950
Health Education—536M
Higher Education—600E, 768, 800E, 812, 835E, 845, 848, 850, 851, 950
Introduction to Education—408
Music—520A, 520B, 536A, 536B
Physical Education—536S, 536T
Radio and Television Education—600J, 601, 800J, 835J, 950
Research Techniques—600V, 710, 800V, 802, 804, 835V, 950
School Library Science—503, 550, 551, 552, 600W, 646, 647

Secondary Education

General Field—535, 600K, 674, 676, 699, 703, 704, 705, 706, 707, 708, 709, 799K, 800K, 829, 831, 832, 835K, 841, 844, 950
Teaching of English—536N, 600N, 663, 669, 670, 671, 674, 800N, 835N, 950
Teaching of Foreign Languages—536D, 536F, 536L, 536O, 536Z, 600-O, 688, 690, 692, 694, 800-O, 950
Teaching of Science—536Q, 600Q, 604, 605, 643, 681, 796, 712, 800Q, 835Q, 851, 950
Teaching of Social Studies—536R, 600R, 669, 677, 678, 800R, 835R, 950
Vocational and Practical Arts Education

Distributive Education—536X, 600X, 717, 780, 781, 782, 800X, 835X, 950
Trade and Industrial Education—536H, 575, 600H, 695, 800H, 835H, 950
Workshops and field experience—505, 549, 632, 799

FOR UNDERGRADUATES

401 (No Cr) A. 402 (No Cr) W. 403 (No Cr) S. Beginning Typewriting. 4 cl. Req'd in the 2nd year of students majoring in business education who lack proficiency required for admission to Ed 471. Miss Wells and Staff
Elective only by students (a) declaring a minor or teaching field in Business Education, (b) declaring a major in Secretarial Service, or (c) within limits of instructional and equipment facilities.
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 must be registered in the course.

404 (2) A. 405 (2) W. 406 (2) S. Beginning Shorthand. 4 cl. Req'd in the 2nd year of students majoring in business education who lack proficiency req'd for admission to Ed 471. Miss Wells and Staff
Elective only by students (a) declaring a minor or teaching field in Business Education, (b) declaring a major in Secretarial Service, or (c) within limits of instructional and equipment facilities. 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 must be registered in the course.

408 (3) Su,A,W,S. Introduction to the Study of Education. 3 cl. Req'd in teacher education program in all fields (except Fine Arts and Music) of freshmen and students transferring into education with less than 90 cr. hrs. Req'd enrollment in the earliest possible qtr. Mr. Cyphert and Staff
An introductory study of cultural factors that affect education, with students helped in understanding through an examination of their own lives.

440 (4) A,W,S. The Laboratory of Industries. 5 2 hr cl and lab. Mr. Towers
Orientation to technological origins of industrial arts teaching through experiences with tools, materials, processes, and products.

441 (4) W. 442 (4) A. Elements of Woodworking. 5 2 hr cl and lab. Prereq: 440 and 460 and Eng Dr 400; 441 prereq for 442. Mr. Ray, Mr. Suess
Experience in planning and developing skills and knowledge of the construction of articles made of wood and of the industries involved.

443 (4) W. 444 (4) S. Elements of Metalworking. 5 2 hr cl and lab. Prereq: 440, 460, Eng Dr 400. Mr. Olson
Experience in planning and developing skills and knowledge of the construction of articles made of metal and of the industries involved.

445 (4) A. Elements of Printing. 5 2 hr cl and lab. Prereq: 440, 460 and Eng Dr 400. Mr. Haws
Experience in letter press, planography, and miscellaneous processes of printing, binding, and an overview of the graphic arts industry.

446 (4) W. Elements of Electricity in Industrial Arts. 5 2 hr cl and lab. Prereq: 440, 460 and Eng Dr 400, Math 416 and Physics 413. Mr. Suess
An introduction to the principles and practices of electricity and electronics as they apply to industrial arts programs in secondary schools, and a study of the industries involved.

450 (4) A. Introduction to Power Mechanics. 5 2 hr cl and lab. Prereq: 440, 460, Eng Dr 400, Physics 411, and Math 416.
An introduction to the field of industrial arts power and transportation. An overview of the design, function and operation of internal combustion engines and their auxiliaries.
451 (4) S. Internal Combustion Engines. 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.

456 (4) S. Residential and Industrial Utilization of Electrical Power. 5 2 hr cl and lab. Prereq: 448. Mr. Sues
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.

460 (3) A. Problem Planning in Industrial Arts. 2 2 hr cl and lab. Prereq: Eng Dr 400 or 401. Mr. Haws
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.

471 (4) A. 472 (4) W. 473 (4) S. Advanced Shorthand, Typewriting, and Transcription. 4 2 hr cl. Prereq: junior standing in the College of Education or sophomore standing in the College of Commerce and Administration and Ed 403 and 406. Open to (a) majors and minors in Business Education, (b) major in Secretarial Service or equivalent and (c) within limits of instructional and equipment facilities by permission of the instructor. For placement test in typewriting and shorthand, see Ed 401 and 404. Miss Wells and Staff
Continued skill development with emphasis upon transcription and business report and letters.

503 (3) W. Organization and Administration of the School Library. 3 cl. Miss Heller
Practice in essential library routines. Purchase of materials, preparation for use, care and repair of books, simple loan systems will be emphasized.

505 (2-15) Su,A,W,S. Field Service Projects in Education. 1 cl plus lab to be arranged. Mr. Nichols and Staff
Professional service with children or youth in some school or community agency. Supervision by both college and agency staff, weekly seminar and evaluation paper.

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

School Related Experience

505A (2) A. Interpretation of September Field experience in Schools. Limited to students who have completed 10 full school days of service in schools in the immediately preceding September.

505E (3) A.S. For students in the Speech and Hearing Therapy Curriculum.

505K (2) A.W.S. For students in the Able Student Program.

Experience in Community Agencies—Non-School

505B (2-15) A.W.S. For students in all curricula in teacher education (elementary, secondary and special subject areas) except those students registering for the special sections as listed below.

505C (2-5) A.W.S. For students in the curriculum in Fine Arts Education.

505M (2-5) Su,A,W,S. For students in the curriculum in Physical Education for Men.

505P (2-5) A.W.S. For students in the curriculum in Physical Education for Women.

505T (2-5) A.W.S. For students in the curriculum in Speech and Radio-Speech.

509 (3) Su,A,S. Kindergarten and Pre-School Teaching. 3 cl and observation. Prereq: 514 or equiv. Mrs. Foster, Miss Miller
Recent development in the education of young children and its influence on the selection and guidance of appropriate activities.

510 (3) Su,A,W,S. Theory and Practice in Elementary Education: Arithmetic. 3 cl. Prereq or concur 514 and Mathematics 410. Mr. Harding, Mr. Wolf
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.
514 (4) Su, A.W.S. Theory and Practice in Elementary Education: Conceptions of Teaching. 2 2 hr cl, alternate 1 2 hr cl. Prereq: 408. For detailed statement of additional prerequisites see College of Education Bulletin. If possible, 514 and 515 should be scheduled during the same quarter on the same days of the week and at consecutive hrs. Not open in Summer Quarterly to elementary majors without teaching experience. Students may not schedule more than 20 hrs while taking this course. Mr. Tomlinson, Miss Koste, Mrs Wolf, Mrs. Foster, Mr. Ramsey, Mr. Tewksbury
First course in basic professional sequence. Designed to acquaint students with elementary school program in general and to deepen conceptions of teaching.

515 (4) Su, A.W.S. Theory and Practice in Elementary Education: Child Guidance. 2 2 hr cl, alternate 1 2 hr cl. Prereq: 514 or concur. Open only to students in the College of Education. Miss King, Mr. Tewksbury
Development of teacher insight and understanding in the education of children. Class work based upon significant research. Required observation of children at University School.

516 (4) Su, A.W.S. Theory and Practice in Elementary Education: The Language Arts. 2 2 hr cl, alternate 1 2 hr cl. Prereq: 514 and junior 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. These two sets of courses need to be scheduled just prior to enrollment in student teaching. Not open in Summer Quarters to elementary majors without teaching experience. Students may not schedule more than 20 hrs while taking this course. Miss Huck, Miss King
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.

517 (4) Su, A.W.S. Theory and Practice in Elementary Education: The Social Studies. 2 2 hr cl, alternate 1 2 hr cl. Prereq: 514 and junior 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. These two sets of courses need to be scheduled just prior to enrollment in student teaching. Not open in Summer Quarters to elementary majors without teaching experience. Students may not schedule more than 20 hrs while taking this course. Mr. Tomlinson, Mr. Burr, Mr. Ramsey, Mr. Wolf, Mr. Tewksbury
This course follows the sequential arrangement of the elementary education curriculum placing particular emphasis upon the social studies in the elementary school program.

The three courses listed above will be combined in a workshop limited to graduates of Colleges of Liberal Arts.

518 (6-15) A.W.S. Theory and Practice in Elementary Education: Student Teaching. Prereq: senior standing in the College of Education. For detailed statement of additional prerequisites, see College of Education Bulletin. Miss Millor, Mrs. Foster, and Staff
Observation, participation, and responsible teaching in a public school in the Columbus area. Individual and group conference or seminars. (Maximum transfer credit accepted is 6 hrs.)

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

518A (6-15) A.W.S. For students in the regular elementary education degree program.
518B (6) A.W.S. For approved students with 3 or more yrs of successful teaching experience.
518C (6) S. For students in the program for graduates with Bachelor of Arts or comparable degrees.
518D (6) S. Second enrollment for students in the Study-Service Program.

520 (3-7) A.W.S. Supervised Student Teaching in Special Subject Fields in the Elementary Schools. Prereq: junior standing in the College of Education, Mr. Andrews and Staff
EDUCATION

521 (3) Su, A.W.S. Children's Literature. 3 cl. Prereq or concur: 514. Miss Koste, Miss Huck, Mr. Ramsey
Study of literature for children with emphasis on standards for selecting materials with reference to the interests, needs, and abilities at different age levels.

522 (5) Su, A.W.S. Industrial Arts Laboratory for Teachers in Elementary Schools. 5 2 hr cl and lab. Prereq: 514 or equiv. Enrollment limited to majors in Elementary and Special Education. Mr. Haws and Staff
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.

528 (3) Su, A.W.S. Theory and Practice in Elementary Education: Science. 3 cl. Prereq: 514 and Bot 402, or Zool 401 or Chem 408, Physics 432 or Geol 418. Mr. Ramsey
Role of science in childhood education and the organisation of learning activities for problem solving. Experiences with children, materials, and resources of environment for teaching.

535 (5) Su, A.W.S. Theory and Practice in Secondary Education. 8 cl per wk. Prereq: 408. Mr. Frymier and Staff
A laboratory field experience course introducing topics, problems, and skills common to prospective secondary school teachers.

536 (3-15) A.W.S. Student Teaching in Secondary Schools. Prereq: senior standing in the College of Education. For detailed statement of additional prerequisites, refer to College of Education Bulletin. Mr. Andrews and Staff
Observation, participation, and responsible teaching in a public school in the greater Columbus area. Individual and group conferences or seminars.
A minimum of 8 credit hours is required to meet certification standards in Ohio and in most secondary academic curriculum 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.

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

536A (3-8) A.W.S. Instrumental Music. Cont. of Ed 520A. Mr. Wilson
536B (3-8) A.W.S. Vocal Music. Cont. of Ed 520B. Mr. Ramsey, Mr. Barr
536C W.S. Fine Arts. Mr. Barkan
536D A.W.S. German. Mr. Allen
536F A.W.S. French. Mr. Allen
536G A.W.S. Industrial Arts. Mr. Haws
536H S. Trade and Industrial Education. Mr. Reese
536J A.W.S. Business Education. Miss Wells
536L A.W.S. Latin. Mr. Allen
536M A.W.S. Health Education. Miss Schroeder
536N A.W.S. English. Mr. Zidenis
536O A.W.S. Spanish. Mr. Allen
536P A.W.S. Mathematics. Mr. Fawcett
536Q A.W.S. Science. Mr. Schlesinger
536R A.W.S. Social Studies. Mr. Jewett
536S A.W.S. Physical Education (Men). Mr. Hixson
536T A.W.S. Physical Education (Women). Miss Schroeder
536U A.W.S. Speech. Mr. Lewis
536V A.W.S. Distributive Education. Mr. Logan
536Z A.W.S. Russian. Mr. Allen

537 (3-15) A.W.S. Supervised Practice in Specialized Forms of Education. Prereq: senior standing in the College of Education. Mr. Andrews and Staff

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

537A A.W.S. Dental Hygiene Education
537C A.W.S. Radio-Speech Education. Mr. Lewis
537D School Psychological Services. Miss Cassidy
537E A.W.S. Speech and Hearing Therapy. Miss Sanderson
537L A.W.S. Special Education. Mrs. Hunt
542 (3) A. The Teaching of Stenographic and Clerical Subjects. 3 cl. Prereq: 408 or equiv, 535 and senior standing. Miss Wells
Objectives, methods, classroom procedures, and materials for teaching shorthand, transcription, typewriting, office practice, and business English.

543 (3) A. The Teaching of Bookkeeping, Office Machines and Related Subjects. 8 cl. Prereq: 535, Acc 418, and senior standing. Miss Wells
The objectives, methods, classroom procedures, and materials for teaching bookkeeping and accounting, office machines and business arithmetic.

544 (3) W. Teaching the Basic Business Subjects. 3 cl. Prereq: 535, senior standing, and 25 cr hrs in Geog, Econ, and Bus Org.
Objectives, methods, classroom procedures, and materials for teaching general or consumer business, business law, economics, business organization, and salesmanship in the high school.

547 (3) Su,A,W,S. The Teaching of Driver Education. 1 2 hr cl, 2 hr lab. Prereq: 535, senior standing, valid driver's license. Graduates of the College of Education who have completed this course will be eligible for certification to teach Driver Training Courses in the secondary schools of Ohio. Mr. Reed
Designed to prepare teachers to organize and conduct driver training classes in the secondary schools, including methods of teaching, scheduling, and other pertinent details.

#550 (3) S. Library Materials for the Secondary Schools. 3 cl. Prereq:
535, Miss Heller
Course is designed to develop ability in the choice of materials for library collection. Criteria, book selection aids, and evaluative study of materials are included.

#551 (2) A. Classifying and Cataloging in the School Library. Prereq:
535, Miss Heller
Introduction to the principles of classifying and cataloging the simpler types of library materials.

552 (5) W.S. Practice Library Work. Arr cl and lab. Prereq: 503, 551
551, Miss Heller
Designed to bring students into touch with actual library conditions through practice work in approved school libraries.

560 (4) W. Letter Press and Offset Printing. 5 2 hr cl and lab. Prereq:
445, Photo 511.
Experience in letter press, photolithography, composition, bookbinding, editing, and publishing a limited edition. Professional considerations include course materials and planning a graphic arts laboratory.

561 (3) A. The Teaching of Industrial Arts I. 4 cl. Prereq: 535 and junior standing. Mr. Towers
A critical study of objectives, methods of presentation, evaluation class and laboratory procedures, and professional problems.

562 (3) W. The Teaching of Industrial Arts II. 3 cl. Prereq: 561 and junior standing. Mr. Towers
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.

563 (3) S. The Teaching of Industrial Arts III. 3 cl. Prereq: 561 and junior standing. Mr. Towers
Problem design and presentation. Planning secondary school courses in drawing and the graphic arts. Methods of student evaluation. Correlation with other subject fields; industrial practice.

575 (3-6) A,W,S. Trade and Industrial Education. Arr cl hrs. Repeatable to a total of 18 cr hrs. Prereq: permission of instructor. For persons now holding or eligible to hold a temporary vocational teaching certificate in a trade and industrial subject.

581 (3-6) Su,A,W,S. Work Experience in Industry. 5 2 hr cl. Prereq: permission of instructor. In no case shall accumulations of cr hrs be in excess of 32 under the head of Ed 506, 586, 581 be permitted. Open only to majors in Indus Arts and Trade and Indus Ed. Staff
A first hand study of the working conditions, methods, and processes of industry and their implication for the teaching of Industrial arts.
555 (4) A,W,S. The Handicrafts. 5 2 hr cl and lab. Repeatable to a total of 12 cr hrs. Mr. Olsen

Described to develop skills and knowledge in the use of the common areas of handicrafts such as leather, ceramics, plastics, wood, and the graphic art.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.


INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

690A Business Education, Miss Wells
690B Adult Education, Mr. Hendrickson
690C Elementary Education, Miss Steglin, Mr. Burr, Mr. Harding, Miss Hock, Mr. Tomlinson, Mr. Ramsey, Miss King, Mr. Wolf, Mr. Taylor
690D Guidance, Mr. Peterson, Mr. Musler, Mr. Brodeel, Mr. Kemp, Mr. Riccio
690E Higher Education, Mr. Anderson, Mr. Kircher, Mr. Andrews
690F History of Education and Comparative Education, Mr. Sutton, Mr. Mahl, Mr. Macia
690G Industrial Arts Education, Mr. Haws, Mr. Towers, Mr. Warner
690H Trade and Industrial Education, Mr. Reese
690I Philosophy of Education, Mr. Kircher
690J Radio and Television Education, Mr. Tyler
690K Secondary Education, Mr. Langefelt, Mr. Mendenhall, Mr. Cypert
690M Educational Administration, Mr. Staub, Mr. Ramsey, Mr. Jensen, Mr. Conrad, Mr. Sessions, Mr. Hack, Mr. Reynolds
690N Teaching of English, Mr. Eberhart, Mr. Zidonis
690O Teaching of Foreign Language, Mr. Allen
690P Teaching of Mathematics, Mr. Fawcett, Mr. Laxr
690Q Teaching of Sciences, Mr. Nash, Mr. Richardson, Mr. Schlessinger
690R Teaching of Social Studies, Mr. Griffin, Mr. Jewett
690S Audio-Visual Materials of Instruction, Mr. Dale, Mr. Woelfel, Miss Williams, Miss Gibboney
690T Exceptional Children, Mrs. Sanderson, Miss Cassidy, Mrs. Crawford, Mr. Ruelman, Mrs. Hunt
690U Speech Education, Miss Sanderson, Mr. Lewis, Mr. Knowler
690V Research Techniques, Mr. Mooney, Mr. Woelfel, Mr. Dale, Mr. Guba, Mr. Mascia
690W Library Science, Miss Keller
690X Distributive Education, Mr. Logan
690Y Curriculum and Supervision: K-12, Mr. Klohr

691 (3) A. Radio and Television in Education. 2 2 hr cl. Prereq: senior standing, Mr. Tyler

The varied types of educational broadcasting in relation to objectives, planning, production, utilization and evaluation.

692 (3) S,A,W,S. Audio-Visual Materials of Instruction. 3 cl hrs. Prereq: senior standing, Mr. Dale, Miss Gibboney, Miss Williams

The contributions 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.

694 (4) S,A,W,S. The Teaching of Secondary School Science, 4 cl. Prereq: 535 and a major or minor in physical or biological science. Not open to students who have had 683-684. Mr. Schlessinger, Mr. Howe

Objectives, problems and procedures, preparing teaching plans, use of demonstrations, experiments, and projects, science curriculum and evaluation, instruments and procedures, tests and reference materials.

695 (3) S,A,S. Problems in the Teaching of Biological Science. 2 2 hr cl. Prereq: 535, 604, Bot 402, Zool 400-401, and junior standing. Recommended for students who expect to teach biological science or general science. Not open to students who have credit for 540. Mr. Schlessinger, Mr. Howe

Use and design of simple apparatus, demonstrations and experiments; collection and preservation of biological materials; the role of the living organism in the classroom.

697 (3) S,A,W,S. Philosophy of Education. 3 cl. Prereq: senior standing.

Mr. Hullihan, Mr. Kircher, and Staff

A study of various philosophies of education and their influences on methods, choice of subject matter, and the administration of the public school.
EDUCATION

612 (3) S. Methods in Speech and Hearing Therapy. 2 2 hr cl. Prereq: concur 516 or 535 or equiv, Speech 683 and 697 or permission of instructor. Miss Sanderson
Organizing speech and hearing therapy programs in schools. State requirements; professional relationships; "Coordination Day" evaluation of progress; observation and child study groups vs individual instruction.

613 (3) W. Behavioral Aspects of Language Disabilities. 2 2 hr cl. Prereq: or concur: 516 or 535, junior standing, Speech 684 and 698 or permission of instructor. Miss Sanderson
Classroom and therapy interrelationships. Consideration of aphasia, voice problems, deafness, and multiple handicaps. The use of records, reports, home visiting, group conferences and essential equipment.

624 (3) Su,A. Social Education. 3 cl. Prereq: 514 or 535 and junior standing or permission of instructor. Mr. Jewett
Analysis of social structures and processes in classroom grouping arrangements; teacher social roles, school traditions, ceremonies, clubs, and athletics.

627 (4) Su,S. The Teaching of Speech in Secondary Schools. 4 cl. Prereq: 535 and Speech 417, 470, 501, 504. Not open to students who have credit for Ed 675. Mr. Lewis
The relationship of speech to the total school program with special emphasis on fundamental processes, forensic activities, and radio speech.

628 (3) Su,A. The Teaching of Dramatics and Oral Interpretation in Secondary Schools. 3 cl. Prereq: 535 and Speech 505, 521, 541, and 545. Not open to students who have credit for Ed 675. Mr. Lewis
The organization and conduct of dramatic classes and extra-dramatic activities; preparation, planning for oral readings, choral speaking, radio-television programming and theatrical productions.

632 (4) Su,A,W,S. The History of Western Education. 4 cl. Prereq: junior standing. Mr. Sutton, Mr. Mehl, Mr. Maccia, and Staff
Development of educational systems in the Western world since ancient times; education in relation to other social institutions; continuity of its evolution.

636 (4) W. Historical Foundations of American Education. 4 cl. Prereq: junior standing. Mr. Mehl
Development of education in the United States since colonial times. Major emphasis on American education since 1880. Including twentieth century developments.

641 (3) Su. History of Practical Arts and Vocational Education. 3 cl. Prereq: junior standing in College of Ed or Agr. Mr. Warner
History of those vocational and non-vocational phases of agriculture, business, industry, and homemaking which concern education.

643 (3) Su,S. Science in Elementary Education. 3 cl. Prereq: 518 or 538 or 3 yrs of teaching experience. Mr. Ramsey
The significance of research for elementary school sciences, the relation of sciences to elementary school curriculum, and the functions of supervisory personnel.

#646] (3) Enriching Curriculum Units Through Use of Library Materials. 3 cl. Prereq: 521 or equiv. Miss Heller
Includes selection, evaluation and study of library materials correlating with units of work in elementary grades or high school.

#647] (3) Reference Work in the School Library. 3 cl. Prereq: 514 or 535. Miss Heller
Includes study of the basic reference materials such as encyclopedias, dictionaries, handbooks, gazetteers, pamphlets and bulletins.

649 (3) Su,A,W,S. Practice in Problems of Public Education. 3 cl. Prereq: 514 or 535 or equiv. Repeatable to a total of 9 cr hrs. Staff
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.
654 (3) Su.A. Mathematics in Elementary Schools. 3 cl. Prereq: 518 or 535, or 3 yrs teaching experience. Not open to students who are pursuing the curriculum for elementary teachers except by special permission of the departmental adviser. Mr. Harding, Mr. Wolf
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.

655 (3) S. Industrial Arts in the Elementary School. 3 cl. Prereq: 440 or 522 or equiv. Mr. Haws
Selection, development and evaluation of typical experience units in both classroom and practical arts laboratory situations at all levels of the elementary school.

656 (3) Su,W,S. Language and Reading in the Elementary School. 3 cl. Prereq: 518 or 536 or 3 yrs teaching experience. Not open to students pursuing the curriculum for elementary teachers except by permission of the departmental adviser. Miss Huck, Miss King
Present trends and research in the teaching of the language arts (reading, handwriting, spelling, oral and written expression).

657 (3) Su,A.W. Social Studies in the Elementary School. 3 cl. Prereq: 518 or 536 or 3 yrs teaching experience. Not open to students who are pursuing the curriculum for elementary teachers except by special permission of the departmental adviser. Mr. Burr, Mr. Tewksbury
The educational values of social studies, reasons for, and ways and means of integrating history, geography, and civics.

659 (4) Su,A.W.S. Teaching Mathematics in Secondary Schools I. 4 cl and 20 hrs participation during the qtr in appropriate secondary school Math classes. Prereq: 535 and 418. Not open to students who have credit for Ed 837. Mr. Fawcett, Mr. Lazar
A study of the concepts and principles of mathematics appropriate for secondary school students, including a consideration of teaching procedures applicable to mathematics.

660 (4) Su,W,S. Teaching Mathematics in Secondary Schools II. 4 cl. Prereq: 535 and 659. Not open to students who have credit for Ed 837. Mr. Lazar, Mr. Trimble
Selected problems in the teaching of mathematics, preparation and evaluation of teaching materials including textbooks, library books, study guides, and multisensory aids.

661 (3) Su.S. Guidance Problems in the Elementary School. 3 cl. Prereq: 514 or 535. Mr. Tomlinson
Selected problems which the elementary teacher faces in providing individual, small-group, and large-group guidance.

663 (3) A. Grammar-Usage Materials for High-School Teachers. 2 cl. Prereq: Engl 418. Recommended for all Engl majors and minors. Open to all prospective high school teachers. Not open to students who have credit for Ed 541. Mr. Zidonis
An intensive study of the major principles of grammar and usage included in the English program and their bearing on the work of the English teacher.

666 (3) Su.A. Introduction to the Education of Mentally Retarded Children. 3 cl. Prereq: Psychol 609, junior standing in Ed or permission of instructor. Mr. Cavin
Study of causal factors, evaluations, learning potential, and general behavior characteristics of the retarded child.

667 (3) Su.A. Programs for Mentally Retarded Children. 3 cl. Prereq: 15 hrs in Psych.
Problems, evaluation, adjustments related to the participation of exceptional children in the regular classroom, grades one through twelve.

669 (3) Su,A.W.S. Literary Material for English and Social Studies. 3 cl. Prereq: 535. Mr. Zidonis
670 (4) Su.A.W.S. Teaching Literature in Secondary Schools. 4 cl. Prereq: 535 or 20 hrs in Engl including Engl 418 and 564 or equiv. Mr. Eberhart, Mr. Zidonis
The objectives of the literature program and techniques for developing appreciation and improving skills in the reading of various types of prose and poetry.

671 (4) Su.A.W.S. Teaching Grammar and Composition in Secondary Schools. 4 cl. Prereq: 535, Engl 418 and 564 or by permission of the instructor. Ed 671 and 670 should be carried prior to student teaching in Engl or Ed 671 or 670 concur with student teaching. Mr. Eberhart, Mr. Zidonis
The role of grammar and linguistics in the English program and techniques for the teaching of oral and written expression in high school.

674 (3) Su.W. The Supervision of Journalism in Secondary Schools. 3 cl. Prereq: 535 or equiv. Not open for graduate credit for Jour majors. Open to students in the College of Education and the Graduate School. Mr. Barton
For journalism teachers in secondary schools and advisors. Covers editorial, advertising, circulation, mechanical production, and publishing phases of school newspapers, magazines, and annuals.

676 (3) Su.S. The Core Program in the Junior High School. 3 cl. Prereq: 535 or equiv. Mr. Cypherd, Mr. Fyrmier
A study of the various types of core programs, their nature, development, organization, and evaluation, with special emphasis upon teaching-learning procedures.

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

678 (4) A.W.S. The Teaching of the Social Studies II. 4 cl. Prereq: 535 and Hist 404 or 423. Mr. Jewett
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.

681 (2-3) Su.A.W.S. Laboratory Practicum for Teachers of Science. 3-2 hr. cl. Prereq: 604 or 684 or equiv and major or minor in Physics, Chem, Physics-Chem, or Comprehensive Science. Maximum 3 cr hrs per qtr; repeatable to 3 qtr hrs. Mr. Schlesinger, Mr. Howe
The preparation, assembly and construction of demonstration and laboratory apparatus and visual aids as related to their use in science teaching.

682 (6-8) Su. Field Laboratory in Conservation Education. Prereq: 514 or 535 or permission of instructor. Full time for first term. Cooperatively staffed by four state universities of Ohio. Mr. Johnson and Staff
Courses on conservation education. Descriptive leaflet available from Departments of Education at Kent, Miami, Ohio, and Ohio State University.

688 (4) W.S. Methods and Techniques of Teaching Romance Languages I. 4 cl. Prereq or concur: 536. Not open to students who have credit for 592h. Mr. Allen
Practice in the use and preparation of teaching materials, tapes, discs, and other types of audio-visual aids.
Section A (W) for French majors and minors.
Section B (8) for Spanish majors and minors.

#689 (3) Su. Field and Laboratory Work for Teachers of Mathematics. 2-3 hr. cl. Prereq: 659 and 669 or equiv, 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.

#690 (3) The Teaching of German. 3 cl. Prereq or concur: 535 and Ger 503 and 15 additional hrs in Ger. Students must have reached the third qtr of their junior year. Mrs. Edie
692 (4) A. Methods and Techniques of Teaching Romance Languages II. 4 cr. Prereq: 536, French 404, 410, 517 or Span 404, 410, 515. Not open to students who have credit for 692a. Mr. Allen
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 (3) S. The Teaching of Latin. Prereq or concur: 535 and Latin 406, 407, and additional 6 cr hrs in Latin. Mr. Tichenor
Values. Teachers' equipment, objectives, and methods. Classroom procedures. Lectures and assigned readings.

695 (3) A. Problems in Teaching and Supervising Trade and Industrial Education for Out-of-School Youth and Adults. 3 cr. Prereq: 575 or equiv and permission of the instructor. For grad credit, teaching or supervising experience reqd. Mr. Reese
Philosophy, facilities, subject matter, instructional methods, teacher education, supervision, coordination; records and reports; types of programs and relationships.

699 (3) S, W. Student Activities in the Secondary School. 3 cr. Prereq: 535 or equiv and junior standing in College of Education. Mr. Laughlin
A study of the student activities programs including home room, assembly, clubs, publications, debating, dramatics, social activities, athletics, administration, and financial control.

704 (2-5) S, S. Laboratory Study of the Ohio State University School. Prereq: 514 or 535 or equiv. Req'd minimum of 12 hrs of observation. Mr. Coon
The philosophy and program of the University School, as revealed through reading, directed observation, and planned conferences with the staff.

#706 (4) The Supervision of School Science Programs. 4 cr. Prereq: 604 or 684 or equiv and teaching or supervisory experience. Mr. Richardson, Mr. Schlessinger
For those concerned with the supervision of teacher training programs in science. Objectives, curricula, recent trends, classroom management, evaluation of teaching, professional literature.

714 (3) S. Selection and Organization of Subject Matter in Industrial Education. 3 cr. Prereq: 536 or equiv. Mr. Towers
Review of resource reports, general and special criterion development, formulation of curriculum guides, and laboratory manuals of instruction.

715 (3) W. Laboratory Planning and Equipment Selection in Industrial Arts. 3 cr. Prereq: junior standing or equiv. Mr. Susz
Principles of industrial arts and technical laboratory planning including equipment selection for all school levels and to meet all curriculum requirements.

717 (3) S. Survey of Vocational Education. 3 cr. Prereq: 535 or equiv. Open to superintendents, secondary school principals, supervisors of Industrial Arts, Vocational Ed, guidance, personnel, and teachers of Industrial Arts and Vocational Ed. Mr. Logan and Staff of the division of Vocational Education of the State Department of Education.
A survey of vocational education, vocational guidance, and industrial arts.

#722 (3) Principles of Business Education. 3 cr. Prereq or concur: 542 or 543 and senior standing. Miss Wells
Meaning, purpose, and scope of the total business education program. The course is designed specifically for business teachers and administrators.

#723 (2) S. Organization and Teaching of Office Practice. Prereq: senior standing and Bus Org 510. Miss Wells
The purpose, content, organization, and materials for an office practice course with practical application in an office practice laboratory.

#724 (3) S. Administration and Supervision of Business Education. 3 cr. Prereq or concur: 542 or 543 and senior standing.
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.
750 (3) Su.A.W.S. Introduction to Guidance Services. 3 cl. Prereq: 514 or 535 and junior standing. Mr. Riccio and Staff
Background and purpose of guidance service, techniques used in analyzing the individual, informational services, counseling service, placement and follow-up developing a guidance program.

757 (3) Su.A. Conceptions of Mind in Educational Theory. 3 cl. Prereq: 607 or equiv.
A study of the doctrines of the mind that have exercised a determining influence upon educational theory and practice.

758 (3) Su.S. The Thinking Process in Its Educational Bearings. 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.

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

760 (3) Su.S. Moral and Religious Ideals in Education. 3 cl. Prereq: 607 or equiv. Mr. Kircher
An inquiry into the role of religion in public education practices, court decisions, and controversial proposals.

761 (3) W. The Use of Certain Concepts of Philosophy and Logic in the Teaching of Mathematics. 3 cl. Prereq or concur: 659 and 660. Mr. Lazar
A study of the role of physical materials and certain concepts of philosophy and logic in the teaching of arithmetic, algebra, and geometry.

762 (4) Su. The Teaching of Algebraic Concepts. 4 cl. Prereq: 619 and 660 or equiv.
The role of algebra in the secondary school, the selection of major concepts, the development of relational thinking and teaching procedures which emphasize mathematical structure.

764 (3-5) A.W.S. Supervised Teaching in Special Classes. Prereq: 515, 517, 518, and 536. Psychol 609 or permission of instructor. Pre-enrollment conference with instructor essential. This course given only upon special request. Staff
Student teaching for qualified students in any area of special education, including the special curriculum in speech and hearing therapy.

766 (3) W. Education of the Emotionally and Socially Maladjusted. 3 cl. Prereq: Psychol 609. Mr. Smith
A critical study of principles and methods in the adjustment of behavior problem children.

770 (3) Su.A.W. Adult Education. 3 cl. Prereq: senior standing, for Ed majors, 514 or 535. Mr. Hendrickson
The nature, extent, and significance of Adult Education; psychological characteristics of the adult; history and types of adult education; present trends and future developments.

771 (3) Su.W. Parent Education. 3 cl. Prereq: senior standing, for Ed majors, 514 or 535. Mr. Hendrickson
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.

772 (3) Su.S. Preparation of Handicapped Children, for Post-School Adjustment. 3 cl. Prereq: 667 or equiv. Mrs. Hunt
Study of the roles of education, guidance, work experiences, placement, and follow-up service in helping handicapped children adjust to employment, family, and community life.

773 (3) Su.W. Practicum in Educational Planning for Mentally Retarded Children. 3 cl. Prereq: 666 or equiv and senior or graduate standing. Miss Hombrook, Mr. Cavin
A study of the underlying social and economic factors in program planning for the mentally retarded from kindergarten through secondary school levels.
775 (3) A. The History of Educational Thought: Ancient and Medieval. 3 cr. Prereq: 632 or 636. Not open to students who have credit for 635. Mr. Mehl
Study and analysis of the major educational theories of the ancient and medieval periods including the educational writings of Plato, Aristotle, and St. Augustine.

776 (3) Su. S. The History of Educational Thought: Modern. 3 cr. Prereq: 632 or 636. Not open to students who have credit for 635. Mr. Mehl
Study of the major educational theories since 1600 including Montaigne, Milton, Locke, and Rousseau and their influence on contemporary educational theory and practice.

777 (3) A. Comparative Education I: Europe and the English-Speaking Countries. 3 cr. Prereq: 632 or 636. Not open to students who have credit for 635. Mr. Sutton
Social and cultural factors influencing the differential development of educational institutions and organization in the countries whose universal school systems are several generations old.

778 (3) Su. W. Comparative Education II: Asia, Africa, Latin America. 3 cr. Prereq: 632 or 636. Mr. Sutton
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.

780 (3) Su. W. Methods of Teaching Distributive Education. 3 cr. Prereq: 555. Mr. Logan
The organization and preparation of teaching plans for distributive education classes; analysis of current on-the-job training methods in business establishments.

#781 (3) Curriculum Content for Distributive Occupational Subjects. 3 cr. Prereq: 780. Mr. Logan
Securing, evaluating, and organizing instructional material and experiences for distributive cooperative education and adult extension courses.

782 (3) Su. W. Organization and Administration of Education for the Distributive Occupations. 3 cr. Prereq: 555. Mr. Logan
A practical study of the development and operation of a distributive education program.

Nurs 796 (4) Methods of Teaching Nursing. (See Nursing)

799 (4-8) Su. On-Campus Education Workshops. Prereq: 514 or 535 or equiv teaching experience, junior standing, and recommendations of the committee on workshops. No other courses may be taken concur with this full-time course.
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.
4 cr hrs for 3 week workshops.
8 cr hrs for 6 week workshops.

INCLUD LETTER WITH NUMBER ON SCHEDULE CARD

[799C] (4) Elementary Education Workshop: Reading.
[799D] (4) Su (July 22-August 9). Elementary Education Workshop: Science. Mr. Ramsey
[799F] (4) Su (July 22-August 12). Workshop in Junior High School Education. Mr. Orphert
[799M] (4) Su (July 22-August 12). Appraising and Developing Teaching Performance. Mr. Staub
[799P] (4) Slow Learning Adolescents.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.
703 (3) Su,A,W. The Role of the Secondary School in the Social Order. 3 cl. Prereq: 518 or 536 or equiv. Mr. Frynier
An orientation course for teachers and administrators which deals with the basic purposes of secondary education in relation to major issues and current trends.

705 (3) Su,S. Trends in the Organization of Secondary Education. 3 cl. Prereq: 518 or 536 or equiv. Mr. Laughlin
Historical background and present status of American secondary education, district organization, vertical and horizontal organization, state and federal control.

707 (3) Su,A,S. The Evolving Secondary School Curriculum. 3 cl. Prereq: 518 or 536 or equiv. Mr. Mendenhall, Mr. Cyphert.
A basic course for teachers and administrators which deals with current theories of, and practices in curriculum development and organization in the secondary schools.

708 (3) Su,W. Evaluation in Secondary Schools. 3 cl. Prereq: 518 or 536 or equiv. Mr. Mendenhall
Study of techniques of evaluation in secondary schools. Attention is given to current evaluation practices with emphasis on procedures appropriate to Ohio schools.

709 (3) Su,A,S. Administration of the Secondary School. 3 cl. Prereq: 727 or equiv. Mr. Laughlin
Major problems and issues in the organization and administration of the secondary school.

710 (3) Su,A,W,S. Introduction to Educational Research. 3 cl. Prereq: 518 or 536 or equiv. Intended primarily for graduate students beginning work on the Master's degree. Not open to students who have had Ed 802. Mr. Macias
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 (3) S. History of the Universities. 3 cl. Mr. Sutton
The university as an institution through ten centuries; patterns of development in different countries; German, English, American contributions to the idea of the American university.

712 (3) Su,W. Science in the School Curriculum. 3 cl. Prereq: 706 or equiv. Mr. Richardson, Mr. Schlessinger
Foundations for science curriculum, current developments, planning and evaluation procedures, research.

725 (3) Su. Improvement of Instruction in Basic Business Subjects. 3 cl. Prereq: 543 or equiv. Miss Wells
A study of objectives, methods, and materials for courses such as general business and business law. Development of units of work.

726 (2) Su. Improvement of Instruction in Bookkeeping and Related Subjects. Prereq: 543 or equiv.
Evaluation of the content and methods of teaching bookkeeping, accounting, and business arithmetic. Improvements in materials, texts, standards, and teaching procedures are considered.

727 (3) Su,A,W,S. Introduction to School Administration. 3 cl. Prereq: 518 or 536 or equiv or permission of instructor. Reqd of graduate students preparing for school executive positions. Mr. Ramseyer, Mr. Staub, Mr. Larm.
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.

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

747 (3) Su,A. Foundations of Elementary Education. 3 cl. Not open to students who have credit for Ed 652. Miss Streitz, Miss Huck
Utilization of research in the basic sciences in developing background and understanding of present trend in elementary education. Critical examination of current theories.
748 (3) Su,W. The Changing American Elementary School. 3 cl. Prereq: 518 or 536 or teaching experience. Not open to students who have credit for Ed 652. Mr. Burr, Miss King, Mr. Wolf
Involves investigation of objectives, issues, and curriculum organization of the modern elementary school program.

749 (3) Su,S. Evaluation in Elementary Schools. 3 cl. Prereq: 518 or 536 or teaching experience. Not open to students who have credit for Ed 652. Mr. Harding
Appraisal of materials and methods in terms of educational aims and research findings.
Consideration of instruments and procedures for comparing achievements with established objectives.

752 (3) Su,A,WS. Group Processes in Guidance. 3 cl. Prereq: 750 or equiv. Mr. Kemp
Experience in the use of group procedures in guidance. Theories, issues, and trends in group procedures.

753 (3) Su,S. School Problems in Child Development. 3 cl. Miss Streitz
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 (3) Su,W. Organization and Administration of Guidance Services. 3 cl. Prereq: 750 or equiv. Mr. Riccio
The selection, organization, and presentation of Guidance Material. Analysis of types of organization, methods of initiating a program, and types of in-service programs.

755 (3) Su,A,WS. Guidance Appraisal Techniques. 3 cl. Prereq: 750 and Psychol 608 or equiv. Mr. Kemp and Staff
Basic concepts and techniques in guidance work in the appraisal of the individual.

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

768 (3) Su,A,WS. Directing Student Teaching. 3 cl. Prereq: teaching certificate and teaching experience. Mr. Andrews
Principles and techniques for public school teachers and college instructors in supervising student teaching and other professional laboratory experience in teacher education.

774 (3) W. Discussion Methods in Adult Education. 3 cl. Prereq: permission of instructor. Mr. Hendrickson
The round table, forum, panel, symposium, and other forms of discussion as applied to adult groups; laboratory practice; clinical analysis of individual difficulties.

800 (2-3) Su,A,WS. Seminars in Education.
These seminars will consider research problems in the several fields of education represented, in terms of the special interests of the students.

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

800A Su. Business Education, Miss Wells
800B A. Adult Education, Mr. Hendrickson
800C Su,W. Elementary Education, Mr. Burr, Mr. Tomlinson, Mr. Harding, Miss Hock
800D Su,A,WS. Guidance, Mr. Peters, Mr. Kemp, Mr. Riccio
800E Su,A,WS. Higher Education, Mr. Anderson
800F Su,A,WS. History of Education and Comparative Education, Mr. Sutton
800G Su,A,WS. Education as a Means of Maintaining National Identity, Mr. Sutton
800H W. Historical Method in Educational Research, Mr. Mahl
800I A. History of American Education. For international students only, Mr. Sutton
800J A,WS. Educational Administration, Mr. Ransome, Mr. Staub, Mr. Hack
800K Su,A,WS. Secondary Education, Mr. Mendenhall, Mr. Laughlin
800L Su,A,WS. Religious Education, Mr. Eberhart
800M Su,A,WS. Teaching of English, Mr. Eberhart
800N
800S  S.  Teaching of Foreign Languages. Mr. Allen
800P  Sn,A,W,S.  Teaching of Mathematics. Mr. Fawcett, Mr. Lazar
800Q  Sn,A,W,S.  Teaching of Sciences. Mr. Richardson
800R  Sn,A,W,S.  Teaching of Social Studies. Mr. Griffin, Mr. Jewett
800S  W.  Audio-Visual Education. Mr. Dale
800T  Sn.  Exceptional Children. Miss Cassidy
800U  Sn,A,W,S.  Speech.
    NL,A,W, Dramatics in Elementary and Junior High School. Mr. Lewis
    Su. History of Speech Education. Mr. Brooks
    Su. Business and Industrial Communication. Mr. Knoer
    A. The Service Course Program. Mr. Knoer
    W. The Teaching of Oral Interpretation. Mr. Brooks
    S. Educational Communication. Mr. Knoer
    A. Secondary School Program in Speech. Mr. Lewis
800V  W,S.  Research Techniques. Mr. Guha
800X  Sn,A,S.  Distributive Education. Mr. Logan
800Y  A,W,S.  Curriculum and Supervision: K-12. Mr. Kohr

Students with permission of advisers may register for more than one section of 800 or for the same section 2 or more times.

802 (3)  Sn,W.  Research Methods. 3 cl. Prereq: 710 or equiv and master’s degree. Mr. Ramsayer

Problem selection, data analysis, organisational and writing problems involved in their preparation also are considered.

#804 (2-5)  S.  Educational Experimentation. 1 2 hr lab each week with weekly conf in proportion to cr hrs taken. Prereq: 710 or equiv and 15 cr hrs of grad work in Ed. Repeatable to a total of 5 cr hrs. Miss King

Analysis of contributions of selected experiments to elementary, secondary, and higher education. Design of experimental method for attacking educational problems.

809 (3)  Sn,S.  Social Philosophies and Their Educational Bearings. 3 cl. Prereq: 607. Mr. Jewett

A study of social philosophies in terms of their significance for educational procedures and programs.

#810 (3)  Sn,S.  The Educational Philosophy of John Dewey. 3 cl. Prereq: 758 or equiv or permission of instructor.

A systematic study of the writings of John Dewey in their bearing upon educational theory and practice.

812 (2)  S.  Seminar in Methods of College Teaching in the Sciences Basic to the Health Professions. 2 cl. Mr. Anderson

Major problems of teaching in the health sciences in higher education. Principles, techniques, visual aids, motivation and evaluation. Individual plans in areas of specialization.

815 (3)  A.  Organization and Administration of Industrial Education. 3 cl. Prereq: 856. Not open to students who have credit for 716. Mr. Warner

International and historic background curriculum resources and development, physical organisation, administrative organisation, supervisory operation, and professional policies.


A study of techniques involved in utilizing case-study methodology.

818 (3)  Sn,A,W,S.  Practicum in School Guidance Work. 2 2 hr cl, 2 to 4 hr lab. Prereq: 752, 755, 756, Psychol 821 and permission of instructor. Repeatable to a total of 9 cr hrs. Not open to students who have credit for E.S. 751. Staff

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.

823 (3)  Sn,S.  Legal Aspects of School Administration. 3 cl. Prereq: 727 or equiv. Not open to students who have credit for 742. Mr. Larmee

A study of statutory and case law, legal principles and provisions as related to educational administration district, personal, finance, curriculum, contracts, property, liability and organization.
824 (3) Su.W. The Elementary School Curriculum. 3 cl. Prereq: 747 and teaching experience. Mr. Tomlinson
Reorganization, construction and administration of the elementary school curriculum in the light of modern educational principles and objectives, research data, and the best current practices.

825 (3) Su.A. The Elementary School Principalship. 3 cl. Prereq: 727. Mr. Burr
Emphasis is given to the elementary-school principal's role in providing leadership in policy making, personnel matters, public relations, research and business management.

826 (3) Su.S. Supervision in Elementary Schools. 3 cl. Prereq: 825 or equiv. Mr. Burr
An analysis of the problems and practices involved in the in-service education and improvement of teachers.

829 (3) Su.A.S. Supervision in Secondary School. 3 cl. Prereq: 703 or 705 or 707, Mr. Mendenhall
Problems involved in the in-service education programs, improvement of instruction, teacher's participation in policy and program-making and utilization of consultant service.

831 (3) A. Laboratory in Curriculum Development in Secondary Schools. 3 cl. Prereq: 707 or equiv. Mr. Mendenhall
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.

832 (2) Su.W. The Community Junior College. 3 cl. Mr. Laughlin
Origin and development of the community college, including an evaluation of general, college-parallel, terminal, and adult education programs in public and private institutions.

835 (3) Su.A.W.S. Advanced Studies in Education. Prereq: permission of instructor. Open only to grad students pursuing the Master of Education Program.

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

Course designed to enable candidates pursuing the Master of Education degree to demonstrate ability to attack and deal with problems independently.

835A Business Education. Miss Wells
835B Adult Education. Mr. Hendrickson
835C Elementary Education. Mr. Burr, Mr. Harding, Miss Huck, Mr. Tomlinson, Miss King
835D Guidance. Mr. Peters, Mr. Kemp, Mr. Riecco
835E Higher Education. Mr. Anderson, Mr. Kircher
835F History of Education and Comparative Education. Mr. Sutton, Mr. Mehl, Mr. Maccia
835G Industrial Arts Education. Mr. Hawes
835H Trade and Industrial Education. Mr. Reese
835I Philosophy of Education. Mr. Kircher
835J Radio and Television Education. Mr. Tyler
835K Secondary Education. Mr. Mendenhall, Mr. Laughlin, Mr. Cyphert, Mr. Frymier
835M Education Administration. Mr. Jensen, Mr. Staub, Mr. Ramseyer, Mr. Conrad, Mr. Wohlers, Mr. Benson, Mr. Hack, Mr. Larmee
835N Teaching of English. Mr. Eberhart
835O Teaching of Foreign Language. Mr. Allen
835P Teaching of Mathematics. Mr. Fawcett, Mr. Lazar
835Q Teaching of Science. Mr. Richardson
835R Teaching of Social Studies. Mr. Griffin, Mr. Jewett
835S Audio-Visual Materials of Instruction. Mr. Dale
835T Exceptional Children. Miss Sanders, Miss Cassidy
835U Speech. Miss Sanders, Mr. Knowler, Mr. Lewis
835V Research Techniques. Mr. Dale, Mr. Mooney, Mr. Guba
835X Distributive Education. Mr. Logan

836 (4) A. 837 (4) W. 838 (4) S. Practicum in Educational Administration. 1 cl plus lab to be arr. Prereq: Master's degree, 727, each Qtr's work is prerq to the next, two yrs teaching experience or equiv and permission of the instructor. Mr. Ramseyer, Mr. Staub, Mr. Hack, Mr. Larmee
A study of the literature and methods of school surveys, as a basis for the investigation of practical problems in school administration and supervision.

840 (4) S. The Teaching of Geometric Concepts. 5 cl. Prereq: 655 or 660 or equiv. Mr. Fawcett
The role of demonstrative geometry, two and three-dimensional concepts, the nature of proof and teaching procedures which emphasize both deductive and algebraic methods.
841 (3) W. Guiding Learning Activities in the Secondary School. 3 cl. 
Prereq: 703, 705, and 707. Mr. Mendenhall
An advanced course dealing with basic principles and generalized techniques involved in 
developing, organizing, and evaluating learning activities.

844 (2-3) W. Administrative Problems of the High School Principal. 3 cl. 
Prereq: 708 or equiv. Mr. Laughlin
An advanced course dealing with selected problems in the administration of secondary 
schools.

845 (5) S. Higher Education. 2 2 hr cl. Mr. Anderson
Problems in higher education, particularly as these relate to theory, history, organization, 
administration, and student personnel.

848 (5) Su.W. Theories and Curricula of Higher Education. 2 2 hr cl. 1 
hr arr. Mr. Kircher
A study of current theories of general education and of representative and experimental 
college programs in the United States.

849 (3) S. Organization of Programs for Exceptional Children. 3 cl. Prereq: 667 and 727, Psychol 609, Miss Cassidy
Planning and financing of educational programs for children who are gifted, mentally 
deficient, blind, partially seeing, deaf, hard of hearing, emotionally disturbed, or who have 
learning problems or other handicaps.

850 (5) Su.A. Teacher Training. 2 2 hr cl. Mr. Anderson
History, organization, administration, curriculum and method, student personnel (including 
measurement) peculiar to teacher training institutions.

851 (4) Su. Science Education in Higher Education. Prereq: 604 or 614 or 
equiv and 706 or 712 or equiv. 
Courses and curricula for teacher preparation programs in science, directing student teaching, off-campus co-operative arrangements, provision for equipment and evaluation.

853 (3) Su.A. School Community Relations. 3 cl. Prereq: 727 or equiv. 
Mr. Staub, Mr. Ramseyer
Principles and practices in developing and maintaining appropriate school community relationships; professional vs. lay roles; institutional relationships; opinion analysis, communication processes; and decision-making patterns.

856 (3-5) Su. Practicum in Industrial Education. 3 cl. Prereq: 550. 
Mr. Warner
Derivation of doctrine, formulation and evaluation of basic programs, curriculum development, organizational implementation, leadership problems, and professional progress, both here and abroad.

859 (3) S. Comparative Philosophy of Education. 3 cl. Prereq: 758 or 765 or equiv. Mr. Kircher
A study of alternative philosophies of education and the speculative development of their implications for educational practice.

866 (3) S. Research in the Laboratory of Industries. 3 cl. Prereq: 754 and 715 or 716, and teaching experience in Indust Arts or Vocational Indus. Ed and permission of instructor. Mr. Ray
Individual or group studies on a conference and laboratory basis, with the policeman of either a professional or technical bulletin as a goal.

870 (3) A. Administrative Problems of Beginning Superintendents. 1 cl. 
Prereq: 727 or equiv. Mr. Hack
Emphasis on such problems as school-community relations, finance, school facilities, staff 
personnel, pupil personnel, instruction, and organization.

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

872 (3) Su.S. Administration of Pupil Personnel. 3 cl. Prereq: 777 or 
equiv. Mr. Staub
Organizational and administrative problems in pupil personnel areas are analyzed. Emphasis of the program, policy development, and staffing relationships also are considered.
EDUCATION 107

873 (3) Su,A. Staff Personnel Administration. 3 cl. Prereq: 727 or equiv.
Mr. Larmee
A study of problems of personnel administration in school districts—recruitment, orientation, appraisal, in-service training, promotion, certification, dismissal, personnel policies, salary provisions, and welfare.

875 (3) Su,A.S. School Finance. 3 cl. Prereq: 727 or equiv. Mr. Hack
General school finance problems; finance and organization; sources of school support; variations in financial ability and effort; state-local finance plans; Federal role.

876 (3) Su,W. Business Administration of Schools. 3 cl. Prereq: 727 or equiv. Mr. Hack, Mr. Larmee
Function of business administration in schools; administrative relationships; personnel; budget making; procuring revenue, financial outlay and accounting; managing plant, facilities, and supplies; payroll, transportation.

880 (3) Su,W. School Plant Planning. 1 2 hr cl and 1 hr (arr). Prereq: 727 or equiv. Mr. Larmee
Problems and techniques in determining school building needs, evaluating school building, planning new construction or remodeling, utilizing specialized personnel; related legal and financial aspects.

#886 (3) Planning Community Adult Education Programs. 3 cl. Prereq: 770 and permission of instructor. Mr. Hendrickson
A study of the community agencies with adult education programs; how new programs may be developed in terms of needs which are not being met.

899 (1-5) W. Interdepartmental Seminar. Mr. Ramseayer
(See under Interdepartmental Seminars)

950 (arr) Su,A,W,S. Research in Education.
Research for thesis or dissertation purposes only.

ELECTRICAL ENGINEERING
Office, 105 Caldwell Laboratory

PROFESSORS BRESEE, AYRES, BOONE, COSGRIFF, W. C. DAVIS, KIMBERLY (EMERITUS), KOUYOMJIAN, KRAUS, MATHEWS, RICHMOND, TAL, THURSTON, WARE, WEED, AND WEIMZER, VISITING PROFESSOR KAWANO, ASSOCIATE PROFESSORS CHANG, CORNETT, COWAN, HOGG, HSU, KO, LEVY, MENON, SMITH, AND WALTER, ASSISTANT PROFESSORS BACON, BATTOCLETTI, D. T. DAVIS, GILFERT, JOSIENANS, KENNAUGH, LACKEY, NASH, PEAKE, PETERS, AND THOMAS, INSTRUCTORS BAKUMLER, BARRICK, CAMPBELL, EHRMAN, FENTON, GEORGE, GERTON, GREEN, HAWKINS, SEEGRER, AND SWARTZ

FOR UNDERGRADUATES

504 (1) A. Professional Aspects of Electrical Engineering. 1 cl. Mr. Ayres
Lectures on employment problems of graduating seniors, professional aspects of engineering and professional societies and ethics. Discussion of employment practices.

625 (5) A. Experience in Practice. Ten weeks of industrial experience following the 9th qtr. or 1 yr of acceptable industrial experience before the end of the 6th yr. Mr. Ayres
Students must register with and obtain complete information and forms from the course supervisor prior to undertaking the ten weeks industrial work for credit.

642 (4) A,W,S. Electrical Engineering. 3 cl, 3 hr lab. Prereq: Physics 533, Math 543. For students not majoring in Elec E or Eng Physics. Mr. Cowan, Mr. Weed
Introduction to circuit analysis; circuit analysis concepts and their extension to mechanical and thermal systems by analogy. Electrical Instruments and measurements.

643 (4) A,W,S. Electrical Engineering. 3 cl, 3 hr lab. Prereq: 642 or equiv. For students not majoring in Elec E or Eng Physics. Mr. Cowan
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.
644 (4) A.W.S. Electron Devices and Controls. 3 cl, 3 hr lab. Prereq: 642. Mr. Weed
Theory and applications of semiconductors, transistors; photoelectric, vacuum and gas-filled tubes. Study of control circuits, feedback, amplifiers, oscillators, filters, magnetic amplifiers and instrumentation.

662 (2) A.W. Electrical Laboratory I. 1 cl, 1 3 hr lab, concur: 612 and 617
Prereq: Math 543 and Physics 533. Mr. Gilfert
Theory and range of application of electrical instruments; measurement of resistance, inductance, capacitance, and impedance at audio frequencies; field plotting for two-dimensional static fields.

663 (2) W.S. Electrical Laboratory II. 1 cl, 1 3 hr lab. Prereq: 662, concur 613. Mr. Gilfert
A laboratory study of electric circuits including resonant circuits, currents and voltage; coupled circuits, polyphase circuits and power measurements, network theorems and circuit transients.

664 (2) A.S. Electrical Laboratory III. 1 cl, 1 3 hr lab. Prereq: 663, concur 614 and 619. Mr. Peters
Transmission line parameters; attenuation, magnitude and phase of voltage and current; lines; reflected waves; wave guide characteristics and techniques; antenna patterns and impedances.

665 (2) A.W. Electrical Laboratory IV. 1 cl, 1 3 hr lab. Prereq: 663, concur 615 and 626. Mr. Campbell
Determination of terminal characteristics of vacuum, gaseous, and solid state electron devices; non-sinusoidal wave form frequency analysis; power supplies, three-phase rectifiers, single-stage amplifiers.

666 (2) W.S. Electrical Laboratory V. 1 cl, 1 3 hr lab. Prereq: 665 and 650, concur 627. Mr. W. C. Davis, Mr. Smith
Tube and transistor multistage amplifiers and broadbending; audio frequency power amplifiers; characteristics and equivalent circuits of lateral motion and saturable core devices; transformers.

667 (2) A.S. Electrical Laboratory VI. 1 cl, 1 3 hr lab. Prereq: 666, concur 628. Mr. Erdman
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.

668 (2) A.W. Electrical Laboratory VII. 1 cl, 1 3 hr lab. Prereq: 652 and 666. Mr. Smith
Study of the generalized machine, including selected transient and steady-state performance of DC, synchronous, induction and generalized two-phase machines.

669 (2) W.S. Electrical Laboratory VIII. 1 cl, 1 3 hr lab. Prereq: 668 and 716, Mr. Bacon
Laboratory study of feedback amplifiers, control systems and their components, operational amplifiers, and analog computers.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

612 (3 or 4) A.W. Circuit Theory I. 3 cl or 4 cl. Prereq: Math 543, Physics 533, concur 617, and Math 608. Not open for graduate credit for 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 (3 or 4) W.S. Circuit Theory II. 3 cl or 4 cl. Prereq: 612. Not open for graduate credit for students majoring in Elec E.
Network theorems and network equivalence, magnetically coupled circuits, polyphase circuits and Fourier Series and Integral with circuit applications.

614 (4) A.S. Circuit Theory III. 4 cl. Prereq: 613. Not open for graduate credit for students majoring in Elec E.
LaPlace transform analysis, zero-pole structure of network impedance functions, Foster's reactance theorem, synthesis of simple networks.
615 (4) A.W. Circuit Theory IV. 4 cl. Prereq: 614, concur 626, Math 624. Not open for graduate credit for students majoring in Elec E.


617 (3 or 4) A.W. Field Theory I. 3 or 4 cl. Prereq: Physics 533, Math 543, concur 612. Not open for graduate credit for 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 (3 or 4) W.S. Field Theory II. 3 or 4 cl. Prereq: 617, concur Math 609. Not open for graduate credit for 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 (3 or 4) A.S. Transmission and Radiation. 3 or 4 cl. Prereq: 618, Math 609. Not open for graduate credit for students majoring in Elec E.

General transmission theory: infinite line; terminated line; impedance transformation; rectangular wave guides; group and phase velocity; impedance of wave guides; simple antenna systems.

626 (3 or 4) A.W. Electron Device Circuit Theory I. 3 or 4 cl. Prereq: 614 and 617 or equiv. Not open for graduate credit for 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 (3 or 4) W.S. Electron Device Circuit Theory II. 3 or 4 cl. Prereq: 615 and 626. Not open for graduate credit for 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.

628 (4) A.S. Electron Device Circuit Theory III. 4 cl. Prereq: 627, concur 768. Not open for graduate credit for students majoring in Elec E.


650 (4) A.W. Electrical Energy Conversion I. 4 cl. Prereq: 614 and 618. Not open for graduate credit for students majoring in Elec E.

Properties and theory of magnetic circuits as applied to electro-mechanical energy conversion. Transformers, non-linear magnetic devices. Introduction to rotating machine analysis.

651 (4) W.S. Electrical Energy Conversion II. 4 cl. Prereq: 650. Not open for graduate credit for students majoring in Elec E.

Nature of characteristics. DC machines—steady and transient states. Thermal transients.

652 (4) A.S. Electrical Energy Conversion III. 4 cl. Prereq: 650. Not open for graduate credit for students majoring in Elec E.


707 (3) A. Advanced Circuits. 3 cl. Prereq: 627. Mr. W. C. Davis

Introduction to network synthesis.

716 (3 or 4) A.W. Circuit Theory V. 3 or 4 cl. Prereq: 618 and 628, 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 (3) W. Radiation from Antennas. 3 cl. Prereq: 519, concur 719. Mr. Kraus

Dipoles, loop, aperture, reflector, lens, surface wave and other antennas. Array theory, Radiation resistance, directivity and input impedance.
719 (1) W. Antenna Laboratory. 1 3 hr lab. Prereq: 664, concur 718. Mr.
Kraus
Measurements and interpretation of antenna field patterns, impedances, gains, and current distribution.

723 (2) S. Digital Computer Laboratory. 1 cl, 1 3 hr lab. Concur 742. Mr.
Cosgriff
Laboratory study of counting, arithmetic and digital circuits.

724 (1) A. Microwave Circuits Laboratory. 1 3 hr lab. Prereq: 619 and
664, concur 736 or permission of the instructor. Mr. D. T. Davis
Measurement of field and power distribution in waveguides. Impedances, components and
microwave generator properties.

725 (2) W. Control Systems Laboratory I. 1 cl, 1 3 hr lab. Concur 728 or
733. Mr. Weed, Mr. Welmer
Experiments chosen by student interest from the course content of open cycle control
and instrumentation and feedback control systems.

728 (3) W. Open Cycle Control and Instrumentation. 3 cl. Prereq: 651 and
concur 716, or 645 and 644 with permission of the instructor. Mr. Weed
Industrial electronic control and instrumentation using semiconductor, vacuum and gas-tube
electron devices; timing, pulse counting circuits; trigger methods; programmed sequence con-
trol; radio frequency heating; x-ray.

731 (3) S. Magnetic Amplifiers. 3 cl. Prereq: 652, 716 or 643 and 644 with
permission of the instructor. Mr. Weed
Theory and transient analysis of self-saturating magnetic amplifiers, system control and
regulation, memory methods.

733 (3) W. Feedback Control Systems. 3 cl. Prereq: 716 and either 632
or 643 with permission of instructor, Math 608 or 611. Mr. Welmer
Application of feedback principles to control systems; performance criteria; compensator
carrier systems, multi-variable systems.

734 (2) S. Control Systems Laboratory II. 1 cl 1 3 hr lab. Concur 731 or
738; 734 may be taken without 725. Mr. Weinberg, Mr. Weed
Experiments chosen by student interest from the course content of advanced control sys-
tems and magnetic amplifiers.

738 (3) S. Advanced Control Systems. 3 cl. Prereq: 733. Mr. Weed
Practical control systems with non-ideal components; non-linear systems.

739 (3) A. Microwave Circuits. 3 cl. Prereq: 619, concur 724 or permission
of instructor. Mr. D. T. Davis
Advanced waveguides, waveguide devices, amplifiers, generators and detection devices
special microwave techniques.

740 (3) A.W. Logic Circuit Theory. 3 cl. Prereq: 628 or 644 with permis-
sion of instructor. Mr. Cosgriff, Mr. Lackey
Synthesis of switching circuits using Boolean Algebra, coding, sequential switching circuits,

741 (4) W.S. Economics and Organization of the Electrical Industry. 4 cl.
Prereq: 614 or 643. Not open for graduate credit for students majoring in
Elec E. Mr. Ayres
Principles of engineering economy and financial analysis applied to electrical in-
dustry: its principal divisions; power supply, communications manufacturing and merchanti-

742 (3) S. Theory and Design of Digital Computers. 3 cl. Prereq: 740
Mr. Cosgriff
Number systems, introduction to computer programming, design of arithmetic units, stor-
er, and digital control systems, use of redundant codes and redundant equipment.

743 (3) W. Communication Theory. 3 cl. Prereq: 650. Mr. W. C. Davis
Theory of communication, information content, frequency spectra, noise, methods of modu-
lation, modulators, and demodulators.

744 (2) W. Communications Laboratory I. 1 cl, 1 3 hr lab. Prereq: 528
and 667. Mr. D. T. Davis, Mr. Gilfert
Theory and laboratory study of non-linear amplifiers and oscillators, modulators and
detectors.
746 (3) S. Space Communications. 3 cl. Prereq: 743. Mr. D. T. Davis, Mr. Peake
A study of space communication systems. Long-distance transmission, wave propagation, and system considerations.

747 (3) S. Communications Systems. 3 cl. Prereq: 743. Mr. W. C. Davis
A study of the synthesis of amplitude and frequency modulated communication systems, with emphasis on transmitters and receivers.

748 (2) S. Communications Laboratory II. 1 cl. 1 3 hr lab. Prereq: 744.
Mr. D. T. Davis, Mr. Gilfert
Laboratory study of communication systems.

756 (3) W. Elements of Radio Wave Propagation. 3 cl. Prereq: 619. Mr. Levis
Practical calculations and procedures for predicting refraction and reflection by a plane or spherical earth. Tropospheric, ionospheric, and scatter propagation.

760 (arr) A. 761 (arr) W. 762 (arr) Su,S. Advanced Theoretical Study in Electrical Engineering. Prereq: permission of instructor. All instructors

763 (3) W.S. Circuit Theory of Solid State Devices. 3 cl. Prereq: 628 and 769 or equiv. Mr. Boone, Mr. Thurston
Advanced circuit theory of solid state devices.

764 (2) W. Solid State Device Laboratory. 1 cl. 1 3 hr lab. Prereq: 667, concur 763. Mr. Boone, Mr. Thurston
Laboratory study of solid state devices and materials.

765 (arr) A. 766 (arr) W. 767 (arr) Su,S. Special Advanced Laboratory. Prereq: a beginning course in Elec E and permission of instructor. All instructors

768 (3 or 4) Su,A,S. Electron Device Physical Theory I. 3 or 4 cl. Prereq: 619 and 627, Physics 610 and 614 and Eng Mech 617, concur 628.
Vacuum electron devices; potential distribution; device current analysis; vacuum device circuit parameters; electron and ion motion in vacuum devices; microwave tubes; gaseous conductors.

769 (3 or 4) A,W. Electron Device Physical Theory II. 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; parametric amplifiers; masers.

The study of the theory and application of small motors. Methods of analyzing the performance of single-phase motors.

777 (4) S. Theory of Alternating Current Machines. 4 cl. Prereq: 652 or permission of instructor.
Theory and equivalent circuit of alternating current equipment, such as generalized machine, servomotor, amplidyne, etc.; energy-conversion aspects; transient and steady-state analysis.

778 (2) S. Laboratory Study of Alternating Current Machines. 1 cl, 1 3 hr lab. Concur 777. Mr. Smith
Laboratory study of alternating current equipment, including selected transient and steady-state performances.

781 (3) S. Advanced Electronic Circuits. 3 cl. Prereq: 628. Mr. W. C. Davis
Integrating and differentiating circuits; counting circuits; timing circuits; pulse circuits; wave-forming and wave-shaping circuits.

782 (2) S. Advanced Electronic Circuits Laboratory. 1 cl, 1 3 hr lab. Prereq: 628 and 667, concur 781. Mr. W. C. Davis
Laboratory study of integrating and differentiating circuits; counting circuits; timing circuits; pulse circuits; wave-forming and wave-shaping circuits.
784 (3) A. Radio Astronomy Instrumentation. 3 cl. Prereq: 615, 619 and 627, or Physics 612 and 713, or permission of instructor. (Given in cooperation with Department of Astronomy) Mr. Kraus, Mr. Ko
Theory and design of radio telescope antennas and receivers for radio astronomy and space research.

790 (3) A. Introduction to Electric Power Systems. 3 cl. Prereq: 619 and 652. Mr. Ayres, Mr. Smith
System stability and related calculations of transmission line and apparatus constants.

791 (2) W. High Voltage Laboratory. 1 cl, 1 3 hr lab. Prereq: 619 and 652. Mr. Ayres, Mr. Smith
A laboratory study of high voltage insulation.

792 (3) W. Electric Power Networks. 3 cl. Prereq: 619 and 652. Mr. Ayres, Mr. Smith
Fault calculations, network analysis, relaying studies, and traveling wave analysis applied to electric power system problems.

793 (2) S. Power Systems Laboratory. 1 cl, 1 3 hr lab. Prereq: 688, 792. Mr. Ayres, Mr. Smith
A laboratory study of power system engineering problems.

794 (3) S. Problems in Electric Power Systems. 3 cl. Prereq: 652. Mr. Ayres, Mr. Smith
Analog and digital computer applications to design and operation. Recent developments in engineering techniques to meet current changes in systems and apparatus.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

801 (arr) A. 802 (arr) W. 803 (arr) Su,S. Advanced Theoretical Study in Electrical Engineering.

805 (arr) A. 806 (arr) W. 807 (arr) Su,S. Advanced Laboratory Study of Electrical Engineering Equipment.

815 (3) Su,A,W. Transients in Linear Systems. 3 cl. Prereq: 626, equiv. Math 601 or equiv. Mr. Warren, Mr. Weimer
Modern methods of solution of transient phenomena in electrical, mechanical, and thermal linear systems involving lumped and distributed parameters.

817 (3) A. Advanced Electromagnetic Theory I. 3 cl. Prereq: 832 or equiv. Mr. Kouyoumjian
Representation of fields by vector wave functions and dyadic Green’s functions. Huygens principle for electromagnetic waves. Application to antennas and scattering problems.

818 (3) W. Advanced Electromagnetic Theory II. 3 cl. Prereq: 817. Mr. Kouyoumjian

827 (3) W. Communication Theory I. 3 cl. Prereq: 815, concur Math 666. Mr. Warren
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.

828 (3) S. Communication Theory II. 3 cl. Prereq: 827 and Math 607. Mr. Warren
A continuation of Electrical Engineering 827.

830 (3) S. Network Synthesis I. 3 cl. Prereq: 815 and Math 607. Mr. Warren, Mr. W. C. Davis
Modern theory of network synthesis with applications to advanced design of filters, oscillators, and compensators.
ELECTRICAL ENGINEERING  

831 (3) A. Network Synthesis II. 3 cl. Prereq: 830. Mr. Warren, Mr. W. C. Davis
A continuation of Electrical Engineering 830.

832 (3) Su,A.W. Fundamentals of Electromagnetic Theory. 3 cl. Prereq: 619 or equiv. Mr. Kraus, Mr. Kouyoumjian

833 (3) A. Electromechanical Systems. 3 cl. Concur 815. Mr. Weed, Mr. Cowan
Application of the methods of electric circuit analysis to mechanical, acoustical, electromechanical and electro-acoustical systems.

834 (3) S. Analysis of Non-Linear Systems. 3 cl. Prereq: 815. Mr. Congriff
An advanced study of methods of analysis of non-linear systems with applications in the field of electric circuit theory and control systems.

841 (3) A. Methods of Analysis of Electron Tubes. 3 cl. Prereq: 768 and 832 or permission of instructor. Mr. Boone
Conformal transformations; space-charge effects; noise; inducted currents and Ramo's Theorem; electron inertia effects.

842 (3) W. Theory of Electron Guns and Electron Beams. 3 cl. Prereq: 768 and 832 or permission of instructor. Mr. Cornetet
Electron optical principles; effect of thermal velocities; effect of space charge; electron guns; periodic focusing.

844 (3) W. Plasma Dynamics. 3 cl. Prereq: 768 or 832 or equiv. Motion of ions and electrons, ionization processes, electromagnetic phenomena in plasma, electron beams in plasma.

845 (3) W. Velocity Variation Electron Tubes. 3 cl. Prereq: 841. Mr. Boone, Mr. Cornetet
Transit time effects at high frequencies; velocity variation and theory of bunching; klystrons and related devices; harmonic generation.

846 (3) S. Electron Interaction with Traveling Waves. 3 cl. Prereq: 845. Mr. D. Davis
Theory of electron interaction with traveling waves; applications to traveling-wave tubes, klystrons, magnetrons, and linear accelerators.

847 (3) W. Theory and Design of Feedback Control Systems. 3 cl. Prereq: 736 and 815 or permission of instructor. Mr. Weimer
Linear feedback theory, signal-flow graphs, return difference, stability studies with parameter variation, independent control of transmission and sensitivity functions, multivariable systems, approximation methods.

848 (3) S. Synthesis of Linear Feedback Control Systems. 3 cl. Prereq: 847. Mr. Weimer
Sampled-data systems, the Z-transform, digital compensation; synthesis of systems with statistical inputs and constraints; advanced topics.

850 (3) W. Wave Guides and Resonators. 3 cl. Prereq: 832. Mr. Peake
General theory of waveguides, modes, discontinuities, losses, cavities, and power considerations.

851 (3) S. Radiation and Radiating Systems. 3 cl. Prereq: 882. Mr. Kraus
Radiation theory; dipole, linear, loop, helical, biconical, and aperture antennas; beam shaping, aperture distribution, self and mutual impedance, microwave optics; radio telescope, antenna temperature.

852 (3) S. Propagation of Electromagnetic Waves. 3 cl. Prereq: 758 and 832. Mr. Levis
Advanced study of transmission and reception of radio waves in the presence of the earth and its atmosphere. Tropospheric, ionospheric, and scatter propagation.
114 ELECTRICAL ENGINEERING

853 (3) S. Theory of Microwave Components. 3 cl. Prereq: 850. Mr. Pease
Reciprocity in microwave circuits. Impedance transformations. Directional devices. Non-reciprocal
elements.

Math 609 or equiv. Mr. Thurston
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.

855 (3) W. Solid State Electron Devices II. 3 cl. Prereq: 854, concur Phys-
ics 727. Mr. Thurston
Basic analysis of conduction phenomena in semiconductors, carrier lifetime; theory of p-n
junction rectifiers, and junction transistors.

856 (3) S. Solid State Electron Devices III. 3 cl. Prereq: 855. Mr. Thr-
oust
Design theory of junction diodes, junction transistors, unipolar transistors, field-effect
switches, variable capacitance diodes, and parametric amplifiers.

857 (3) A. 858 (3) W. 859 (3) S. Quantum Electron Devices. 3 cl. Prereq:
Physics 726 and 727. Math 723 and Physics 728 recommended. Mr. Chang
Introduction to quantum electronics; quantum mechanical interaction of microwave waves
materials; atomic and molecular absorption and emission spectra and their applications in radio
astronomy, plasma, atomic clock, and optical masers; macroscopic electric properties of ma-
terials; paramagnetic properties of materials; theory of masers and lasers; properties of fer-
magnetic materials and ferrimagnetic devices; conductivity, superconductivity and super-
conducting electron devices.

860 (3) W. Theory and Analysis of Magnetic Amplifiers. 3 cl. Prereq: 815
or equiv. Mr. Weed
Theory of magnetic materials. Steady state and transient analysis of magnetic amplifiers;
suppressed and free harmonics; power gain; resistive, inductive and capacitive load.

861 (3) S. Analysis of Magnetic Amplifiers, Memory Devices and Com-
ponents. 3 cl. Prereq: 860 and 847, or equiv. Mr. Weed
The analysis of magnetic amplifiers with extrinsic and intrinsic feedback; a-c, d-c, or com-
bination control; switching properties; and applications.

870 (3) S. A. Advanced Antenna Design. 3 cl. Repeatable once. Prereq:
851. Mr. Richmond, Mr. Walter
Topics selected from such subjects as traveling wave antennas, excitation of surface wave
interaction of antennas with dielectric and metal bodies.

881 (1-3) Su,A,W,S. Seminar in Electrical Engineering. 1-3 cl. Prereq:
permission of instructor. Repeatable. Staff.
(a) Analytical Methods in Electrical Engineering. W. 1964. Mr. Tai
(b) Solid State Electron Devices. S 1964. Mr. Thurston
(c) Information Theory. W,S. 1964. Mr. Saltzer
(d) Parametric Electronics. A. 1963 and W. 1964. Mr. Hsu
Astron 896 (3) W. Radio Astronomy Theory I.
(See under Astronomy)
Astron 897 (3) S. Radio Astronomy Theory II.
(See under Astronomy)

898 (1-5) Su,A,W,S. Interdepartmental Seminar in Radio Astronomy. Mr.
Ko, Mr. Kraus, Mr. Slettebak
(See under Astronomy) Fundamental theory of radio astronomy and the exploration of the universe by radio
astronomical methods.

899 (1-5) Su,A,W,S. Interdepartmental Seminar.
(See under Interdepartmental Seminars)

Research for thesis or dissertation purposes only.
ENGINEERING DRAWING
Office, 218 Brown Hall

PROFESSORS PAFFENBARGER, MEIKLEJOHN (EMERITUS), FIELDS (EMERITUS),
COOPER, SHUPE, MACHOVINA, AND PARKINSON; ASSOCIATE PROFESSORS
HANG, PHILBY, WATKINS, REED AND YARRINGTON, ASSISTANT PROFESSORS
ACKLEY, BALDWIN, ROMEO, DEVEREAUX, AND RICKLY, MR. DAVIS, MR. BROWN,
MR. DENNY, MR. LATIMER, AND ASSISTANTS

400 (4) A.W.S. Elementary Engineering Drawing. 4 2 hr cl and lab. Elective
in all curricula except engineering. Mr. Brown, Supervisor
Use of instruments, projection drawing, auxiliary views, sections, size descriptions, pictorial
drawing.

402 (4) W.S. Principles of Engineering Drawing. 4 2 hr cl and lab. Prereq: 400 or permission of the instructor. Elective in all curricula except engineering. Mr. Rickly
Auxiliaries, dimensioning, working drawings, slide rule, charts, and graphs.

#415 (2) W. Elements of Drawing and Lettering. 3 2 hr lab. Elective
for students in engineering, arts, education, pharmacy. Mr. Philby
Instruction in single stroke commercial gothic, inclined, display lettering, and layout.

439 (3) W. Drawing in Business. 3 2 hr cl and lab. Req'd in industrial
management curriculum. Not open to students who have previous credit in
Eng Dr. Mr. Parkinson
Fundamentals of engineering drawing with emphasis on reading and understanding. Ortho-
graphs and pictorial shape description, conventional practices, threaded fasteners, dimensions
and tolerances, working drawings, slide rule.

440 (3) Su,A,W,S. Principles of Orthographic Projection. 3 2 hr cl and
lab. Req'd in all curricula. College of Engineering, 1st yr. Prereq: one unit of
high school Geometry or Math 416 or 421. Not open to students who have credit
in Eng Dr 401 and 403. Mr. Shupe, Supervisor
Lettering: applied geometry; orthographic projection, freehand and with instruments, to
include reading, auxiliary and oblique views, and the elements of engineering geometry.

441 (3) Su,A,W,S. Principles of Engineering Drawing. 3 2 hr cl and lab.
Req'd in all curricula, College of Engineering, 1st yr. Prereq: 440. Not open to
students who have credit in Eng Dr 401 and 403. Mr. Cooper, Supervisor
Intersection and developments of surfaces, Representation of machine parts; sections and
conventions; pictorial drawing; basic dimensioning, freehand and with instruments.

442 (3) Su,A,W,S. Principles of Working Drawings and Graphics. 3 2 hr
class and lab. Req'd in all curricula, College of Engineering, 1st yr. Prereq: 441.
Not open to students who have credit in Eng Dr 405. Mr. Machovina, Supervisor
Screw threads, fasteners, and graphic symbols; working drawings, allied material; charts
and graphs; curve fitting; graphical calculus; slide rule.

504 (4) A. Technical Drawing. 4 2 hr cl and lab. Prereq: 402 or 442. Elective
in Industrial Arts. Mr. Watkins
Dimensioning applied to detail and assembly drawings with and introduction to limits and
tolerances. Technical sketching of machine parts; representation and specifications of gears,
riveting and welding.

506 (4) W. Structural Drawing. 4 2 hr cl and lab. Prereq: 504 or 442.
Elective in Industrial Arts. Mr. Watkins
Introduction to structural drafting. Includes steel and frame structures; riveted, bolted
and welded connections; terminology and erection requirements.

508 (4) S. Production Illustration. 4 2 hr cl and lab. Prereq: 506. Elective
in Industrial Arts. Mr. Philby
Commercial and industrial applications of pictorial representation. Includes both instru-
ment and freehand techniques, rendering and preparation for presentation and reproduction.
ENGINNEERING DRAWING

537 (5) A.S. Graphic Presentation. 5 2 hr cl and lab. Req'd in the areas of ceramic art, commercial art, interior design, industrial design, and mechanical illustration. Prereq: sophomore standing. Mr. Philby, Supervisor

Graphic presentation in terms of shape and size description, Orthographic projection, perspective drawing, and the application of rendering techniques in monochrome.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Academic regulations. courses in this group are not open to freshmen or sophomores.

710 (3) W. Advanced Graphies. 3 cl. Prereq: 442 and Math 543 or 441 or equiv. Mr. Hang


755 (3) S. Chemical Plant Design. 2 3 hr cl and lab. Prereq: 442 or 450

Chem E 772 concurr.; Chem E 5th yr. Mr. Parkinson

Sketching and preliminary layout for industrial chemical plants, including design and selection factors for equipment and process auxiliaries.

ENGINEERING MECHANICS

Office, 211 Communications Laboratory

PROFESSORS: WESB, FOLK, CLARK, NIEDENFURH, GRAHAM, OTE (EMERITUS), AND POWELL (EMERITUS), ASSOCIATE PROFESSORS LEISSA, AND TUCKER (EMERITUS), ASSISTANT PROFESSORS CHIN, KOZIK, AND MAHIG, MR. BARNES, MR. RUSSMAN, MR. CLAUSEN, MR. DENNING, MR. FROST, MR. KOBA, AND MR. STILLMAN

FOR UNDERGRADUATES

511 (4) A. 512 (4) W. 513 (4) S. Applied Mechanics. 3 cl, 1 2 hr lab

Prereq: Math 440. Mr. Denning

Statics of force systems by analytical and graphical methods; centroids and moments of inertia; stresses and strains of structural members; combined stresses by Mohr's Circle; column deflections and statically indeterminate beams by area moments.

521 (5) Su, A, W, S. Statics. 5 cl. Prereq: Physics 531 and, or concur Math 543, Mr. Barnes

Resultants and equilibrium of coplanar and noncoplanar force systems; trusses, frames and connected bodies; friction; centroids and moment of inertia of masses and areas.

650 (3) A, W, S. Digital Computer Programming: Engineering Applications. 2 cl, 1 2 hr lab. Prereq: admission to Professional Division of College of Engineering.

Algebraic language programming. Processing of programs using facilities of the Computational Laboratory. Engineering applications.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Academic regulations. courses in this group are not open to freshmen or sophomores.

602 (3) A, W, S. Strength of Materials. 4 cl, 1 2 hr lab. Prereq: 521, Mr. Kozik

Normal and shear stresses and strains; energy; torsion; flexural stress; beam deflections; combined stress; theories of failure; columns.

605 (3) A, W, S. Stress Analysis I. 3 cl. Prereq: 602. Mr. Graham, Mr. Mahig

Statically indeterminate and variable section beams by area moments; bending of nonsymmetrical sections; thin, circular plates; energy of bending and shear.

606 (3) A, W, S. Stress Analysis II. 3 cl. Prereq: 602. Not open to students who have credit for 714. Mr. Graham, Mr. Folk

Failure theories; Mohr's circle for strain rosettes; thick cylinders; non-circular curved beams; Castigliano's theorem.
607 (3) A.W.S. Dynamics. 3 cl. Prereq: 521. Not open to students who have credit for 617. Mr. Chin
Linear and angular motion from constant and variable forces; connected bodies; impulse; momentum; energy.

617 (5) W.S. Dynamics. 5 cl. Prereq: 602 or concur, Math 544 or 608 or
611. Mr. West, Mr. Niedenfuhr
Dynamics of particles and rigid bodies; impulse, momentum, work, energy; three-dimensional vector acceleration; conservative systems; single degree of freedom vibration analysis.

703 (2) A.S. Experimental Stress Analysis. 4 lab hrs. Prereq: 602. Mr.
Clark
Experiments with electric strain gages, stress coot, brittle models, and photoelastic analysis of structures; determination of fatigue limits.

704 (2) W. Photoelasticity. 4 lab hrs. Prereq: 602. Mr. Clark
Construction of two and three dimension models and analysis of stress distribution by photoelastic methods.

707 (3) A. Mechanical Vibrations. 3 cl. Prereq: 607 and Math 544, 608
or 611. Mr. West, Mr. Chin
Acceleration, velocity, and displacement from variable cyclic forces; free and forced vibrations; torsional vibrations; dynamic balance; vibration and whipping of shafts.

712 (3) W. Advanced Strength of Materials. 3 cl. Prereq: 602 and/or concur Math 609 or 626. Mr. Folk
Beams on elastic foundations; beam columns; deflection curves by trigonometric series; limitations of superposition.

715 (3) A. Theory of Elastic Stability. 3 cl. Prereq: 605 or 606, Math 544
or 608 or 611. Mr. Niedenfuhr
Buckling of bars under axial and lateral loads; effect of curvature and eccentricity; determination of critical loads by energy; tube and beam buckling.

716 (3) A. Elastic Energy Theory. 3 cl. Prereq: 605 and one of: Civil E
701, 711, Aero-Astro E 710. Mr. Clark, Mr. Graham
Deformations and stresses in frames, beams, bends, rings, arches, and columns; redundant beams and frames; combined direct and torsional stresses; shear deformations.

717 (3) W. Advanced Engineering Dynamics. 3 cl. Prereq: 607 and Math
544 or 608 or 611. Mr. West, Mr. Leissa
Three dimensional vector states; kinematics and kinetics of particles and rigid bodies; energy, momentum, stability; application of Lagrange's equations to machinery, vehicles, ballistics; gyroscope.

718 (3) S. Theory of Dynamic Stability. 3 cl. Prereq: 707. Mr. Niedenfuhr
Study of the criteria for dynamic stability. Methods of stabilizing critical mechanical systems. Applications to space mechanics, structures, and vehicles.

725 (3) S. Theory of Thin Elastic Plates. 3 cl. Prereq: 605 and Math 544
or 608 or 611. Mr. Niedenfuhr, Mr. Graham
Pure bending of rectangular plates; thermal stresses; equations for small deflections for various edge conditions and shapes; large deflections; approximate methods.

750 (3) W. Methods of Engineering Analysis. 3 cl. Prereq: 10 hrs 700
level in Eng Mech and Math 609. Mr. West, Supervisor
Comprehensive study of techniques and devices for solving equations arising in engineering mechanics.

790 (2-5) A.W.S. Special Problems in Advanced Engineering Mechanics.
Prereq: 13 hrs of 600 courses, and permission of instructor.
The student must register for specific problems in the areas indicated below, and may register for more than one at a time. He cannot accumulate more than 15 credits for entire course.

(a) Experimental Stress Analysis
(b) Dynamics
(c) Fluid Mechanics
(d) Applied Elasticity
(e) Strength of Materials
(f) Vibrations
(g) Plasticity
(j) Plates and Shells
FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.


The student must register for specific subject in the areas indicated below, and may register for more than one at a time. He cannot accumulate more than 15 credits for entire course.

(a) Advanced Experimental Methods
(b) Advanced Dynamics
(c) Hydrodynamics and Fluid Mechanics
(e) Applied Elasticity
(f) Strength of Materials
(g) Vibrations
(h) Elasticity
(i) Plates and Shells

807 (3) W. Vibrations of Continuous Media. 3 cl. Prereq: 707 and/or concur Math 609 or 626. Mr. West, Mr. Leissa
Equations of motions for strings, membranes, prismatic bars, and plates for various boundary conditions; approximate methods for complicated shapes; wave propagation in elastic media.

808 (3) S. Non-Linear Vibrations. 3 cl. Prereq: 707 and Math 607 or equiv. Mr. West
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.

#810 (3) S. Classical Hydrodynamics. 3 cl. First offering Spring 1965. Will alternate with 817. Prereq: 717, Math 609, 622, 624 or equiv. Mr. Leissa
Basic equations and concepts of inviscid fluid flow; solutions to two and three dimensional problems; conformal transformations; approximate methods.

813 (3) A. 814 (3) W. 815 (3) S. Applied Elasticity. 3 cl. Prereq: 605 or 606 and/or concur Math 609. Mr. Niedenfurh, Mr. Leissa
Analysis of stress and strain; laws of elasticity; plane stress and strain for isotropic and anisotropic bodies; complex variable methods; torsion; membrane; stress concentrations; analysis of structural elements.

#817 (3) S. Analytical Dynamics. 3 cl. Prereq: 717. Mr. West, Mr. Niedenfurh
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.

#820 (3) W. Theory of Plasticity. 3 cl. Prereq: 813. Mr. Graham
Plastic range stress-strain relations; elasto-plastic behavior of beams, trusses; torsion of prismatic bars; plane strain; shear lines; limit analysis.

#825 (3) A. Theory of Thin Elastic Shells. 3 cl. Prereq: 725, 813. Mr. Niedenfurh
Equation of deformation of an arbitrary shell; thermal effects; exact and approximate solutions; Rayleigh's bending theory; membranes; shells of variable thickness; orthotropic shells.

#830 (3) A. Energy Principles in Mechanics. 3 cl. Prereq: 605 or 606 or 716 and Math 544 or 608. Mr. Graham
Theoretical development of energy principles in mechanics; strain energy and complementary energy with relatively minimal principles; applications to problems in elasticity, dynamics, vibrations.

#850 (3) A. History of Mechanics. 3 cl. Prereq: 10 hrs 700-800 level courses in Eng Mech and reading knowledge of French or German. Mr. West
Evolution of concepts in engineering mechanics; impact on scientific thought; effect on engineering analysis and design; critical study of original literature.

Research for thesis or dissertation purposes only.
ENGLISH
Office, Dunney Hall

PROFESSORS: ESTRICH, FULLINGTON, PERCIVAL (EMERITUS), WALLEY, WILSON, DERBY (EMERITUS), CHARYAT, SIMPSON, UTLEY, HUGHES, ALTICK, ROBBINS, PEACRE, ELLIOTT, LOGAN AND TAYLOR, ASSOCIATE PROFESSORS: SNOW, WRIGHT, ELICKLE, FURNESS, RUDN, BABB, HOWARD AND SHEDD (LAKEWOOD), ASSISTANT PROFESSORS: CRAIG (EMERITUS), DUMBLE, VARANDYAN, HANCOX, KANE, WHEELER, MAUER, PARKS, MARKELS, GRUSBY, HOCHFIELD, OKELLY, SOLMON, BRUCCOLI, WANG, MCDONALD AND MUSTE, MRS. ENGLAND, MRS. DASHER, MRS. LORD, MISS BEALL (NEWARK), MRS. EDWARDS, MRS. PASSI, MR. CARTER (MARIAN), MISS JEAN COX, MR. ENGLE (MARIAN), MRS. ALLEN (MANSFIELD), MR. ATTINGTON, MR. TOLLIVER, MISS WEEBER, MRS. ROOD (LIMA), MR. BARDACH, MR. BIES, MR. GUNTER, MR. TOLIVER, MISS LEE COX, MRS. CAMERON, MRS. HEIT, MRS. RICE (LAKEWOOD), MISS NASON (LAKEWOOD), MR. MANHEIM (LAKEWOOD), MISS KARPINSKI (LAKEWOOD), ASSISTANT INSTRUCTORS, ASSISTANTS, AND GRADUATE ASSISTANTS

GENERAL PREREQUISITES

Unless otherwise noted in course announcements, the prerequisites are as follows:
(a) 500 courses: English 401, or 412, or 418, or the equivalent.
(b) 400 courses: ten hours in literature, history, history of fine arts, history of appreciation of music, anthropology, philosophy.
(c) 700 courses: Except for English 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 400 level, but only upon permission of the department Graduate Committee.

FOR FOREIGN STUDENTS (credit not counted toward graduation)

406-407-408 English as a Foreign Language. A sequence of courses designed to train foreign students in the use of written and oral English. Often taken in conjunction with Speech 405. Assignment to both Speech and the appropriate English course is made on the basis of examinations given at the beginning of each quarter to all new students whose native language is not English. Course credit may not be counted toward graduation. Director, Mr. Gunter.

Review of English structure for foreign students. Proceeds from basic oral-aural patterns to application in writing.

Develops academic and social effectiveness in the use of advanced patterns in written and spoken English.

408 (3) Su,A,W,S. 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.

FOR UNDERGRADUATES

400 (3) Su,A,W,S. 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 Engl 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 Engl 416. This course may not be taken concur with Engl 416. An additional fee will be charged to cover the cost of this review course. Director, Mr. Robbins.
A review of the elementary principles of written composition with guided practice in writing.

416 (3) Su,A,W,S. Composition and Reading. Not open to students who have credit for Engl 401, 402, or 505. Director, Mr. Robbins.
Training in the fundamentals of expository writing, as illustrated in the student's own writing and in the essays of professional writers.
ENGLISH

417 (3) Su,A,W,S. Composition and Reading. Prereq: 416 or 410. Not open to students who have credit for Engl 401, 402, 411, 413, or 505. Director, Mr. Robbins
Continued training in expository writing with emphasis on the logical elements in exposition.

418 (3) Su,A,W,S. Composition and Reading. Prereq: 417 or 411. Not open to students who have credit for Engl 412, 414, or 505. Director, Mr. Robbins
Training in expository writing; a continuation of Engl 417, approached specifically through the study of imaginative literature.

PREREQUISITES FOR 500 COURSES
Unless otherwise indicated, the prerequisites for 500 courses are English 401 and 402, or 418, or 412.

501 (3) W. Readings in Recent Drama. Not open to students who have credit for Engl 670. Not accepted for credit on the Engl major. Mr. Dumble
Wide reading in American and European plays since 1900. Lecture and discussion.

502 (3) A.S. Readings in Recent Prose Fiction. Not accepted for credit as the Engl major. Mr. Dumble
Wide reading with particular attention to the novel. Lecture and discussion.

505 (5) Su,A,W,S. Informative Writing. Prereq: junior standing and 417 and 430, 412, or 418, or the equiv. Director, Mr. Markels
Intensive advanced training in the art of informative writing.

[506] (5) S. Critical Writing. Prereq: permission of the instructor.
Introduction to critical theory. Critical analysis of student's own writing. Recommended for students interested in creative writing and in the study of literature.

507 (5) A.W. Narrative Writing. Prereq: permission of the instructor
Mr. Taylor, Mr. Varandyan, Mr. Dumble
Guided practice in the writing of short fiction.

508 (5) S. Verse Writing. Prereq: permission of the instructor. Mr. Pacc
The technique of writing verse. The students will write in various forms and meters and study the works of established poets as models.

510 (3) Su,A,W,S. Introduction to American Literature I. Not open to students who have credit for Engl 609, 610. Mr. Pearce, Director, Mr. Hochfield, Mr. Meste, Mrs. Passe, Mr. Grigaby, Mr. Brucoll, Mr. Charvat, Mr. Simpson, Mr. Markels, Mr. Thompson, Mr. Solomon
A critical survey of major writers and movements from the beginning to about 1870, with emphasis upon Poe, Emerson, Hawthorne, Melville, Thoreau, and Whitman.

511 (3) Su,A,W,S. Introduction to American Literature II. Not open to students who have credit for Engl 608, 610. Mr. Pearce, Director, Mrs. Passe, Mr. Charvat, Mr. Hochfield, Mr. Muste, Mr. Brucoll, Mr. Grigaby, Mr. Markels, Mr. Simpson, Mr. Thompson, Mr. Solomon
A critical survey of major writers and movement from about 1870 to the present, with emphasis upon Twain, Emily Dickinson, James, and a few leading twentieth century writers.

519 (3) A,W,S. Technical Writing. 2 cl, 1 hr conf. Prereq: junior standing. Recommended for and open only to students in the Bachelor of Science curricula. Mrs. Bickle and Staff
Training in practical writing for industry, business, and research, with emphasis on special requirements and techniques for the professional report.

520 (3) Su,A,W,S. Introduction to Poetry. Mr. Wheeler, Director, Mr. Parks, Mr. Grigaby, Mr. Hampsten, Miss Webber, Mr. Meste, Mr. Babb
A course designed to help students to understand and appreciate poetry through intensive study of a representative group of poems.

521 (3) Su,A,W,S. Introduction to Fiction. Mr. Simpson, Director, Mr. Wright, Mr. Meste, Mr. Solomon, Mr. Torson, Mr. Babb, Mr. Baumbach, Mr. Beja, Mr. Toliver, Mr. McDonald, Mr. Haney, Mr. Hampsten, Miss Cox
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.
522 (5) S. Introduction to Language.
A general survey of language and languages and the ways available to study them, with English as the focal language.

529 (5) A.S. The English Bible. Mr. Fullington
A study of the King James version of the Bible with respect to literary questions, historical development, and religious concepts.

540 (5) A.W.S. Masters of Modern Literature. Mr. Utley, Director, Mr. Varandy, Mr. Snow, Mr. Wheeler, Mrs. Dasher, Mr. Howard, Mr. Beja, Mr. Torezon, Mrs. Kabealo, Mr. Elliott, Mr. McDonald, Mr. Maurer, Mr. Babb, Mr. Baumbach, Mrs. Shipiro, Mr. Haney
An introduction to modern poetry, drama, and fiction through the study of five or six authors: Shaw, O'Neill, MacLeish, Frost, Conrad, Mann, Eliot, Robinson, Forster, Yeats, and Forster.

550 (5) S, A.W.S. Introduction to Shakespeare. Not open to students who have credit for Engl 555. Students majoring in English in the College of Arts and Sciences should elect Eng 676 instead of Engl 550. Mr. Walley, Director, Mr. Furniss, Mr. Wilson, Mr. O'Kelly, Mr. Maurer, Mr. Baumbach, Mr. Kuhn
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.

555 (5) S. Introduction to Drama. Not open to students who have credit for Engl 550. Mr. Walley
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.

563 (5) S, A.W.S. Masterpieces of English Literature. Not open to students who have credit for Eng 560 and 562. Mr. Logan, Director, Mr. Kuhn, Mr. Wright, Mr. Haber, Mr. Toliver, Mrs. Kabealo, Mr. Howard, Mr. O'Kelly, Miss Webber, Mr. Beja, Miss L. Cox, Mr. McDonald, Mr. Fullington
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.

564 (5) S, A.W.S. Masterpieces of English Literature. Not open to students who have credit for Eng 560 or 562. A continuation of Eng 563, but may be taken separately. Mr. Logan, Director, Mr. Howard, Mr. O'Kelly, Mr. Toliver, Miss Webber, Mr. Kuhn, Mr. Wright, Mr. Haber, Mrs. Kabealo, Mr. Torezon, Mr. Beja, Miss L. Cox, Mr. Elliott
Selections of prose and poetry will be drawn from works of major British writers from 1675 to 1900.

690 (5) A.W.S. Senior Seminar and Tutorial. Not open to students who have credit for Eng 562. Open only to undergraduate Eng majors and required of them in their last or next to last quarter. Director, Mr. Babb
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.

705 (3 to 10) A. 706 (3 to 10) W. 707 (3 to 10) S. Honors Courses. Pre-reqt: (1) senior standing; (2) the record of A in at least half of his Eng courses and an average of B in all of his courses; (3) the permission of the professor under whose supervision the work is to be completed. Open only to candidates for distinction in Eng who have in their junior year completed with high grades a program approved by the Committee on Honors. Not open for graduate credit. Mr. Grigsby
A program of reading arranged for each student, with individual conferences and reports.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

Unless otherwise indicated, the prerequisites for 600 courses are Eng 418 and ten hours in literature, history, history of fine arts, history or appreciation of music, anthropology or philosophy.
609 (5) Su. A. The American Renaissance in Literature. The readings of this course do not duplicate those of Engl 510. Mr. Muste, Mr. Grigoby
An introduction to the major American writers of the mid-nineteenth century: Poe, Hawthorne, Melville, Emerson, Thoreau, Whitman.

610 (5) W. American Fiction from Twain to Dreiser. The readings in this course do not duplicate those in Engl 511. Mr. Hochfield
Studies in fiction from the Civil War to about 1920, with emphasis on Twain, Howells, James, the regionalists, the early naturalists, Dreiser, and Willa Cather.

615 (5) S. Twentieth Century American Writers. Mr. Charvat
A study of the development of American literature after World War I, with emphasis on the major poets and novelists.

616 (5) W. A Writer's Approach to Fiction. Prereq: 507 or the equiv or permission of the instructor. Mr. Taylor
The writing and analysis of fiction. Although the emphasis is upon student writing, there will be reading and discussion of the works of contemporary writers.

620 (5) S. Folklore. Mr. Simpson
A critical examination of some of the outstanding English and American folktales and international folk tales. Lectures and class discussions will be supplemented by recordings.

625 (5) A.W.S. English Usage. Prereq: the general prerequisites for 600 courses as listed above, or Jour 505 or 602. Mr. Gunter
Usage and linguistic variety in written and spoken English, for students interested in writing and teaching.

626 (5) W. Structure of English. Prereq: the general prerequisites for 600 courses as listed above. Mr. Gunter
An investigation of the linguistic structure of modern English.

627 (5) Su.A. History of the English Language. Prereq: the general prerequisites for 600 courses as listed above, or Jour 505 or 602. Mr. Howard, Mr. Gunter
A study of the historical development of the English language and the internal and external influences which have determined its characteristics.

635 (5) A. The Age of Wit and Satire. Mr. Wilson
The skeptical mind of the Early Enlightenment as shown in satiric verse, essays, and drama, from Dryden to Pope.

636 (5) A.W. Literature of the Eighteenth Century. Mr. Elliott, Mr. Wright
The ideas and artistry of the Age of Reason as reflected in the work of major figures: Swift, Pope, Fielding, Sterne, Boswell, Johnson, and Blake.

640 (5) S. Nineteenth Century Prose. Mr. Altick
Selections from the principal romantic and Victorian nonfictional prose writers, read both as literary art and as documents of contemporary thought.

641 (5) Su.A.S. Romantic Poetry. Mr. Snow
English literary and intellectual romanticism as seen in the poetry of Wordsworth, Coleridge, Byron, Shelley, and Keats, and selected critical documents of the period.

642 (5) W. Victorian Poetry. Mr. Logan
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 (5) S. The Writing Laboratory. 3 cr. conf. Prereq: permission of the instructor. Mr. Snow
Detailed analysis in conference and class discussion of work presented by students. Six novels are discussed as types in modern writing.

(648) 5 A. Playwriting. Prereq: or concwr, one of the following courses: Engl 676, 677, or 670.
Elementary laboratory course in playwriting. Methods of play analysis with attention to dramatic technique. An historical consideration of the major forms of drama.
653 (5) Su. A. Chaucer. Not open to students who have credit for Engl 753. Mr. Howard, Mr. Utley
A close study of Chaucer’s principal works and of the poet’s development as an artist in relation to his social and literary background.

654 (5) W. Introduction to Medieval Literature. Mr. Estrich
The study of masterpieces from the Middle Ages, chosen for their values in interpreting medieval culture as well as for their independent literary worth.

656 (5) S. The Nineteenth Century English Novel. Mr. Logan
Readings in a group of major novelists, such as Austen, Dickens, Thackeray, and others, with special emphasis upon social and humanistic values.

Anthrop 660 (4) Introduction to Anthropological Linguistics.
(See Anthropology)

670 (5) W. Modern Drama. Mr. McDonald
An historical and critical examination of the major developments, personalities, and achievements in the drama of Europe and America since the advent of Ibsen.

671 (5) Su. Early Seventeenth Century Literature. Mr. Robbins, Miss Webber
A study of non-dramatic literature in England from 1600 to 1660, with chief emphasis on the work of Bacon, Jonson, Donne, Browne, and Milton.

674 (5) S. The English Renaissance. Mr. O’Kelly
A study of Tudor prose and poetry as they exemplify literary art and as they reflect the creative and inquiring temper of the age.

676 (5) W. S. Shakespeare. Mr. Walley, Mr. Markels
A critical consideration of the art, personality, and achievement of Shakespeare in the light of Renaissance and modern significance.

677 (5) A. English Drama: Medieval and Renaissance. Prereq: 550 or 555 or the equiv. Mr. Walley
A study of English popular drama from its origin to 1642, with special emphasis upon the evolution of dramatic concepts and theatrical art.

678 (5) S. English Drama: Restoration and Eighteenth Century. Prereq: 550 or 555 or the equiv. Mr. Wilson
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.

689 (5) W. Literary and Cultural Heritage of the Middle East. 5 cl. Mr. Varanyan
An introduction to Assyro-Babylonian, Arabic, and Persian literature in their historical and cultural settings.

**PREREQUISITES FOR 700 COURSES**

Except for English 706-707, all 700 courses are designed primarily for graduate students. They are open also to seniors who have credit for 10 hours of literature courses on the 600 level. Permission of the English Department Graduate Committee is necessary for registration in them.

701 (1 to 5) Su. A. W. S. Minor Problems in English. 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] (3) Su. Principles and Methods of Linguistic Analysis. 5 cl, 2 1 hr workshops. Permission of the Director. 702, 703, 704 to be taken concur. Mr. Newmark
The study of the principle methods of the analysis of the English language.

[703] (3) Su. Structural Analysis of English Expository Prose. 5 cl, 2 1 hr workshops. Permission of the Director. 702, 703, 704 to be taken concur. Mr. Robbins
The theory and practice of modern expository prose composition.
708 (5) A. Studies in the American Renaissance. Acquaintance with major writers studied in Engl 608 is assumed. Mr. Charvat
An intensive study of several major literary figures of the mid-nineteenth century in relation to the American environment and foreign influences.

709 (5) Su,W. Studies in American Fiction, 1865-1914. Acquaintance with major writers studied in Engl 610 is assumed. Mr. Charvat, Mr. Solomon
An intensive study of important fiction from Twain to Dreiser.

710 (5) A. The Study of Literature and Culture. Mr. Pearce
A review of theory and practice in some of the principal forms of literary-cultural analysis and of their bearing upon criticism and literary history.

715 (5) Su,A,W,S. Studies in English or American Literature. Prereq: permission of the Chairman of the Department Graduate Committee.
Under this number, the Department occasionally offers an intensive course on some phase of English or American literature.

717 (5) S. The Writing of Fiction. Prereq: submission of a manuscript to the instructor before enrollment. Engl 507 and 616 are desirable preparation for this course. Mr. Taylor
A course for those who have already demonstrated some proficiency in the writing of fiction.

727 (5) Su,S. Twentieth Century Poetry. Prereq: acquaintance with the major poets studied in Engl 615 is assumed. Mr. Simpson, Mr. Grigsby
A critical study of a representative body of modern poetry, with emphasis on selected major writers of England and America.

728 (5) A. Twentieth Century Fiction. Prereq: some acquaintance with modern continental novelists is recommended. Mr. Simpson
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.

735 (5) S. Dryden. Mr. Maurer
A detailed study of the poems, plays, and essays of John Dryden, as exemplifying the principles and practices of the Early Enlightenment.

#736 (5) A. Pope, Mr. Elliott
Pope's poetry and the dominant ideas of the Age of Reason.

#737 (5) S. Swift, Mr. Elliott
An intensive critical study of Swift's work and its relation to the intellectual and political movements of the Age of Reason.

738 (5) Su,W. Studies in the Eighteenth Century. Mr. Wright
Intensive work in an important aspect of the eighteenth century literature or thought. The topic for 1963-1964: Dr. Johnson and His Circle.

742 (5) W. Studies in Victorian Poetry. Mr. Altick
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.

#744 (5) A. Studies in Victorian Prose. Mr. Altick
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.

745 (5) Su,S. Studies in Romantic Poetry and Poetics. Mr. Logan
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 from year to year.

#746 (5) S. Introduction to Middle English Language and Literature. Mr. Howard
A study, with some cultural background, of important Middle English writings, in their original form.
A Studies in Early English Literature. Prereq: 751, 746, or equiv. Mr. Utley
A critical and detailed study of a medieval topic. Topic for 1964: To be announced.

W. Old English Poetry. Mr. Utley
A critical reading of Old English poetry with some cultural background partly from contemporary prose. The language itself will be taught only as needed.

S. Beowulf. Prereq: 751 or equiv. Mr. Estrich
A close study of the text of Beowulf and its background.

W. #756 (5) S. Linguistics and English. Mr. Utley
An advanced approach to linguistics, language and culture, phonetics, the history and structure of English, and the teaching of English language and literature.

S. Donne and Other Metaphysical Poets. Mr. Rabb
A close study of significant verse of the early seventeenth century designed for graduate students and for undergraduates with a special interest in poetry.

A Studies in Renaissance Prose. Miss Hughey
The evolution of literary prose from More to Milton as seen in representative works which are related critically to rhetorical theory and significant cultural forces.

W. Spenser. Miss Hughey
A study of Spenser's poetry, its literary significance and its relation to foreign, classical, and native English poetic traditions.

Su. Milton, Mr. Toliver
A critical study of the poetry and prose of John Milton, viewed against his social and literary background.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

Su.A,W,S. Master's Thesis. Staff

A. #836 (5) W. Studies in Eighteenth Century Literature. Mr. Kuhn
Problems in the literature and ideas of the Age of Reason.

W. #838 (5) S. Research in the Restoration Period. Mr. Wilson
Individual research in Restoration literature, Dryden to Pope; oral and written reports.

Su. #843 (5) A. Studies in Nineteenth Century Literature. Mr. Kuhn
Reading and research in the literary production of the century and its intellectual and social backgrounds. Topic varies from year to year.

W. #866 (5) S. Studies in American Literature and Cultural History. Mr. Pearce
Individual research in problems in American literature.

Su. #876 (5) S. Studies in the Age of Shakespeare. Miss Hughey
Exploration of the problems, materials, and methods relevant to a scholarly study of Shakespeare's work and cultural environment, culminating in individual research.

A. Bibliography and Method. Mr. Wright, Mr. Altick, Mr. Maurer
A course for the advanced graduate student in the methods and tools of documentary research.

S. Textual Criticism and Editing. Prereq: 880, Miss Hughey
Evaluation of literary editorial methods, past and present; training in skills requisite to the textual critic and scholarly editor; practice in textual editing.

Research for dissertation purposes only.
ENTOMOLOGY

Department of Zoology and Entomology
Office, 101 Botany and Zoology Building

PROFESSORS WHARTON, BORROW, BRIGGS, CUTRIGHT (EMERITUS), DAVIDSON, DeLONG (EMERITUS), HOLDSWORTH, KNULL (EMERITUS), C. R. NEISWANDER (EMERITUS), R. R. NEISWANDER, PETERSON (EMERITUS), RINGS, ROTHENBUBLER, SKEESE, VENARD, ASSOCIATE PROFESSORS BIRT, DUNSER (EMERITUS), FISK, MYER, POLIVKA, SHAMBAUGH, WARE, WEAVER, ASSISTANT PROFESSORS FORCEY, TREECE, TRIPLEHORN, VALENTINE AND ASSISTANTS

FOR UNDERGRADUATES

550 (5) A.W.S. General Entomology. 3 cl, 22 hr lab. Not open to students who have credit for 450. Mr. DeLong, Mr. Fisk
The biology and habits of insects, the use of insects in scientific research, and the interspecies beneficial and harmful species with man.

551 (5) A.W.S. Economic Entomology. 5 cl. Not open to students who have credit for 451. Mr. Davidson
A basic course dealing with the economic aspects, analyzing and solving of common insect problems.

566 (3) S. Horticultural Entomology. 3 cl. Prereq: 551. Mr. Davidson
A detailed study of insects and mites attacking horticultural crops.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

608 (5) S. Insect Physiology. 3 cl, 22 hr labs. Prereq: 550, or equiv. 20 additional hrs Biol sci, and 1 quarter organic chem or Agr biochem. Mr. Fisk
The general physiology of insects and other arthropods. The laboratory will stress the use of insects to demonstrate fundamental physiological processes.

620 (3) S. Biology of the Honey Bee. 3 cl. Prereq: Zool 400 and Entom 550 and 551 and 10 additional cr hrs of biological science. Mr. Rothenbuhler
The behavior, social organization, morphology, physiology, reproduction, diseases and parasites of the honey bee studied from a comparative and evolutionary viewpoint.

640 (5) A. Advanced Economic Entomology. 3 cl, 22 hr labs. Prereq: 20 hrs biological science with 551 or equiv recommended. Mr. Davidson
An advanced course covering the principles of insect control. Field and laboratory studies will be made of major insect control problems.

650 (5) S. Entomology for Biology Majors. 3 cl, 22 hr labs. Prereq: 401, 402 or equiv and at least 10 additional hrs of biological fields. Not open to students who have credit for Entom 550. Mr. DeLong
The biology, morphology, metamorphosis and habits of insects. Methods of collecting, preserving, culturing and identifying the more important families.

651 (5) A. External Morphology of Insects. 2 cl, 6 hrs lab. Prereq: 20 hrs of Zool and 10 hrs of Entom. Mr. Borrow
A study of the comparative external morphology of insects with special emphasis on evolutionary trends and on taxonomic applications of morphology.

653 (5) W. Principles of Insect Toxicology. 3 cl, 22 hr lab. Prereq: 550 or 551 and at least 15 additional hrs of biol sci and Chem 411, 412 or equiv. Mr. Ware
Deals with the physicochemical properties and physiological action of insecticides, miticides, and acaricides. Methods of securing, evaluating, and presenting toxicological data are stressed.

655 (3 or 5) S. Medical Entomology. 3 cl, or 3 cl and 22 hr lab. Prereq: 401, 402, and 10 additional cr hrs in Microbiol or Entom or Parasitology. Mr. Venard
A consideration of the recognition characteristics, biology, and control of insects and other arthropods of importance to the health of man, livestock, and wildlife.
670 (4) Su (1st Term). Advanced Entomology. All day classes—3 days per week. Prereq: 550 or equiv and at least 15 additional hrs of biol sci. Given only at the Franz Theodore Stone Laboratory. Not open to students who have credit for Hydrobiology 670. Staff
This course deals primarily with collecting, identification and field methods. Field trips are made to various islands of Lake Erie and the mainland.

# 671 (4) Su. Aquatic Entomology. Prereq: 670 or equiv and at least 15 additional hrs of biol sci. Given only at the Franz Theodore Stone Laboratory. Not open to students who have credit for Hydrobiology 671. A course designed for preparation in the teaching of biology or research on aquatic resources. Taxonomy and ecology of aquatic larvae are stressed.

701 (2 to 5) Su, A.W.S. Special Problems. Prereq: satisfactory preparation for individual work in the field of the chosen problem and permission of instructor.

(a) Apiculture and biology of the honey bee. Mr. Rotkenbaler
(b) Immature insects and biological control (Agriculture). Mr. Briggs, Mr. Britt, Mr. Valentine
(c) Insects causing or transmitting diseases of animals. Mr. Borror, Mr. Davidson, Mr. Venard
(d) Insects causing or transmitting diseases of plant. Mr. Briggs, Mr. Davidson
(e) Insect control. Mr. Davidson, Mr. Ware
(f) Insect ecology. Mr. Borror, MR. Briggs, Mr. Britt, Mr. Triplehorn
(g) Insect morphology. Mr. Borror, Mr. Fisk
(h) Insect physiology and toxicology. Mr. Fisk, Mr. Shambaugh, Mr. Ware
(i) Insect taxonomy. Mr. Borror, Mr. Davidson, Mr. Triplehorn, Mr. Valentine
(j) Laboratory technique and rearing methods. Mr. Fisk
(k) Insect behavior. Mr. Fisk, Mr. Holdsworth, Mr. Rotkenbaler
(l) Field and Experiment Station problems. Mr. Davidson, Mr. Forsythe, Mr. R. B. Neiswander, Mr. Polivka, Mr. Hings, Mr. Shambaugh, Mr. Sleezmann, Mr. Treece, Mr. Ware
(m) Arachnology—3 weeks, Summer Program. Mr. Wharton

# 705 (5) W. Systematic Entomology. 2 cl, 6 lab hr. Prereq: 651. Mr. Borror
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.

# 706 (5) W. Systematic Entomology. 2 cl, 6 lab hrs. Prereq: 651. Mr. Borror
A continuation of 705, covering the Diptera, Lepidoptera and Hymenoptera.

# 712 (5) A. Immature Insects. 1 cl, 4 2 hr lab. Prereq: 705 and 706 or equiv. Mr. Valentine
A survey of immature stages of insects with emphasis on the anatomy and taxonomy of holometabolous larvae. A student collection of immature insects determined to family is required.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 groups except by permission of the Graduate Council.

801 (2-5) Su, A.W.S. Special Problems. For graduate students only. Prereq: satisfactory preparation for individual work in the field of the chosen problem and permission of instructor.
For topics: See under 701.

814 (5) W. Biological Control. 3 cl, 2 2 hr lab. Prereq: permission of instructor. Mr. Biggs
The principles of biological control with particular reference to insects.

# 816 (5) W. Research Methods: Living Insects. 3 cl, 2 2 hr labs. Prereq: 658 and permission of instructor. Mr. Fisk
Deals with current field and laboratory research methods of trapping, sampling, handling, and rearing insects; conducting life history studies; and measuring environmental factors.

# 817 (5) W. Internal Morphology of Insects. 2 cl, 3 2 hr labs. Prereq: 651. Mr. Fisk
Deals with the internal structures of insects, including anatomy, function, histology, embryology, and metamorphosis. Laboratory includes preparation of permanent microscopic slides of insect tissues.
ENTOMOLOGY

850 (5) A. Advanced Insect Physiology. 3 cl, 22 hr. labs. Prereq: 650 or equiv, and 20 additional hrs of Biol Sci, including Agr Biochem 610 and 621 or equiv. Mr. Fisk. Topics include insect integument, water balance, excretion, digestion, nutrition, respiration, growth and metamorphosis. The project type laboratory provides experience in techniques of insect physiology.

Zool 900 (1 or 2). Seminar.
(See Zoology)

850 (arr) Su.A.W.S. Research in Entomology.
Research for thesis and dissertation purposes only.

FINE ARTS
Office: 146 Fine Arts Building

PROFESSORS FANNING (EMERITUS), FREY (EMERITUS), HOPKINS (EMERITUS), ROBINSON (EMERITUS), HAUSMAN, ATHERTON, BARKAN, BOGATAY, R. GATELL, KAPLAN, KING, LITTLEFIELD, LUDDEN, SEVERINO, AND SHERMAN. ASSOCIATE PROFESSORS RANNELLS (EMERITUS), CHADWAYNE, CHAFFETZ, OSURI, FREEMAN, FRILEY, M. GATELL, JONES, KRUMM, PATTON, WOOD, AND ZIMMER. ASSISTANT PROFESSORS DAUGHERTY, BERENDSEN, BLACK, ECKER, FINK, HALL, HEBNER, HEWITT, KITTS, MELINIKAS, MITCHELL, SAMORS, SCHWARTZ, THOMPSON, WALLSCHLÄGER, AND WYNN, INSTRUCTORS, BAIGLIE, CHAFFETZ, HOHLWEIN, HORN, HUNTE, KOTTLE, LABURN, LAWALL, RUBRIGHT, AND WENKLE

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FOR UNDERGRADUATES

400 (6) Su.A.W.S. Field Experience. 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 (3) Su.A.W.S. Introduction to Fine Art Activities. 1 cl, 4 1 hr. lab. Not open to candidates for the degrees B.F.A. and B.Sc. in Edu with Fine Arts as a major nor to dental students. Not open to students who have credit for Fine Arts 421 or 423. Mr. Holtwein and Staff

An investigation of visual form, its perception, development, and use.

402 (3) S. Freehand Drawing. 6 hr. lab. Prereq: 401. Not open to candidates for the degrees B.F.A. or B.Sc. in Edu with Fine Arts as a major nor to dental students. Not open to students who have credit for Fine Arts 421 or 423.

Continued practice through a variety of media in the use of visual form principles and emphasis on their relationship to other modes of art expression.

406 (3) A. Form Organization. 3 2 hr. lab. Open only to students registered in College of Dentistry. Mr. Sherman, Mr. Friley, Mr. Bogatay

Work in drawing and carving (sculpture) with emphasis on visual organization and skills appropriate to dentistry. Materials: clay, wire, and plastic.

407 (3) S. Water Color. 2 2 hr. lab. Prereq: 404 or 423. Not open to majors in Fine Arts.

Painting from still life, models, and landscape. Lectures, laboratory work, and critique.
[411] (3) A.W.S. Drawing from Life. 2 3 hr lab. Prereq: 404 or 423. Not open to majors in Fine Arts.
   Drawing from the living model, with lectures and problems in surface anatomy.

421 (5) Su,A.W.S. Drawing and Fine Arts Orientation. 5 2 hr lab, plus 1 cl for classes given Autumn Qtr.
   Introduction to studio activity. Laboratory experience, with emphasis on relating drawing and design. Lectures and discussion related to fields of specialization in fine arts.

423 (5) Su,A.W.S. Drawing. 5 2 hr lab. Prereq: 401 or 421, or 569 or 430 for Elementary Education students only. Not open to students who have credit for Fine Arts 404-405.
   A concentrated experience in the use of various drawing media with continuation of the underlying principles as utilized in Fine Arts 421. Laboratory and field problems.

430 (5) Su,A.W.S. Fundamentals of Art. 5 2 hr lab. Not open to majors in Fine Arts or to students who have credit for 569. Mr. Krueger and Staff.
   An introduction to rudimentary concepts of art through studio experience, exploring two and three dimensional media, analysis of form, and modes of expression.

431 (5) Su,A.W.S. Elementary Design. 5 2 hr lab. Prereq: 401 or 421.
   An introductory course in dimensional design, with special attention given to the fundamentals of visual organization and the inventive use of art materials.

432 (5) Su,A.W.S. Intermediate Design. 5 3 hr lab. Prereq: 430 or 431.
   Three-dimensional design with special emphasis upon the inventive use of various hand tools, materials, and techniques.

459 (3) S. Orientation of Art Education. 3 cl. Prereq: sophomore standing.
   Historical introduction to the art education program, with attention to the orientation and professional preparation of an art teacher.

461 (5) Su,A.W.S. Sculpture. 5 3 hr lab. Prereq: 421. Not open to students who have credit for Fine Arts 561. Mr. Black, Mr. Freeman, Mr. Thompson, Mr. Wenkle.
   An introduction to the principles of sculpture, emphasizing basic form and materials.

484 (3) Su,A.W.S. An Introduction to Ceramic Art. 1 cl, 6 lab hrs. This course may be repeated to a maximum of nine hours with instructor's written permission.
   An introduction to pottery making. Laboratory practice in building pottery by hand, with short lectures giving a broad survey of the ceramic arts.

490 (5) Su,A.W.S. Elementary Ceramic Art. 1 cl, 9 lab hrs.
   An introduction to the art phases of the ceramic field. Laboratory practice in the hand forming process.

491 (3) Su,A.W.S. Ceramic Art Laboratory. 5 2 hr lab, plus 5 hrs arrangements. Prereq: 484 or 490.
   An introduction to model-making, mold-making, slip-casting, and other forming processes.

494 (3) Su,A.W.S. Introduction to Art. 3 cl. Mr. Patton and Staff.
   A study of meaning of visual form and imagery in architecture, sculpture, and painting.

497 (3) Su,A.W.S. Historic Styles in Art. 3 cl. Not open to Fine Arts majors and students who have credit for Fine Arts 494.
   An introduction to the principal artistic styles of the Western world.

500 (5) Su,A.W.S. Painting. 5 2 hr lab. Prereq: 423, 431. Not open to students who have credit for Fine Arts 427.
   A course in painting which emphasizes the use of color, drawing, and design in the development of a personal idiom of expression. Opaque media. Laboratory and field problems.

501 (3) Su,A.W.S. History of Western Art I. 3 cl. Prereq: 494 or 497 or junior standing.
   A survey of Ancient and Medieval Art.

502 (3) Su,A.W.S. History of Western Art II. 3 cl. Prereq: 494 or 497 or junior standing.
   A survey of Renaissance and Baroque Art.
503 (3) A.W.S. History of Western Art III. 3 cl. Prereq: 494 or 497 or junior standing.
A survey of the art of the Modern period.

505 (5) Su,A.W.S. Life Drawing. 5 & lab. Prereq: 423, 431.
Drawing from the human figure, using a variety of media. Discussion of drawing as related to important historical styles. Laboratory problems and field trips.

507 (5) W. Product Design. 5 & lab. Prereq: 554, 582. Mr. Kitts, Mr. Wood
Developmental studies in the design of small-scale products and equipment for living. Design-problem analysis based upon environmental and human factors.

509 (3) S. History of Oriental Art. 3 cl. Mr. Kaplan
A survey of Far Eastern Art; India, China, and Japan.

526 (5) S. Introduction to Printmaking. 5 & lab. Prereq: 423 and 431. Mr. Chafetz
The basic tools, methods, and materials of printmaking. Study and examination of original prints.

527 (5) Su,A.S. Water Color Painting. 5 & lab. Prereq: 427 or 432 and 500.
The use of the medium of water color, with special emphasis on its unique capacities for personal expression. Problems in landscape, still life, and the figure.

528 (5) Su,A.W.S. Oil Painting. 5 & lab. Prereq: 431 or 500.
Painting from still life, with the object of developing the color sense and acquiring directness of presentation. Problems in the organization and execution of pictures.

530 (3) S. Orientation to Environmental Design and Planning. 3 cl.
A survey of design history, theory, and practice for all majors in the advertising, industrial, and interior design curricula.

534 (5) A.W.S. Design Materials. 5 & lab. Prereq: 430 or 431. Mr. Hebert
Three-dimensional design with emphasis on the inventive use of shop equipment and procedures.

548 (5) W. Art Education Laboratory. 5 & lab. Prereq: 432 and 459. Mrs. Mitchell
Laboratory problems with a variety of design materials, with attention to the nature of different media and their educational potential.

549 (3) S. Art Education Laboratory. 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 (5) A. 555 (5) W. 556 (5) S. Visual Communication Design. 5 & lab. Prereq: 530 and 558. Not open to students who have credit for Fine Arts 651, 655, or 653. Mr. Horn, Mr. Wallbichleger, Mr. Zimmer
Development of knowledge and skills in the application of color, lettering, typography, illustration, graphic technology to diverse two and three-dimensional graphic communication problems.

558 (3) A.W.S. Lettering. 1 cl. 3 & lab. Prereq: 421.
The principles of lettering and its application to advertising design.

562 (5) Su,A.W.S. Intermediate Sculpture. 5 & lab. Prereq: 461 or 561. Mr. Black, Mr. Freeman, Mr. Thompson, Mr. Jenkle
Sustained projects with the option of a variety of techniques and materials.

569 (5) Su,A.W.S. Art for Elementary Teachers. 5 & lab.
Laboratory experiences with two-dimensional and three-dimensional materials toward understanding the visual arts as background for teaching in the elementary schools.

570 (3) Su,A.W.S. Art for Elementary Teachers. 3 & lab. Prereq: 430 or 560. Mr. Barkian, Mrs. Mitchell, Mr. Ecker
Problems of teaching in terms of personal knowledge about art, insight into children's art work and understanding of elementary school curriculum.
572 (5) A.W.S. Elements of Weaving. 5 2 hr lab. Prereq: 431. Mr. Baughsman
An introduction to the creative and functional aspects of handweaving. Experience in the construction, warping, threading, and manipulation of both standard and modern design techniques.

573 (3) A.W.S. Creative Weaving. 3 2 hr lab. Prereq: 431. Mr. Baughsman
The use of weaving materials and equipment, with an emphasis on creative design of functional fabrics.

576 (5) S. Space and Enclosure Design. 1 cl, 5 2 hr lab. Prereq: 507. Not open to students who have credit for Fine Arts 602. Miss Krumm, Mr. Wall-schlaeger
A study of form and order concepts in environmental space and enclosure problems. Developmental studies in full architectural scale.

577 (3) A.W.S. Fundamentals of Design. 3 2 hr lab. Prereq: 430. Not open to Fine Arts majors.
The creative use of art materials, with lectures and projects utilizing principles of design related to textiles, home furnishings, and other phases of contemporary life.

582 (5) A. Introduction to Product and Environmental Design. 5 2 hr lab. Prereq: 550, 558.
Laboratory and discussion regarding basic principles and theories of three-dimensional design as applied to products and enclosures.

587 (5) Su.A.W.S. Ceramic Laboratory. 15 lab hrs. Prereq: minimum of 8 cr hrs from 484, 490, and 491. Not open to Ceramic Art majors.
A laboratory course for students not majoring in Ceramic Arts who desire more advanced experience than that obtained in 484 and 486. Specific problems in the ceramic field.

590 (5) W. Advanced Ceramic Laboratory. 15 lab hrs. Prereq: 484 or 490.
Laboratory practice in designing ceramic wares, with emphasis on the use of the potter's wheel.

591 (5) W. Ceramic History. 5 cl. Mr. Atherton
A survey in the historical classification of Ceramic Art, emphasizing impulses and influences, with a comparative study of results achieved and means of achievement.

592 (5) S. Advanced Ceramic Laboratory. 15 lab hrs. Prereq: 590 or permission of instructor.

593 (5) A. Ceramic Composition. 5 cl. Mr. Littlefield
A course in ceramic computations, designed for art students. Methods of representing ceramic composition; discussion of ceramic raw materials and their use in building bodies and glazes.

594 (5) W. Ceramic Composition. 2 cl, 4 2 hr lab. Prereq: 484 or 490 and 553. Mr. Littlefield
Laboratory practice in development of the aesthetic aspects of ceramic glazes and bodies; methods of presenting their fired composition and correction of faults.

595 (5) S. Ceramic Composition. 2 cl, 4 2 hr lab. Prereq: 594. Mr. Littlefield
Laboratory study and development of individual projects leading to creation of ceramic compositions of aesthetic merit. Further studies in texture and color.

603 (5) A. Interior Environment I. 1 cl, 11 lab hrs. Prereq: 503, 576. Not for graduate credit. Miss Krumm
Study of materials and factors peculiar to the field of interior environment. Solving of interior problems involving domestic, commercial, and public buildings. Field trips.

604 (5) W. Interior Environment II. 1 cl, 11 lab hrs. Field trips. Prereq: 603. Not for graduate credit. Miss Krumm
A continuation of experience in solving interior environment problems; a review of professional procedure and ethics.

605 (3) A. Development of Interior Design I. 3 cl. Prereq: 501, 502, 503; for students outside the School of Art—Hist 401, 402 or equiv. Not for graduate credit.
A survey of European interiors from 1300 to 1850, followed by a study of French design from Louis XIII through the Empire period.
606 (3) W. Development of Interior Design II. 3 cl. Prereq: 605. Not for graduate credit. Miss Krumm
A study of the Tudor, Jacobean, Carolean, Georgian, and Regency Periods—considering the aesthetic, political, and economic implications.

607 (3) S. Development of Interior Design III. 3 cl. Prereq: 606. Not for graduate credit. Miss Krumm
A survey of American interiors since 1850, followed by a study of the development of interior design in the Western world since 1880. Field trips.

608 (5) S. Product Design—Models. 5 2 hr lab. Prereq: 507. Not for graduate credit. Mr. Kitts, Mr. Wood
Study of materials, construction techniques, and fabrication of products. Fractional scale studies and model construction. Planning and presentation of environmental products.

609 (5) A. Advanced Product Design—Mass Production. 5 2 hr lab. Prereq: 608. Not for graduate credit. Mr. Kitts, Mr. Wood
Design problems related to manufacturing processes, materials, and technology. Laboratory practice in planning and design for mass production. Problems of dimensional coordination and standardization.

610 (5) S. Product Design—Furniture. 5 2 hr lab. Prereq: 608. Not for graduate credit. Mr. Wood, Mr. Kitts
Independent research and developmental work in furniture and related environmental products. Analysis, planning, design, and prototype development up to production phase.

635 (5) A. W. 636 (5) S. Advanced Visual Communication. 5 2 hr lab. Prereq: 507 and 556. Not for graduate credit. Mr. Wallach, Mr. Zimmer
Explorations coordinating graphic media, technology, and techniques in advanced two-dimensional and three-dimensional graphic problems. Research and development projects.

644 (5) S. Advanced Water Color Painting. 5 3 hr lab. Prereq: 557. Not for graduate credit.
Further practice in the water color medium, with emphasis on the critical capacity of the student. Laboratory problems and field trips.

660 (5) Su.S. Advanced Oil Painting. 5 3 hr lab. Prereq: 565, 572
Not for graduate credit.
Painting in oil from still life and the costume model. Advanced problems in composition.

FOR ADVANCED UNDERGRADUATES AND GRADUATES
According to University regulations, courses in this group are not open to freshmen or sophomores.

600 (4) A. The Theory of Art Education. 9 hr lab. Prereq: 549 and 514, 553. Mr. Barkan
Problems of art education in the public schools. Laboratory experience with art media; lectures and discussion; observation in the public schools.

625 (5) Su.A. Advanced Life Drawing. 5 3 hr lab. Prereq: 505.
Advanced problems in drawing from life and figure composition.

626 (5) A. The Art of India and Indonesia. 5 cl. Mr. Kaplan
A cultural art history of India in terms of monuments, people, and religious philosophy.

627 (5) W. Art of China. 5 cl. Mr. Kaplan
A cultural art history of China in terms of monuments, people, and ideas.

628 (3) A. The Art of Japan. 3 cl. Mr. Kaplan
A cultural art history of Japan in terms of monuments, people, and beliefs.

629 (5) Su.A. Contemporary Art. 5 cl. Mr. Lawall
Twentieth Century European Art. A study of the major achievements in painting, sculpture, and architecture since 1900.

630 (5) Su.S. Advanced Water Color Painting. 5 3 hr lab. Prereq: 565, 572
Painting from still life, models, and landscapes. Special problems in organization and development of pictures.
643 (5) W. Graphic Processes. 5 3 hr lab. Prereq: 500. Graduate students must have fifteen qtr hrs of course work in drawing and painting. Mr. Gatrell. Lithography and serigraphy explored by students as part of their professional experience in print-making.

654 (5) A. Renaissance Arts in Italy. 5 cl. Mr. Melnikas. 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.

661 (2-5) Su.A. 662 (2-5) W. 663 (2-5) S. Special Problems. Repeatable to a maximum of 45 cr hrs. Prereq: permission of instructor. Mr. Hausman, Mr. Atherton, Mr. Baigell, Mr. Barkan, Mr. Baughman, Mrs. Berendsen, Mr. Black, Mr. Bogatay, Mr. Chadeayne, Mr. Chafetz, Mr. Csuri, Mr. Ecker, Mr. Freeman, Mr. Friesly, Mr. Gatrell, Mr. Hall, Mr. Hewett, Mr. Hohlwein, Mr. Jones, Mr. Kaplan, Mr. King, Mr. Kitts, Miss Krumm, Mr. Lawall, Mr. Littlefield, Mr. Ludden, Mr. Melnikas, Mrs. Mitchell, Mr. Patton, Mr. Rubright, Miss Samors, Mr. Severino, Mr. Sherman, Mr. Thompson, Mr. Wallshlaeger, Mr. Wood, Mr. Zimmer. INCLUDE LETTERS WITH NUMBER ON SCHEDULE CARD
(A) History (H) Weaving
(B) Visual Communication Design (I) Interior Design
(C) Ceramics (K) Drawing
(D) Design (M) Medieval Art
(E) Art Education (P) Oil and Water Color Painting
(G) Graphic Arts (S) Sculpture
Advanced study for students in specialized programs.

670 (5) W. The Art of Ancient Egypt and the Near East. 5 cl. Mr. Rubright. The specialized study of the art and archaeology of the valleys of the Nile and Tigris in ancient times.

671 (5) S. Ancient Greek and Roman Art. 5 cl. Mr. Rubright. 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.

673 (5) Su.A. Medieval Art. 5 cl. Mr. Ludden. A selective survey of the Early Christian, Byzantine, Romanesque, and Gothic arts, considered in their social and cultural context.

675 (3) W. Latin-American Art. 3 cl. Mr. Baigell. A survey of the Pre-Columbian, Colonial and Modern periods in Hispanic America and Brazil.

678 (5) W. Nineteenth Century European Art. 5 cl. Mr. Ludden. A study of European art from NeoClassicism through Post-Impressionism. Emphasizing the study of the works of the major painters.

679 (3) W. Primitive Art. 3 cl. Prereq: two basic courses in the history of Art, or two basic courses in Anthrop, or permission of instructor. Mr. Kaplan. The art of various ethnic groups from prehistoric times to the present. Staff members of the Anthropology Area will collaborate.

682 (5) A. American Art. 5 cl. Mr. Baigell. A study of architecture, painting, and sculpture in America during the eighteenth, nineteenth, and twentieth centuries.

684 (5) S. Northern Renaissance Arts. 5 cl. Mr. Ludden. The art of The Netherlands, France, Germany, and England from 1400 to 1500—with emphasis on Van Eyck, Rogier van der Weyden, Fouquet, Durer, Holbein, Bosch, and Breughel.

685 (3) A. Museum Problems. History of Art Staff. A seminar—with practical exercises and field trips—concerning the organisation, functions, and objectives of museums of art. An introduction to professional work in museums.

686 (5) W. Art of the Seventeenth Century in Europe. 5 cl. Mr. Lawall. Baroque Art in Italy, France and the Lowlands—with emphasis on the major artists.
687 (5) A. Comprehensive Drawing. 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 (5) Su.A. Graphic Processes. 5 3 hr lab. Prereq: 500. Graduate students must have had fifteen qtr hrs of course work in drawing and painting. 
Mr. Chaftetz
Woodcuts, etchings, and engravings explored by students as means for individual expression.

689 (5) A. Greek Archaeology. 5 cl. Mr. Rubright
Minoan-Mycenaean civilization as revealed by archaeology. Classical Greek sites will emphasize the arts and social, economic, religious data provided by the archaeological material.

704 (3) S. Spanish Art. 3 cl. Not open to students who have credit for:
674. Miss Samors
A selective study of the architecture, sculpture, painting, and minor arts of Spain.

705 (3) S. Italian High Baroque Art. 3 cl. Mrs. Berendsen 
Study of painting, sculpture, architecture and theatrical aspects of Italian High Baroque Art with emphasis upon Rome as a center.

728 (3-5) A. 729 (3-5) W. Advanced Sculpture. 3-5 hr lab. Prereq: 562
Mr. Black, Mr. Freeman, Mr. Thompson, Mr. Winkle
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.

730 (5) S. Renaissance Painting in Tuscany. 5 cl. Prereq: 654 or permission of instructor. Mr. Melnikas
Painting tradition in Florence and Siena (from Duccio and Giotto to Michelangelo and Mannerists); emphasis on how paintings of major Tuscan artists reflect cultural trends.

790 (4) Su. Art Workshop for Elementary Teachers. Full time of student for first three weeks of second term. Prereq: three years of work in professional education curriculum. Not open to students who have credit for Fine Arts 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.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 level except by permission of the Graduate Council.

701 (1-5) Su.A. 702 (1-5) W. 703 (1-5) S. Minor Problems. Repeatable to a maximum of 15 cr hrs. Mr. Hausman, Mr. Atherton, Mr. Baigell, Mr. Barkan, Mr. Baughman, Mrs. Berendsen, Mr. Black, Mr. Bogaty, Mr. Cademayne, Mr. Chaftetz, Mr. Cour, Mr. Ecker, Mr. Freeman, Mr. Friley, Mr. Gatrell, Mr. Hall, Mr. Hewett, Mr. Hohnew, Mr. Jones, Mr. Kaplan, Mr. Keal, Mr. Ketts, Miss Krumm, Mr. Lawall, Mr. Littlefield, Mr. Ludden, Mr. Mangelas, Mrs. Mitchell, Mr. Patton, Mr. Rubright, Miss Samors, Mr. Severin, Mr. Sherman, Mr. Thompson, Mr. Wallschlaeger, Mr. Wood, Mr. Zimmer

INCLUDE LETTERS WITH NUMBER ON SCHEDULE CARD

(A) History
(C) Ceramics
(D) Design
(E) Art Education

(G) Graphic arts
(P) Painting
(S) Sculpture

705 (2) A. Perception-Art Form Seminar. 2 cl. Mr. Sherman 
Seminar utilizing the Ames Visual Demonstration Center as a basis for discussion of perception and aesthetic form.

710 (5) Su.A. Art Education in the Elementary Schools. Not open to students who have credit for 713. Mr. Barkan, Mr. Hausman
The role of the Art Supervisor for curriculum development and instruction in the elementary school program.

714 (5) Su (First Term), A. Art Education in the Secondary Schools. Mr. Barkan, Mr. Hausman
The role of the Arts Supervisor for curriculum development and instruction in secondary school programs.
715 (3-5) SuA. Minor Seminar for the Practicing Art Teacher. Mr. Barkan, Mr. Hausman
Curriculum problems in teaching the visual arts. Studio work in related arts; theoretical considerations.

718 (3-5) S. Research Problems in Art Education. Mr. Barkan, Mr. Hausman
Problems of art education at the elementary, secondary, and college level. Individual student problems will be initiated in light of current educational needs.

[720] (3) A. Research Methods. History of Art Staff
Investigation of source materials and bibliography of the fine arts.

721 (3-5) W. Art Theory and Criticism. History of Art Staff
Investigations of theories of Art and their applications.

722 (3-5) A. 723 (3-5) S. Ceramic Design Techniques. Mr. Bogatay
Personal development in the techniques and processes of the ceramic designer with emphasis upon quality as evidenced in form, color, and decoration.

724 (3-5) A. 725 (3-5) W. Painting. Mr. Gatrell, Mr. King, Mr. Sherman, Mr. Chadeayne, Mr. Cauri
The painter's development as a creative artist, the relation of theory and practice. Individual and group criticism in work in progress. Lectures and field trips.

726 (3-5) S. [727] (3-5) S. Mural Painting. Mr. Sherman
Studies in wall decoration for specific architectural settings. Presentation sketches and full-scale execution. Traditional and contemporary media.

801 (3-5) Su.A. 802 (3-5) W. 803 (3-5) S. Research Problems. Repeatable to a maximum of 15 cr hrs. Mr. Hausman, Mr. Atherton, Mr. Barkan, Mrs. Berendsen, Mr. Bogatay, Mr. Chadeayne, Mr. Chafetz, Mr. Cauri, Mr. Ecker, Mr. Gatrell, Mr. Jones, Mr. Kaplan, Mr. King, Mr. Kitts, Miss Krumm, Mr. Lawall, Mr. Littlefield, Mr. Ludden, Mr. Melnikas, Mr. Patton, Miss Samors, Mr. Severino, Mr. Sherman, Mr. Wood, Mr. Zimmer to a maximum of 15 cr hrs.

INCLUDE LETTERS WITH NUMBER ON SCHEDULE CARD

801C Ceramics 801P Painting
801E Art Education 801S Sculpture
801G Graphic Art

804 (2-5) Su.A.W.S. Seminar in History and Criticism of Art. Repeatable to a maximum of 15 cr hrs.

INCLUDE LETTERS WITH NUMBER ON SCHEDULE CARD

[804A] Su.S. Oriental Art. Mr. Kaplan
804B S. Art Theory and Criticism. Mr. Ludden
804C W. Medieval and Renaissance Art. Mr. Ludden
804D A. Modern Art. Mr. Ludden
804E W. American Art. Mr. Patton
804F S. Italian Renaissance. Mr. Melnikas

813 (3-5) W. 814 (3-5) S. Problems in Ceramic Composition. Mr. Littlefield
Research in the development of special ceramic compositions pertinent to particular problems in ceramic design.

815 (3-5) W. 816 (3-5) S. Historical Materials and Processes. Mr. Atherton
Original research in derivations and use of historical ceramic materials and processes with specific relation to the problems of the ceramic industrial designer or the practicing potter.

817 (3-5) W. Painting. Mr. Gatrell, Mr. King, Mr. Sherman, Mr. Chadeayne
Emphasis on the principles of abstraction in pictorial organization. Attention to the relation of subject matter and abstraction as related to contemporary and traditional approaches.

818 (3-5) A. 819 (3-5) W. 820 (3-5) S. Advanced Sculpture. Mr. Free
Advanced sculpture with a wide range of choice in media.

950 (arr) Su.A.W.S. Research in Fine Arts.
Research for thesis and dissertation purposes only.
FORESTRY
Department of Forestry and Wood Science
Office, 118 Forestry and Wood Science Building, 1827 Neil Ave.

PROFESSORS HOWLETT, LAURIE (EMERITUS), W. N. BROWN, CHADWICK, ALBAN
RIPLINGER, HARTMAN, HILL, AND GOUJD, ASSOCIATE PROFESSOR REINCE
ASSISTANT PROFESSORS COWEN, GRIFFIN, MILLER, TOUSE, AND ASSISTANTS

FOR UNDERGRADUATES

402 (3) S. Farm Forestry. 2 cr, 1 2 hr lab. For agricultural students.
Farm forestry, its relation to farm management, good land use, and the conservation of soil,
water, and wildlife. The measurement, harvesting, utilization, and marketing of farm forest
products.

406 (3) A. Forest Products. 3 1 hr cr. Mr. Touse
A study of the products made from wood and products derived from wood by chemical
and other means—emphasis on wood as a construction material.

408 (3) S. Hardwood Dendrology. 2 cr, 1 2 hr lab. Prereq: Bot 401. Mr.
Touse
A study of the principal species of Angio sperms in the United States with emphasis on
identification, range, and silvical characteristics.

409 (3) A. Coniferous Dendrology. 2 cr, 1 2 hr lab. Prereq: Bot 401 and
402. Mr. Touse
A study of the principal species of Gymno sperms in the United States with emphasis on
identification, range, and silvical characteristics. One Saturday field trip.

410 (5) A. Principles of Forestry. 3 cr, 2 2 hr lab. Mr. Touse
History of American forests, their character and occurrence; underlying fundamentals of
silviculture and forest management; introduction to forest management and protection.

502 (3) S. Silvics. 3 cr. Prereq: Bot 401-402. Mr. Touse
The effect of site factors on forest vegetation and action of forest cover on site.
Characteristics of individual trees and forest stands.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

701 (2-5) Su,A,W,S. Minor Investigations. Prereq: permission of instruc-
tor.
Special problems in the field of pomology, vegetable gardening, floriculture and ornamental
horticulture, horticultural products or forestry.

FOR GRADUATES

950 Su,A,W,S. Research in Forestry.
Research for thesis and dissertation purposes only.

FRENCH
Department of Romance Languages and Literatures
Office, 115 Derby Hall

PROFESSORS LUIGI BORELLI, SCHUTZ, DEMOREST (EMERITUS), HAVENS, (EMER-
TUS), MONKOE (EMERITUS), AND MOORE (EMERITUS), ASSOCIATE PROFESSORS
BULATKIN, CARLUT, MEIDEN, AND FUMSLKUR, ASSISTANT PROFESSORS MARY
BORELLI, MITCHELL, MRS. FOWDEN, AND ASSISTANTS

FOR UNDERGRADUATES

401 (5) Su,A,W,S. Elementary French. Sections limited to 25 students.
This course may not be taken simultaneously with Span 401-402, Ital 401-402,
or by 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. Staff
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 (5) Su, A, W, S. Elementary French. Prereq: 401. Sections limited to 25 students. This course may not be taken simultaneously with Span 401-402, Ital 401-402. Staff

Review of salient points of elementary grammar, attention to French idioms. Reading of short stories, plays, and novels.


410 (5) A, W, S. Elementary French Conversation and Composition. Prereq: 404 Course conducted in French. Sections limited to 15 students. Mrs. Foureman
Intensive practice in oral and written French, based on texts and periodicals concerned with French life of today. Grammar and idiom review.

415 (5) W. 416 (5) S. Elementary-Intermediate French for Selected Students. 5 cl, Prereq: Grad "A" in 401 and permission of Department. Staff
Successful completion of 401-415-416 fulfills language requirements and satisfies prereq for 500 courses.

Not open to students who have credit for 417. Staff
Rapid reading and discussion of French literary movements and masterpieces of the nineteenth century and their relation to modern France.

Review of French grammar; composition on assigned topics and practice in translation.

Vocabulary building, practice in speaking French, conversation and composition dealing with social and economic aspects of French life.

522 (2) W. Intermediate French Conversation and Composition. Prereq: 410. Mr. Carlut
Vocabulary building, practices in speaking French, conversation and composition dealing with intellectual and artistic aspects of French life.

530 (5) S. Masterpieces of French Literature. Prereq: 417 or 517. Mrs. Bulatkin
Emphasis on texts of the sixteenth, seventeenth, and eighteenth centuries.

705 (3-10) A. 706 (3-10) W. 707 (3-10) S. Honors Courses in French. Prereq: senior standing, with a record of A in at least half of the French courses and an average of B in the remainder, and the approval of the department. This course is intended to give undergraduates of special aptitudes a greater opportunity to do independent study than is possible in the ordinary course. Not open for graduate credit. Staff
Work in conferences, library or phonetics laboratory.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

Students intending to major in French in the College of Arts and Sciences and in the Grad.

School are urged to elect the following courses outside the department: Class Lang 629, 631,


#603 (5) W. The Romantic Period in French Literature, 1800-1850. Prereq: 417 or 517. Mr. Carlut
The development of romanticism and rise of realism in the first half of the nineteenth century, in the novel, poetry and drama.

#616 (5) A. French Literature of the Renaissance. Prereq: 417 or 517.
Mr. Schutz
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 (5) A. French Classicism, 1600-1715. Prereq: 417 or 517.
The formation of the classic spirit. The perfection of dramatic form and the seventeenth century portrait of man.

#618 (5) S. French Literature of the Enlightenment. Prereq: 417 or 517.
A study of the ideas of the eighteenth century in their relation to modern times. Special emphasis on Montesquieu, Voltaire, Diderot, and Rousseau.

#619 (3) S. French Translating. Prereq: 518 or 520 or equiv or permission of instructor. Mrs. Borelli.
Translating from French to English and from English to French.

#628 (5) W.S. Modern French Syntax. Prereq: 518. Mr. Meiden
Systematic review of French grammar with composition and other exercises, based on contemporary authors. Modern tendencies in syntactic analysis.

#632 (5) Su.A.W.S. French Pronunciation. Prereq: 410 or equiv. Sections limited to 12 students.
Formation of French sounds, rules of pronunciation and diction; lectures and practical exercises; use of phonetic symbols.

#634 (3) A. Contemporary French Drama. Prereq: 417 or 517. Mr. Carlut
Plays of Lenormand, Romains, Claudel, Giraudoux, Cocteau, Monttherian, Anouilh, Sartre, Camus and Ionesco. The different theatres and directors from Copeau to the present day.

#635 (3) W. La civilisation française jusqu'à la Révolution. Prereq: 520, 518, or 521, or 522. Courses conducted in French. Mr. Carlut.
Major developments of French culture down to the nineteenth century.

#636 (3) A. La civilisation française depuis la Révolution. Prereq: 520, 518, or 521 or 522. Course conducted in French. Mr. Carlut.
Life, institutions, and culture of France since 1800.

#638 (3) S. Advanced Spoken and Written French. Prereq: 521, 522 and 628 or equiv. Sections limited to 12 students.
Intensive practice in speaking and writing French. Based on contemporary usage.

#639 (3) Su.S. Explication de textes. Prereq: 417 or 517 and one 400 literature course. Repeatable to a total of 6 cr hrs. Mr. Davidson
Intensive linguistic and literary exploration of representative passages from modern French authors. Su. 1963. Topic to be announced.

#640 (5) Contemporary French Literature. Prereq: 417 or 517.
Twentieth century literary currents and their significance, with special attention given to the novel, Proust, Gide, Malraux, Mauriac, Bernanos, Saint-Exupéry, Camus, Sartre and others.

#645 (3-5) Su.W. French Literature. Prereq: 417 or 517. Repeatable to a maximum of 15 cr hrs.
#646 (3) To be announced.
#647 (3) To be announced.

#651 (3) A. Modern French Poetry. Prereq: 417 or 517. Mr. Borelli
Sources and processes of poetic creations as exemplified in selected works of French poets from Baudelaire to Valéry.
FRENCH 139

670 (5) A. French Literature in English Translation. Prereq: junior standing. Not open to French majors: (following "English or American Literature"). Mr. Mitchell
A survey of French masterpieces in English translation from Montaigne to Proust with special reference to their bearing on English or American literature.

701 (1-5) Su,A,W,S. Minor Problems in French. Prereq: permission of the instructor. Staff

729 (1-5) A. History of the French Language. Req'd of M.A. Candidate in French; others by permission of instructor. Mrs. Bulatkin
A survey of Roman times to the present with emphasis on cultural and social factors. The relations of language to literature. Modern principles and methods in linguistics.

FOR GRADUATES

405 (0) Su,A,W,S. Reading of French. 3 cl. No Prereq. Graduate students only. The fee for this course will be the same as that for a three hour credit course. No hours credit will be allowed for this course for graduation. Mrs. Borelli
Designed primarily for students who have no formal preparation in French and who wish to acquire a reading knowledge.

801 (3) W. Introduction to Old French. Prereq: knowledge of Latin. Req'd of all Ph.D. candidates. Mr. Schutz
Elements of Old French phonology and morphology.

802 (3) S. Introduction to Old French. Prereq: 801. Mr. Schutz
Continuation of 801, with increased attention to linguistic geography, text criticism, semantics. Short review of schools and scholars in Romance philology.

803 (3) A. Old Provençal. Prereq: French 802 or Span 806. Mr. Schutz
Origins of the troubadour lyric. Its history, as to form and content, in the eleventh and twelfth centuries. Elements of phonology and morphology.

804 (3) W. Old Provençal. Prereq: 803. Mr. Schutz
Troubadour lyric in the thirteenth century. Increased attention to non-lyric genres, and to prose. Continuation of linguistics, with greater emphasis on semantic problems.

[805] (3) A. Middle French Literature. Prereq: 818. Mr. Schutz
Survey from about 1300 to 1465. Machaut, Froissart, Deschamps, Christine de Pisan, Charles D'Orléans, Villon, Anglo-French literary relations, with special reference to Chaucer.

811 (2-3) Su. (3-5) A. Seminar in French Literature. Prereq: permission of instructor.
Su. 1st Term: to be announced.
A. Mr. Davidson: Molieres

812 (2-3) W. Seminar in French Literature. Prereq: permission of instructor.
Su. 2nd Term: to be announced.
W.: To be announced.

813 (3) W. Old French Literature. Req'd of M.A. candidates. Mr. Bulatkin
Lectures on main currents of Old French literature to 1396. Reading of the Chanson de Roland, Yvain of Chrétien de Troyes, Béroul's Tristan, representative lyrics.

817 (3-5) S. Seminar in French Literature. Prereq: permission of instructor.
Mr. Borelli: Balsac

880 (3) A. Bibliography and Method. Req'd of all Ph.D. candidates in French. Mr. Borelli
A course to acquaint graduate students with tools, problems and methods of linguistic and literary research.

950 Su,A,W,S. Research in French Language or Literature.
Research for thesis and dissertation purposes only.
GEODETIC SCIENCE
Office, 239 Graduate School
Edward Q. Moulton, Acting Chairman

PROFESSORS HEIKANEN, BRANDENBERGER, AND LAURILA, ASSOCIATE PROFESSOR UOTILA, ASSISTANT PROFESSOR MUeller, MR. GHOSH AND ASSISTANTS

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores. Prerequisites for all courses in this group include Mathematics 538 or 543, Physics 412 and 413 or 528 and 535, and Civil Engineering 502. Civil Engineering 502 may be waived where the student can demonstrate through previous experience a comprehensive understanding of the topics embraced in this course offering.

611 (3) W. Geodesy I. 2 cl, 1 3 hr lab. Not open to students who have credit for 540.

The principles, purposes, and methods of geodesy. Geodetic instruments and observations.

612 (3) S. Geodesy II. 2 cl, 1 3 hr lab. Prereq: 540 or 611. Not open to students who have credit for 640.

Techniques and formulas for horizontal survey on the sphere. Methods of horizontal and vertical survey.

617 (4) S. Geodetic Astronomy. 3 cl, 1 3 hr lab. Prereq: 540 or 611, Astron 402 or 500.

The determination of time, latitude, longitude and azimuth from astronomic observations.

621 (3) A. Photogrammetry I. 2 cl, 1 3 hr lab. Not open to students who have credit for 545.


622 (3) W. Photogrammetry II. 2 cl, 1 3 hr lab. Prereq: 540 or 611, 545 or 621, concur 653. Not open to students who have credit for 645.


623 (3) S. Photogrammetry III. 2 cl, 1 3 hr lab. Prereq: 622 or 645, concur 654. Not open to students who have credit for 745.


625 (3) W. Photo Interpretation. 2 cl, 1 3 hr lab. Prereq: 621, Geol 401 or 488, 461. Not open to students who have 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 (3) A. Map Projections. 3 cl. Not open to students who have credit for Geography 612.

The description of the various map projections used for major map series.

653 (4) W. Adjustment Computations I. 3 cl, 1 3 hr lab. Prereq: Concur 611. Not open to students who have credit for 600.

The principles of the theory of errors and of adjustment computations.

654 (3) S. Adjustment Computations II. 2 cl, 1 3 hr lab. Prereq: 653 or 660, concur 612. Not open to students who have credit for 760.

Adjustment of observed data with method of variation of parameters and of correlates. Standard error of unknowns and functions.

656 (5) Su, First Term. Field Work in Geodesy. 4 cl, 5 4 hr lab. Prereq: 612 or 640. Not open to students who have credit for 602a.

657 (5) Su, Second Term. Field Work in Geodetic Astronomy. 4 cl, 5 4 hr lab. Prereq: 617.
688 (5) Su, Second Term. Field Work in Photogrammetry. 4 cl, 5 4 hr lab. Prereq: 612 or 640, 623 or 745. Not open to students who have credit for 629b. Prerequisites for all courses in this group include Geodetic Science 622 or 646, 654 or 760 and at least five hours of Mathematics courses in the 600 or higher level.

711 (3) A. Geodesy III. 2 cl, 1 3 hr lab. Prereq: permission of instructor. Not open to students who have credit for 740.

721 (3) W. Aerial and Terrestrial Photography. 2 cl, 1 3 hr lab. Prereq: 623 or 745. Not open to students who have credit for 757.

723 (4) A. Stereophotogrammetry I. 2 cl, 1 3 hr lab. Prereq: 623 or 745 or permission of instructor. Not open to students who have credit for 864.

725 (3) A. Photogrammetry in Practice. 2 cl, 1 3 hr lab. Prereq: 625 or 745. Not open to students who have credit for 756.

751 (4) W. Physical Geodesy. 3 cl, 1 3 hr lab. Prereq: Geol 735 and Geod Sc 711. Not open to students who have credit for 606.

753 (3) A. Advanced Adjustment Computations. 2 cl, 1 3 hr lab. Not open to students who have credit for 742.

755 (3) W. Electronic Surveying I. 3 cl. Prereq: 711 or 740. Not open to students who have credit for 742.

759 (3) S. Electronic Surveying II. 2 cl, 1 3 hr lab. Prereq: 742 or 758.


FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

Geodetic Science 711 or 740 must be taken prior to or concurrent with any of the courses in this group.

811 (3) S. Advanced Geometric Geodesy. 2 cl, 1 3 hr lab. Not open to students who have credit for 861.

822 (4) W. Stereophotogrammetry II. 3 cl, 1 3 hr lab. Prereq: 723 or 864. Not open to students who have credit for 865.

824 (3) S. Aerial Triangulation. 2 cl, 1 3 hr lab. Prereq: 823 or 865. Not open to students who have credit for 866.

825 (3) S. Analytical Photogrammetry. 2 cl, 1 3 hr lab. Prereq: 623 or 745. Not open to students who have credit for 867.


831 (4) W. Advanced Map Projections. 3 cl, 1 3 hr lab. Prereq: Geog 612.
The theory of various types of maps with special attention to maps used in the United States.

831 (4) S. Advanced Physical Geodesy. 3 cl, 1 3 hr lab. Prereq: 751, 752 or 842. Not open to students who have credit for 843.

Applications of celestial mechanics in geodesy, modern theories in physical geodesy, analysis of the gravity distribution of the earth; description of gravity field at high elevations.

855 (3) A. Celestial Methods in Geodesy. 3 cl, Prereq: 617. Not open to students who have credit for 802.
The use of eclipses, occultations, rockets, and satellites for geodetic purposes.

Research for thesis and dissertation purposes only.

GEODETIC SCIENCE

Office, 156 Hagerty Hall

PROFESSORS TAFFEE, VOGHEE (EMERITUS), CARLSON (EMERITUS), SMITH, RANDALL, AND HOFFMAN, ASSOCIATE PROFESSORS BASILE, HUNKER, VILLMOW, BROWN, AND SEA WALL, ASSISTANT PROFESSORS PATTEN AND SILVERNAIL, ASSISTANT INSTRUCTORS AND GRADUATE ASSISTANTS

The courses in the field of geography may be grouped as follows:
I. Physical environment: 401, 615, 701.
II. Economic and cultural geography: 503, 505, 605, 615, 634, 651, 697, 701.
IV. Regional geography: 504, 505, 605, 620, 621, 622, 624, 625, 626, 627, 701.
V. Techniques: 519, 611, 612, 700, 702, 726.
VI. Commerce: 630, 631, 632, 634, 701.

FOR UNDERGRADUATES

401 (5) Su,A,W,S. Introduction to Geography. 5 cl. Mr. Randall, Mr. Basile, Mr. Villmow, Mr. Seawall, Mr. Silvernail, and Assistants
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.

403 (5) Su,A,W,S. Economic Geography. 5 cl. Prereq: 401. Not open to students who have credit for 503 or 504. Mr. Smith, Mr. Wright, Mr. Hoffman. Mr. Hunker, Mr. Brown, Mr. Patten
Geography of the world's principal commodities; a survey of the economic activities of the major political areas in relation to their geographic conditions.

503 (3) A,W,S. Fundamentals of Economic Geography. 3 cl. Prereq: 3 yr standing. Not open to students who have credit for 403 or 504. Mr. Hoffman. Mr. Hunker
Elements of the human habitat with particular emphasis on world resources, geographic and economic factors in the development of the major industrial areas of the world.

504 (5) Su,A,W,S. World Regional Geography. 5 cl. Not open to students who have credit for 403 or 503. Mr. Randall
A comparative study of representative regions of the world. An examination of the cultural, social, economic, and political developments in relation to the geographic conditions.

505 (3) Su,A,W,S. Geography of the United States and Canada. 3 cl. Prereq: 401, 403. Also open to seniors majoring in Ager Econ, Conserv, Econ, Enr. Pol Sci, or other closely related fields. Mr. Wright, Mr. Hunker
A geographical analysis of the United States and Canada, the correlation of their natural resources and other environmental factors with their economic and cultural development.
510 (3) A. An Introduction to Cartography. 3 cl. Mr. Basile
Cartographic techniques, map compilation, scales, generalization, symbolization, grid systems, reproduction, and map-making instruments and equipment.

710 (4) A.W.S. Military Aspects of World Political Geography. 4 cl. Prereq: 401, 403, or Pol Sci 613, or 10 cr hrs in Hist or senior standing in advanced ROTC. Req'd of all seniors in Air Force ROTC. Not for graduate credit. Mr. Randall, Mr. Brown
The power position of a state or a group of states. The security of the United States, geographic, economic, and political factors and the power potential of a state.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

603 (3) W.S. Localization of Manufacturing Industries. 3 cl. Prereq: 401, 403, or Econ 401-402, or 4th or 5th yr standing in Eng. Mr. Wright
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 (3) A. Conservation of Natural Resources. 3 cl. Prereq: 401, 403, or 15 cr hrs of allied subjects. Mr. Wright
Economic and geographic appraisal of resource conservation in the United States. Regional and national planning for resource utilization.

605 (3) W. Geography of Ohio. 3 cl. Prereq: 401, 403, or 15 cr hrs of allied subjects. Mr. Wright
An appraisal of geographic factors in the development of Ohio's natural resources, agriculture, manufacturing, and commerce. Historical development of the major economies.

611 (3) W. Cartography and Map Interpretation. 3 cl. Prereq: 401, 403, or 10 cr hrs of allied subjects. Mr. Smith
Map projections and their uses for particular maps and the map series published by the United States government, by foreign countries, and by private map-producing organizations.

615 (4) A. Climatology. 4 cl. Prereq: 15 cr hrs of natural or social science, including one of the following: 401, Physics 420, Bot 402, or Agron 501. Mr. Smith, Mr. Basile
The elements and the controls of climate. Types of climate and their distribution. Climates and their effects on the economic and other activities of man.

620 (3) Su.W. Geography of Eastern Europe. 3 cl. Prereq: 401, 403. Also open to seniors and graduates in Econ, Hist, Pol Sci, or other closely related fields. Mr. Brown
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.

621 (3) A. Geography of Western Europe. 3 cl. Prereq: 401, 403. Also open to seniors and graduate students in Econ, Hist, Pol Sci, or other closely related fields. Mr. Villmow
Geographic factors in the economic, social and political progress of the nations of Western Europe. Major problems of the area in the light of their geographic background.

622 (3) S. Geography of the Soviet Union. 3 cl. Prereq: 401, 403. Also open to seniors and graduate majors in Econ, Hist, Pol Sci, or other closely related fields. Mr. Villmow
The major regional divisions of the Soviet Union. The resource base in relation to the economic and political aims of the Soviet State.

624 (3) W. Geography of Latin America. 3 cl. Prereq: 401, 403. Also open to seniors and graduate majors in Econ, Hist, Pol Sci, or other closely related fields.
Geographic regions of Latin America. Development of the political division in relation to their geographic conditions. A geographic analysis of inter-American affairs.
625 (3) S. Geography of the Far East. 3 cl. Prereq: 401, 403. Also open to seniors and graduate majors in Econ, Hist, Pol Sci, or other closely related fields. Mr. Hoffman.
The geographic divisions of southern, southeastern, and eastern Asia. The major activities of the people in the regions of densest population and greatest economic importance.

626 (3) S. Geography of the Middle East. 3 cl. Prereq: 401, 403. Also open to seniors and graduate majors in Econ, Hist, Pol Sci, or other closely related fields. Mr. Randall.
The Middle East and its natural regions in relation to local and international problems. Physical and cultural patterns in relation to the current economies.

627 (3) W. Geography of Africa. 3 cl. Prereq: 401, 403. Also open to seniors and graduate majors in Econ, Hist, Pol Sci, or other closely related fields. Mr. Patten.

630 (3) Su,W. Geography of Transportation. 3 cl. Prereq: 401, 403, or 504, or 15 cr hrs of allied subjects. Mr. Seawall.
A geographical analysis of the nature and distribution of rail, water, highway, pipe line and air transport facilities and their importance in regional development.

631 (3) A. The Historical Geography of Commerce. 3 cl. Prereq: 401, 403, or Hist 401-402. Mr. Hoffman.
Geographic factors in commerce to 1900. Resources and production in the ancient and medieval world. Trade routes and the exchange of goods and ideas.

633 (3) A.S. The Geography of Modern Commerce. 3 cl. Prereq: 401, 405. Also open to seniors majoring in Econ or Pol Sci. Mr. Basile.
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 (3) W.S. Urban Geography. 3 cl. Prereq: 401, 403, and senior standing. Mr. Hunker.
Origin and growth of cities. Structure and function of urban centers, their areal expansion, and intertrade center relations, each examined in relation to city planning.

651 (3) A. Philosophy of Cultural Geography. 3 cl. Prereq: 401, 403 or 504 and senior standing. Mr. Randall.
Cultural geography, treating of environmentalism, regionalism and other doctrines. An examination of the philosophical elements in geography.

Agr Econ 697 (4) Natural Resources Problems, Programs, and Policies.
(See Agricultural Economics)

700 (2) S. Field Work in Geography. Prereq: 12 cr hrs in Geog. Mr. Basile.
A course in the practice of field observation and geographic mapping.

701 (2-5) Su,A,W.S. Special Problems in Geography. Prereq: 18 cr hrs in Geog and permission of instructor.
Individual study of a special problem or a particular region.

702 (2-5) A,W,S. Special Problems in Cartography. Conferences and laboratory periods to be arranged. Prereq: 15 cr hrs in Geog or closely allied fields and permission of instructor. Mr. Smith, Mr. Basile.
Individual study of cartographical subjects such as: map compilation, map design, color separation, map reliability, analysis of source materials, toponymy, graphical symbolism, physiographic drawing, etc.

(See National Security Policy Studies)

712 (3) W. Political Geography. 3 cl. Prereq: 401, 403, or Pol Sci 613, or 10 cr hrs in Hist. Mr. Randall.
The geographical characteristics of nation states. The geographic factors in the evolution, structure, and function of states. The relation of geopolities to political geography.
798 (2 or 3) Su,A,W,S. Special Studies in Geography. Repeatable by seniors to maximum of 6 cr hrs and by graduate students to a maximum of 12 cr hrs. Prereq: 18 cr hrs in Geog and permission of instructor. Staff

Group study of special topics in various fields of Geography.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate School.

803 (2-5) Su,A,W. Economic Geography. Prereq: 40 cr hrs in related sciences, 30 hrs of which must be Geog. Mr. Smith, Mr. Wright, Mr. Hoffman, Mr. Hunker, Mr. Brown

A study of economic, industrial, or urban geography.

804 (2-5) A,W. Regional Geography. Prereq: 40 cr hrs in Geog and allied subjects. Mr. Smith, Mr. Wright, Mr. Randall, Mr. Hoffman, Mr. Hunker, Mr. Villimow, Mr. Brown

The geographical investigation of a selected area. The region under study to be announced by the department.

805 (2-5) A. Political and Historical Geography. Prereq: 40 cr hrs in related social sciences, 30 hrs of which must be in Geog. Mr. Smith, Mr. Randall

Readings and research in political and historical geography.

807 (2-5) A,W. Physical Geography. Prereq: 40 cr hrs in Geol and Geog. Mr. Smith, Mr. Basile

The study, at an advanced level, of land forms, climate, soils, and other aspects of physical geography.

811 (3) S. History of Geography. 3 cr. Prereq: 18 cr hrs of Geog. Mr. Smith

Readings in the classics. The history of the development of geographic theories. Modern tendencies as seen in current literature.

812 (2-5) S. Cartography and Map Intelligence. Prereq: 30 cr hrs in Geog and closely allied fields. Mr. Smith, Mr. Randall

Readings and research in cartography, graphics, and map intelligence.

850 (2) Su,A,W,S. Seminar in Geography. Not more than two seminars to be given each quarter. Subject to be announced each quarter.

897 (1) A,W,S. Interdepartmental Seminar in Natural Resources.
(See under Interdepartmental Seminars)

899 (1-5) Su,A,W,S. Interdepartmental Seminar.
(See under Interdepartmental Seminars)

950 (arr) Su,A,W,S. Research in Geography.
Research for thesis and dissertation purposes only.

GEOLOGY

Office: 107 Mendenhall Laboratory

PROFESSORS PINCUS, LAMEY (EMERITUS), CARMAN (EMERITUS), SPIEKER (RESEARCH PROFESSOR), STEWART (EMERITUS), GOLDTHWAIT, FULLER, SCHOPP, LA ROCQUE, AND BATES. ASSOCIATE PROFESSORS BULL, ROORE, SWEET, WEISS, AND WHITE, ASSISTANT PROFESSORS FAURE, STEPHENS, SUMMERSON, AND MARFLE (EMERITUS), AND ASSISTANTS

FOR UNDERGRADUATES

415 (S) Su,A,W,S. Introduction to Geology. 4 cr, 11 hr lab. Not open to students who have credit for 401 or 451. Mr. Bates and Staff

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.

417 (S) A,W,S. Physical Geology. 4 cr, 1 2 hr lab, 1 half-day field trip. Prereq: 416. Not open to students who have credit for 401 or 451. Staff

Minerals and rocks and their origin; land forms and how they are produced; structural features of the earth's crust.
GEOL OGY

418 (5) A.W.S. Historical Geology. 4 cl, 1 2 hr lab, 1 half-day field trip. Prereq: 416 or 401 or 451. Not open to students who have credit for 402. Staff. The history of the earth and its inhabitants through geologic time.

505 (3) A. Study of Geologic Maps. 3 2 hr lab. Prereq: 417, 418. Mr. Summerson. Geologic structures as interpreted from geologic maps and aerial photographs.

520 (5) A. Invertebrate Paleontology. 5 cl. Prereq: 418. Mr. La Rocque, Mr. Sweet. A systematic survey of the groups of the invertebrate animals significant in the geologic record.

525 (3) W. The Common Rocks. 3 2 hr lab. Prereq: 401 or 451 or 416 and Mineral 511, 512 or concur. Mr. Moore. A study of the common rocks, their associations and occurrences, and elementary concepts regarding their origin.

533 (3) W. Geology of Water Resources. 3 cl, 1 half-day field trip. Prereq: 401 or 451 or 416. Not open to students who have credit for Geol 433. Mr. Weiss. A study of the geology and hydrology of surface and subsurface waters, with application to conservation programs.

600 (3) S. The Common Mineral Deposits. 3 2 hr lab. Prereq: 525. Not open to students who have credit for 526. Mr. Fauce. A study of the components of the common mineral deposits, their associations and relations; elementary concepts regarding origin of mineral deposits.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

601 (5) A. Geomorphology. 4 cl, 1 2 hr lab, field trips. Prereq: 417 or permission of instructor. Mr. White. 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.

602 (5) W. Structural Geology. 4 cl, 1 2 hr lab. Prereq: 505, and Math 417 or 422. Mr. Moore. A study of the principal kinds of geologic structure and their interpretation.

605 (5) W. Economic Geology: Metals. 5 cl. Prereq: 526 or 600. Mr. Faure. A study of the characteristics and origin of metallic mineral deposits.


607 (5) S. Economic Geology: Petroleum. 3 cl, 2 2 hr lab. Prereq: 602, 618, and 619, or senior standing in Petr E. Mr. Bates. A study of the principles of petroleum geology.

# [608] (3) S. Stratigraphic Geology of Ohio. 2 cl, field trips. Prereq: 525, 518 or permission of instructor. Mr. Sweet, Mr. Weiss. Field trips, lectures, reading, and reports.

609 (5) S. Petrology. 4 cl, 1 2 hr lab. Prereq: 525 and Mineral 512. Mr. Moore. The origin, occurrence, association, chemical relationships, and distribution of rocks; laboratory study of rocks.

#611 (5) W. Geomorphology of Western United States. 5 cl. Prereq: 601, 602 recommended. Mr. White
Geomorphology of the United States west of the Central Lowlands, using structure and
stratigraphy of the physiographic provinces as background.

#613 (5) S. Glacial Geology. 5 cl, field trips. Prereq: 601, Mr. Goldthwait
The features produced by glaciers, present or past, with special reference to features pro-
duced in Ohio.

#615 (3) S. Geologic Surveying. 1 cl, 2 3 hr lab. Prereq: 505, and Math
417 or 422. Mr. Moore
Techniques used in field mapping; field practice in the use of instruments; use of aerial
photographs.

#618 (3) W. Paleozoic Stratigraphy. 3 cl. Prereq: 520. Mr. Weiss
The principles of stratigraphy and related historical geology, developed by study of selected
American and European Paleozoic examples.

#619 (3) S. Mesozoic and Cenozoic Stratigraphy. 3 cl. Prereq: 520. Mr.
Spieker
The principles of stratigraphy and related historical geology, developed by study of selected
American and European Mesozoic and Cenozoic examples.

#622 (3) W. Vertebrate Paleontology. 3 2 hr lab. Prereq: 520 and Zool
401, or senior standing in Zool or Anat. Mr. Stephens
A study of the phylogenetic development of the fossil vertebrates throughout geologic time.
The evolution of the vertebrate skeleton and various paleoecologic relationships.

#623 (3) S. Microfaunalontology. 3 2 hr lab. Prereq: 520. Mr. Sweet
A study of fossil microorganisms, especially the foraminifera, ostracods and conodonts:
structure, habits, taxonomic relationships, and phylogenetic development; preparation of faunas
and their use in stratigraphic correlation.

#624 (3) A. Advanced Vertebrate Paleontology. 3 2 hr lab. Prereq: 520.
Mr. La Rocque
Laboratory study of fossil faunas, including paleontological techniques and procedures.

#625 (3) S. Paleobotany. 2 cl, 2 2 hr lec and demonstration. Prereq: 416
and 10 hrs Biol Sci. Mr. Schopf
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.

#627a (6) Sn. 627b (6) Sn. Field Geology. Requires full time of student.
Prereq: 505, 523 and 615 and permission of instructor; 520, 618 and 619 rec-
commended. Not for graduate credit. Mr. Spieker and Staff
Concentrated training in the basic essentials of field observation and mapping. The work
is done in central Utah, with headquarters in Ephraim.

#629 (3) A. Geologic Report. 2 cl, conf. Prereq: 627b. Staff
Preparation of geologic report based on field data obtained in Geol 627a and 627b.

#632A (3) S. Exploration Geophysics, Principles. 3 cl. Prereq: 401 or 451
or 416 and Physics 412 or 413 or 532 or 533. Mr. Bull
Principles and techniques of exploration geophysics, with emphasis on gravimetric, geo-
magnetic, seismic, electrical and radioactivity surveys.

#632B (2) S. Exploration Geophysics, Practical. 2 2 hr lab. Prereq:
632A (or concur) or permission of instructor. Mr. Bull
Methods of exploration geophysics. Gravity seismic, electromagnetic, magnetic, and el-
ctrical surveys.

#636 (5) W. Engineering Geology and Hydrogeology. 5 cl. Prereq:
602 or concur 602 or senior standing in Civil E, Mine, or Petr E. Mr. Pineus
Principles and techniques of geology in supporting engineering and hydrology.

#701 (1-5) Su,A,W,S. Special Problems. Prereq: permission of instructor.
Staff
Special problems in any branch of geology for which the student has the proper qualifica-
tions.
#765 (3) S. Coal Geology. 2 cl, 2 2 hr lec and demonstration. Prereq: 606 and permission of instructor. Mr. Schopf
Origin, occurrence, and variation in carbonaceous deposits; geology and economic application of coal analytic and resources data.

706 (4) S. Glaciology. 2 2 hr cl. Prereq: 602, Physics 412, 413, Math 440 or 536, Mineral 511, or permission of instructor. Mr. Bull
Types of glaciers, their feeding, mass budgets, climatic relations, motion, and existing structures.

712 (3) S. Microscopic Sedimentary Petrology. 2 cl, 1 3 hr lab. Prereq: Mineral 722 or equiv. Mr. Weiss
Lectures on the petrology or sedimentary rocks, together with specimen study, particularly by microscopic methods.

713 (3) W. Sedimentary Petrography I. 2 cl, 1 3 hr lab. Prereq: 609, 618 and 619. Mr. Summerson
The theory and application of various techniques in the laboratory study of sediments and sedimentary rocks, chiefly by non-microscopic methods.

714 (3) A. Sedimentary Petrography II. 3 3 hr lab. Prereq: Mineral 621. Mr. Moore
Laboratory preparation and microscopic examination of heavy and light mineral fractions of rock fragments and insoluble residues of sediments and sedimentary rocks, and the interpretation of results.

#(725) (3) A. Analysis of Structural Problems. 3 2 hr lab. Prereq: 602, 609, 618 or 619, and Math 418 or 419 or 435. Mr. Pincus
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.

735 (3) A. Geophysics. 3 cl. Prereq: senior standing in Geol and Math 440 or 536 and Physics 412 or 413 or 532 or 533; or senior standing in Geol or Physics and 401 or 451 or 435; or senior standing in Civil E, Min E, or Petr E. Mr. Bull
Analytical treatment of concepts and methods of gravimetry, geomagnetism, terrestrial electricity, and terrestrial heat; geological interpretation of potential data.

#(736) (3) A. Geophysics. 3 cl. Prereq: senior standing in Geol and Math 440 or 536, and Physics 412 or 413 or 532 or 533; or senior standing in Geol or Physics and 401 or 451 or 435; or senior standing in Civil E, Min E, or Petr E. Mr. Bull
Analytical treatment of concepts and methods of physical oceanography, tectonophysics and seismology; mechanical properties of earth materials.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 840 or 900 group except by permission of the Graduate Council.

812 (3) W. Principles of Sedimentation and Stratigraphy. 3 cl. Prereq: 601, 618, 619, and 609 recommended. Mr. Spieker
The origin, constitution, and relationships of stratified rocks; an approach to the outstanding problems of stratigraphy; processes of sedimentation and their results: interpretation: correlation.

#815 (3) S. Metamorphism. 4 cl. Prereq: 609. Mr. Faure
A study of the processes of metamorphism, with a critical analysis of the rock types produced.

#820 (3) S. Precambrian Geology. 4 cl. Prereq: 602, 609, 618, and 615. Mr. Faure
A study of the principles of Precambrian geology, and the Precambrian geology of important areas.

#821 (3) W. Paleozoic Geology. 3 cl. Prereq: 602, 618, and 619. Mr. Bates
A study of the Paleozoic systems of the United States, subdivision, faunal sequences, and correlation with homotaxial deposits abroad.
#822 (3) S. Mesozoic and Cenozoic Geology. 3 cl. Prereq: 602, 618, and 619. Mr. Spieker
A study of the outstanding Mesozoic and Cenozoic sections of the world, with emphasis on principles of nomenclature, subdivision, correlation, and interpretation.

#823 (3) W. Quaternary Geology. 3 cl. Prereq: 613. Mr. Goldthwait
Chronology of Pleistocene glacial and interglacial events throughout the world; the use of animal and plant remains, soils, and radiocarbon in determining this chronology.

#825 (3) A. Advanced Structural Geology. 3 cl. Prereq: 602, 609, 618 or 619, and Physics 411 or 531. Mr. Pincus
Recognition and interpretation of geological structures; application of theoretical analysis, field observation, and experimental methods to selected problems.

#827 (3) W. Advanced Geomorphology. 3 cl. Prereq: 601. Mr. Goldthwait
A seminar devoted to current and classical problems in geomorphology, such as the origin of submarine canyons or pediments.

#851 (3) W. Seminar in the History of Geology. 3 cl. Mr. LaRocque
Discussion of the development of geologic science, intended to give the student a firm basis for comprehension of the science as it exists today.

#855 (3) W. Seminar in Paleocology. 3 cl. Prereq: 624. Mr. LaRocque
A study of the principles of paleocology with illustrations from the literature and selected faunas.

950 (arr) Su,A,W,S. Research in Geology.
Research for thesis and dissertation purposes only.

GERMAN
Office, 213 Derby Hall

PROFESSORS CUNZ, HURCKHARDT, PLEISCHHAUER, MAHR (EMERITUS), NAUMANN, SKILDIN, AND SPERRER (EMERITUS), ASSOCIATE PROFESSORS BEKKER, WITTENBERG, ASSISTANT PROFESSORS GOTTFALD AND GROENKE, MRS. EDGE, MR. GOODMAN, MR. SCHINDLER, AND ASSISTANTS

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 Bulletin.

Students who are given advanced standing in the department as a result of the placement and proficiency examination become eligible for University credit.

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.

FOR UNDERGRADUATES

401 (5) Su,A,W,S. Elementary German. 5 cl. Credit toward a degree will be granted only if 402 is satisfactorily completed. Staff

402 (5) Su,A,W,S. Elementary German. 5 cl. Prereq: 401 or equiv. Staff

403 (5) Su,A,W,S. Intermediate German. 5 cl. Prereq: 402 or equiv. Staff
Reading of narrative prose; oral and written practice; grammar review.

404 (5) Su,A,W,S. Intermediate German. 5 cl. Prereq: 403, 420, or 412. Staff
Reading of narrative prose; oral and written practice; vocabulary building.
409 (2) A.W.S. Elementary German Conversation. 2 cl. Prereq: 402. Also open to students who completed 401 with grade A. No audit.

412 (15-10-5) Su. Intensive German. Enrollment limited to 15 students. Prereq: permission of chairman. Students who have credit for 401 or 402 may, with the permission of the chairman, enroll in the course for only 5 or 10 credits, though the course must be taken in its entirety. For students with no prior credit in German no partial credit can be granted. Not open to students with credit for 403. 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.

417 (5) W. 418 (5) S. Elementary-Intermediate German for Selected Students. 5 cl. Prereq: grade A in 401. Successful completion of the sequence 401-417-418 fulfills language requirements and provides eligibility for 500 courses. Staff

420 (5) S. Intermediate Scientific German. 5 cl. Prereq: 402. Not open to students who have credit for 408. For students taking B.Sc. curriculum. Staff Reading of narrative prose; oral and written practice; introductory readings in scientific German.

421 (5) A. Intermediate Scientific German. 5 cl. Prereq: 420, 408 or 412. Not open to students who have credit for 404. For students taking B.Sc. curriculum. Staff

Readings in scientific German.

503 (3) S. Intermediate German Conversation. 3 cl. Prereq: 404 and 408 or equiv with a minimum grade of C. 503 may be taken concur with 504. Reqd of students majoring in German. No audit. Staff Practice in spoken everyday idiomatic German, based on texts and periodicals concerning German life today.

504 (2) S. German Composition. 2 cl. Prereq: 404 and 409 or equiv with a minimum grade of C. 504 may be taken concur with 503. Reqd of students majoring in German. No audit. Staff Practice in simple writing with some conversation.

571 (3) A. German Civilization I. 3 cl. Taught in English. Reqd of students majoring in German. Mr. Cunz

The cultural heritage of the German people from the beginning to about 1500. Institutions, phases of civilization, interrelationship of social and literary history.

572 (3) W. German Civilization II. 3 cl. Taught in English. Reqd of students majoring in German. Mr. Cunz

German civilization from Luther to the Age of Goethe. Cultural trends, social changes, historical development to the end of the Holy Roman Empire.

575 (5) A. 576 (5) W. 577 (5) S. Introduction to German Literature. 5 cl. Prereq: 404, 418, or equiv. Students with special aptitude are advised to register also in 503, 504. Students may offer courses in this group in partial fulfillment of requirements in literature under the B.A. curriculum. Staff

575 German Literature of the Classical Period.
Readings from Goethe and Schiller.

576 German Literature of the Nineteenth Century.
Readings from Keller and Meyer.

577 Modern German Literature.
Readings from representative authors such as Mann, Schnitzler, Duerrenmatt.

590 (3) A.W. German Literature in Translation from Goethe to Thomas Mann. 3 cl. Designed for students not majoring in German. This course partially fulfills the B.A. and B.Sc. requirements in literature. Not for credit on a major in German. Mr. Seidlin, Mr. Burckhardt

Social and intellectual forces in Germany as reflected in German literature from Age of Enlightenment to the present. Masterpieces from Goethe to Thomas Mann.
FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.
Prerequisite for 400 courses: ten hours of 500 courses in the department. Exception may be allowed by instructors for students with special qualifications.

# [611] (3) A. German Literature of the Eighteenth Century. 3 cl. Mr. Cunz
The literature of the Enlightenment with special emphasis on Lessing, Klopstock, Wieland, and the young Schiller.

# [612] (3) S. Goethe’s Faust. 3 cl. Mr. Wittkowski
The history of the Faust legend from the sixteenth century to Goethe. Reading and discussion of the drama.

# [613] (3) W. Goethe’s Life and Works. 3 cl. Mr. Seidlin
The development of Goethe’s art and personality. His significance for modern times.

# [614] (3) W. German Romanticism. 3 cl. Mr. Seidlin
The romantic revolt against the ideals of classical humanism. Novalis, the Schlegels, Tieck, Kleist, Eichendorff, E. T. A. Hoffmann.

# [615] (3) A. German Literature of the Nineteenth Century. 3 cl. Mr. Wittkowski
Literary forces and trends from Goethe’s death to the founding of the German Reich (Grillparzer, Buechner, Hebbel, Raimund, Moerike, Stifter, Keller, Meyer).

# [616] (3) S. Contemporary German Literature. 3 cl. Mr. Burckhardt
The main currents of German thought and literature from Nietzsche to the present. Special emphasis on Hauptmann, Schnitzler, Mann, Biike, George, Hofmannsthal, Kafka, Brecht.

# [617] (3) S. Survey of German Literature. 3 cl. Mr. Bekker
A historical survey of German literature from the earliest times to the Baroque.

650 (3) Su. Proseminar. 3 cl. The quarter. Mr. Naumann
a. (1) Su. Proseminar. 3 cl. First term. Mr. Naumann

# [655] (3) S. Introduction to the Historical Study of German. 3 cl. Mr. Groenke
Survey of the history of the German language with an outline of the Germanic languages. Relations between German and English (phonology, words and meanings).

685 (3) W. Advanced Conversation and Composition. 3 cl. Staff

# [691] (2) S. Practical German Pronunciation. 2 cl. Mr. Fleischhauer
Standard German pronunciation. Oral and written drill.

701 (2-10) Su. A, W. S. Minor Problems. Prereq: permission of the Chairman. Repeatable for credit. Mr. Cunz, Mr. Burckhardt, Mr. Fleischhauer, Mr. Seidlin, Mr. Wittkowski
Investigation of minor problems in the various fields of German literature and philology.

# [705] (3) S. Introduction to the Study of Language. 3 cl. Mr. Groenke
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.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate School.

499 (9) Su. A, W. S. Basic German for Graduate Students. 5 cl. No prereq. Open only to graduate students. The fee for this course will be the same as that for a five hour credit course. No hours credit will be allowed for the course for graduation. No audit.

The fundamentals of German grammar, as required for the reading of German texts in the sciences and humanities.
501 (0) Su,A,W,S. Rapid Reading for Graduate Students. 3 cl. Prereq: 499 or thorough knowledge of basic German grammar. Open only to graduate students. The fee for this course will be the same as that for a three hour credit course. No hours credit will be allowed for the course for graduation. No audit. Staff
An accelerated course designed to develop reading ability. Systematic study of practical problems encountered in interpreting and translating technical German.

#501 (4) A. Middle High German. 4 cl. Mr. Fleischhauer
Middle High German texts. Methods of textual criticism.

#510 (3) S. Gothic. 3 cl. Mr. Fleischhauer

#810 (3) [821] (3) A. [822] (3) W. [823] (3) S. History of German Literature until 1700. 3 cl. Prereq: graduate standing. Primarily for 1st yr graduate students. Mr. Bekker
Readings from the earliest period to the end of the 17th century.

860 (5) Su,A,W,S. Seminar in German Literature. 2 cl. Mr. Cunz, Mr. Bekker, Mr. Burchhardt, Mr. Seidlin, Mr. Wittkowski
Selected topics from German Literature after 1800; problems of methods and interpretation.

870 (3) A.W. Seminar in German Linguistics. 2 cl. Mr. Fleischhauer, Mr. Groenke
Selected topics from medieval literature, word history, stylistics, and psychology of language.

950 (arr) Su,A,W,S. Research in German.
Research for thesis and dissertation purposes only.

GREEK
Department of Classical Languages and Literature
Office, 217 Derby Hall

PROFESSORS TITCHENER, BOLLING (EMERITUS), ABBOTT, AND FORBES, ASSOCIATE PROFESSOR W. R. JONES, ASSISTANT PROFESSORS HOLSINGER, AND LENARDON, MR. C. W. FORNARA, AND ASSISTANTS

FOR UNDERGRADUATES

401 (5) A. Elementary Greek. 5 cl. Credit in 401 will be counted toward graduation only if followed by successful completion of 402, or if taken after successful completion of the fourth regular University course in another foreign language. Mr. Lenardon
Grammar and practice in translation of the Greek idiom.

402 (5) W. Elementary Greek. 5 cl. Prereq: 401. Mr. Lenardon
A continuation of grammar and selected reading.

403 (5) S. Plato. 5 cl. Prereq: 402. Mr. Lenardon
Reading in the earlier dialogues; the personalities of Socrates and Plato and their work.

415 (15) Su. Intensive Introduction to Greek. 10 cl and 10 or more hrs of supervised study. Prereq: permission of chairman. Not open to students who have credit for 401, 402, 403. Students must devote their entire time to this course.
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 (5) A. Homer. 5 cl Prereq: 402. Mr. Fornara
Reading in the Iliad and Odyssey: the epic of Greece.
506 (3) W. New Testament Greek. 3 cl. Prereq: 403. Mr. W. R. Jones, Mr. Abbott
A course of reading in the Greek New Testament primarily intended for students interested in theology.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

604 (3) W. Herodotus. 3 cl. Prereq: 401, 402, 403, 504. Mr. Lenardson, Mr. Fornara
Reading and Discussion; assessment of the nature of Herodotus' contribution to literature and history.

605 (3) S. Greek Drama. 3 cl. Prereq: 401, 402, 403, 504. Mr. Lenardson, Mr. Fornara
Dramas by Aeschylus, Sophocles, or Euripides will be read extensively; lectures and discussion on the development and significance of Greek theatre.

631 (1-6) Su A,W,S. Private Reading and Minor Problems. Repeatable. Prereq: 504. Mr. Forbes, Mr. W. R. Jones, Mr. Lenardson
Passages for private reading and topics for investigation will be suggested to meet the needs of the individual students.

FOR GRADUATES

700 (1-6) A,W,S. Advanced Reading. Repeatable. Prereq: 2 qtrs of 631 or 6 cr hrs in 631. Mr. Forbes

705 (3) A. 706 (3) W. 707 (3) S. History of Greek Literature. Prereq: 10 hrs of 631 or equiv. Repeatable for graduate credit. Mr. Forbes
Lectures and assigned reading on the development of Greek Literature; required and suggested passages for translation in each author studied.

HEALTH EDUCATION

Department of Physical Education
(Men) 124 Physical Education Building
(Women) 317 Pomerene Hall

PROFESSORS ALLENBAUGH, CUSHMAN, OBERTUEFFER, SLEPECEVICH, ASSOCIATE PROFESSORS BEYER, FOGLE, ASSISTANT PROFESSORS KAPLAN, SOLLEDER, INSTRUCTOR NOLTE, AND STAFF

400 (1) Su A,W,S. Hygiene. 1 cl and 1 lab hr. Req'd of all freshmen except those who take 410. Not open to majors or minors in Phys Ed, Health Ed, and Dent Hyg Ed. Coordinator, Miss Solleder
This course is designed to influence knowledge, attitudes, and behavior related to individual health.

410 (5) Section for Men. A.S., Section for Women. A.S. Hygiene. 5 cl. Req'd of all students in Health Ed, Dent Hyg Ed, and Phys Ed curricula. Sections for Men, Mr. Cushman; sections for Women, Miss Beyrer
The course aims to establish a basis for positive health and efficiency through a consideration of various conditions and factors which affect health.

473 (1) Su A,W,S. First Aid. 2 cl. Staff
A consideration of first aid practices to the injured. Includes laboratory experience as well as lecture and discussion. Completion leads to Red Cross certificates in first aid.

610 (3) Su A,W,S. Health Education for Secondary Teachers. 3 cl. Req'd of all students preparing for secondary school teaching except those in Health Ed or Phys Ed. Not open for graduate credit. Mr. Cashman, Miss Beyrer, Mr. Kaplan, Miss Slepecevich, Miss Allenbaugh, Miss Solleder, Miss Nolte.
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.
FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

609 (3) Su, A.W.S. Health Education for Elementary Teachers. 3 cl. Not open to undergraduate or graduate minors or majors in Phys Ed or Health Ed. Mr. Obertseuffer, Miss Sliepecevich, Miss Allenbaugh, Mrs. Fogle, Miss Beyrer, Miss Solleder

The teacher's responsibility for health of school child. Screening, referral, vision and hearing, nutritional problems, instructional programs, emergency care, teacher's health.

641 (3) A. Personal Health Problems. 3 cl. Mr. Cushman, Miss Beyrer

An advanced course in personal health problems. Extensive reading and reporting in selected health areas.

644 (4) Su, S. The Teaching of Health. 5 cl. Prereq: 410 or equiv. Mr. Obertseuffer, Miss Sliepecevich, Mr. Cushman, Miss Beyrer, Miss Allenbaugh, Miss Solleder, Miss Nolte

Principles, methods, materials, and resources involved in teaching health. Direct, correlated and integrated curriculum patterns. Individual teaching experience.

645 (3) W.S. Organizational Relationships in School Health Education. 3 cl. Prereq: 692. Miss Sliepecevich, Miss Beyrer, Mr. Cushman, Mrs. Fogle

Emphasis is placed on the relation of the school health program to the total community health program. Official and non-official health agencies are studied.

692 (3) Su, A,W. School Health Services. 3 cl. Prereq: 410 or equiv. Mr. Cushman

Consideration of healthful school living and health services, including health appraisal, counselling, educational adjustments, communicable diseases, and emergency programs.

701 (1-4) Su, A,W,S. Minor Problems in Health Education. Prereq: permission of adviser. Staff

This course is designed primarily for seniors and graduate students to provide them with an opportunity to investigate selected professional problems.

705 (2) S. Current Progress in Disease Control. 2 cl. Prereq: senior or graduate standing in a health science area. Mr. Cushman

Authorities in medicine and health sciences will interpret how current findings may affect disease prevention and control. Newer knowledge of cancer, dental care, etc., will be discussed.

799 (4) Su, School Health Education Workshop. 3 wk workshop. Prereq: permission of instructor. Mr. Fogle

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.

FOR GRADUATES

801 (2) A. Seminar in School Health Education. 2 cl. Mr. Cushman, Miss Sliepecevich

820 (3) Su,A,W,S. Problems in School Health Education. Staff

Advanced problems in school health education. Individual or group participation.

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

820J A. Curriculum in Health Education
820K W. Survey of Research in Health Education
820L S. Evaluation in Health Education

950 Su, A,W,S. Research in Health Education. Staff

Research for thesis and dissertation purposes only.
HISTORY
Office, 108 University Hall

PROFESSORS GRIMM, WOODRING (EMERITUS), HILL (EMERITUS), MCDONALD, DULLES, ROSEBOOM, WEISENBURGER, SIMMS, HAGATZ, FISHER, MORLEY, DORPALEN, BRENNER, COLES, AND GOLDBERG, ASSOCIATE PROFESSORS BENDER, POIRIER, AND ROBERTS, ASSISTANT PROFESSORS HARE (EMERITUS), YOUNG, RULE, TEFASKE, AND GRIEDEER, MR. BARNARD, MR. SIMON, MR. TRUSTY, MR. VON DER HEIDE, MR. WHEELER, MR. CROSBY, MR. GRAY, MR. KNAPP, MR. RIPKIN, MR. ALBERT, MR. BLOOMFIELD, MR. BUCKHOUT, MR. COHEN, MR. GILLETTE, MR. KRAGALOTT, AND MR. TIPTON

FOR UNDERGRADUATES

401 (5) A,W,S. 402 (5) Su,A,W,S. History of Western Civilization (1500 to the Present). 5 cl. Either 401 or 402 may be taken independently as an elective. Not open to students who have had Hist 421-422-423. All Instructors

401. 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. Restoration; reaction; democracy; economic and political radicalism; Romanticism, nationalism; Imperialism; World War; post-war Europe.

403 (5) Su,A,W,S. 404 (5) Su,A,W,S. History of the United States (1763 to the Present). 5 cl. Not open to students who have had Hist 421-422-423. All Instructors

403. 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. A continuation of Hist 403. The two provide a legal sequence but either may be taken independently as an elective.

421 (5) Su,A,W,S. 422 (5) Su,A,W,S. 423 (5) Su,A,W,S. The Western World in Modern Times. Designed for all 1st yr students of the College of Arts and Sciences in the B.A. degree program. Not open to those who have had Hist 401, 402, 403, or 404. 5 cl. All Instructors

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.

421. From the beginning of modern times through the first third of the nineteenth century.

422. The nineteenth century.

423. The twentieth century.

504 (5) W. American Civilization. 5 cl. Mr. Coles and Staff

A survey emphasizing the origin and development of basic ideas and institutions, continuing problems of American democracy, and the U.S. and world affairs.

510 (3) W. Great Figures in British History. 3 cl. Mr. Roberts

British history since 1485 as illustrated in the lives of notable figures. Lectures, readings, discussion.

511 (3) W. Great Figures in Greek and Roman Antiquity. 3 cl. Mr. McDonald

A biographical approach to Antiquity through an examination of the lives and times of eight prominent men. Readings in ancient and modern biographies.

512 (3) Su,A. Great Figures of Modern Europe. 3 cl. Mr. Rule

A study of modern European history through an examination of the lives and times of great figures.

513 (3) A,W,S. Great Figures in American History. 3 cl. Mr. Coles, Miss Young, and Staff

Main trends of American development through the medium of biography. Historical background, comparison and contrast of leading figures, and analysis of motivation and character.

517 (3) S. Great Figures of the Middle Ages. 3 cl. Mr. Fegues

A study of medieval European history through an examination of the lives and times of great figures.
537 (3) A.W.S. Recent History of the United States (1898-1928). 3 cl. Mr. Dulles and Staff
The impact of modern industrialism upon American imperialism, society, government, and foreign policy. Laissez-faire and government regulation, the Progressive movement, and the First World War.

538 (3) A.W.S. Recent History of the United States (since 1928). 3 cl. Mr. Dulles and Staff
A 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.

590 (3) Su.A. Contemporary Europe (1920 to the Present). 3 cl. Mr. Dorpalen
Political, social, and economic developments; Paris Peace Conference; Communism, Nazism; World War II; Europe between East and West; moves toward unification.

693 (2) W. Major Influences in the History of Western Civilization. 2 cl. Reqd of undergraduate Hist majors. Mr. Rule
Offered by senior members of the staff and designed to acquaint the student with problems in the interpretation of the history of western civilization.

705 (3-5) A. 706 (3-5) W. 707 (3-5) S. Honors Courses. Not open for graduate credit. Informal conf, the intent being to allow full scope to the initiative of the student. Prereq: senior standing and forty hours of cr in Hist, with a record of A in at least half of the Hist courses and an average of B in the remainder. At least two qtrs reqd of candidates for the degree of Bachelor of Arts with Distinction in Hist. All Professors
A special topic is assigned each quarter and results are tested by papers and special examinations. Inability to attain a grade of B in this course is a disqualification for special honors.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

For all courses in this group, the prerequisite is at least junior standing and four quarter courses in the social science field, of which at least two must be in history. Specific prerequisites are indicated in connection with specific courses. These courses are not open to freshmen or sophomores.

607 (3) W. The Renaissance. 3 cl. Mr. Grimm
The literary, artistic, and intellectual achievements primarily of Renaissance Italy against the economic, political, and social developments in western Europe.

608 (5) S. The Reformation. 5 cl. Mr. Grimm
The rise and growth of Protestantism and the Catholic reformation of the sixteenth century against the economic, political, and social developments in western Europe.

609 (5) Su.A. The History of England from Its Beginning to 1688. 5 cl. Mr. Roberts
A study of the religious, political, economic, and intellectual development of the English people from the earliest times to the Glorious Revolution. Lectures, readings, discussions.

610 (5) W. History of England (since 1688). 5 cl. Mr. Poirier
The course of political, social, and intellectual change, of industrial and commercial growth of Hanoverian, Victorian, and Edwardian England. Readings, lectures, and reports.

611 (3) W. Constitutional History of England (to 1485). 3 cl. Mr. Pegues
The development of royal administration; the rise of common law and central courts, the origins and growth of representative and constitutional government to 1485.

612 (3) S. Constitutional History of England (since 1485). 3 cl. Prereq: 611 or consent of instructor. Mr. Roberts
The Tudor system, the struggle between king and parliament, cabinet government, electoral reform, and the law of the modern constitution.

617 (5) Su.W. Europe, 1660-1789. 5 cl. Mr. Rule
A study of the rise of the absolute state, the changing diplomatic alignments, and the enlightenment.

618 (3) Su. American Military Policy. 3 cl. Mr. Coles
The development of American military policy, 1763 to the present, in relation to its political, economic, and social implications.
619 (5) A. Medieval Civilization. 5 cl. Mr. Pegues
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.

620 (5) S. Europe, 1815-1871. 5 cl. Mr. Raganz
Nationalism, the democratic movement, economic growth, imperialism, and cultural advance
from the Congress of Vienna to the close of the Franco-Prussian War.

622 (5) W. Africa and the Western World in the Nineteenth and Twen-
tieth Centuries, 5 cl. Mr. Raganz
Economic penetration, the conflict of cultures, political developments, and social advance.

623 (5) S. Asia, the Pacific Basin, and the Western World in the Nine-
teenth and Twentieth Centuries. 5 cl. Mr. Raganz
The rise and decline of colonialism and contemporary problems.

624 (5) A. The French Revolution and Napoleon. 5 cl. Mr. Goldberg
The background of the Revolution; the social bases and political schemes of the first three
Revolutionary governments, 1789-1795; the program and role of Napoleon.

625 (5) S. France since 1815. 5 cl. Mr. Goldberg
The social and economic evolution of France, 1815-1870; the evolution of French politics
and social classes, 1870-1914; the problems of France between two wars; the Fourth Republic.

626 (3) A. The Rise of Islam and the Spread of Muslim Civilization.
3 cl. Mr. Fisher
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, 1357.

627 (3) W. The Rise and Fall of the Ottoman Empire. 3 cl. Mr. Fisher
A study of the significance of the Middle East with respect to Europe from the thirteenth
century to World War I.

628 (3) S. The Middle East since 1914. 3 cl. Mr. Fisher
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.

629 (3) S. A. Modern Germany (1815 to the Present). 3 cl. Mr. Dorpalen
Political, social, economic, and cultural developments; the national and liberal movements;
unification; Empire; Weimar Republic; Nazi regime; present-day Germany.

630 (3) A. Europe, 1871-1918. 3 cl. Mr. Dorpalen
Political, social, and economic developments; nationalism; imperialism; democratic move-
ments; state-church relations; social reforms; revolutionary forces; World War I.

631 (5) W. Constitutional History of the United States. 5 cl. Mr. Dulles
Problems involved in the constitutional growth and development of the United States from
the struggle for independence to the present.

633 (3) A. The Slavery Controversy in the United States. 3 cl. Mr. Simms
The social system of the Old South; the various aspects of the controversy; secession and
the impact of war. Lectures, readings, and discussions.

634 (3) S. Reconstruction and the New South (1863 to the Present). 3 cl.
Mr. Simms
The controversy over reconstruction; the social and economic readjustments in Southern
States during and after reconstruction. Lectures, readings, and discussions.

635 (3) S. U. American Foreign Policy to the Close of the Civil War.
3 cl. Mr. Coles, Mr. TePaske
Emphasis on these topics: the revolution, neutral rights, the Monroe Doctrine, the War
with Mexico, the Civil War. Readings and discussions.

636 (5) S. American Foreign Policy since the Civil War. 5 cl. Mr. Dulles
Emphasis on these topics: Overseas expansion, U. S. relations with Latin America, the
Far East, and with Europe since 1914. Discussion and readings.

639 (5) W. The Influence of Immigrant Groups upon United States His-
tory, 5 cl. Mr. Weisenburger
The share of different immigrant groups in the building of the nation, from the colonial
period to the present. Lectures, readings, and discussions.
641 (5) S. The Westward Movement since 1783. 5 cl. Miss Young
The westward spread of settlement and the influence of the westward movement on American development.

642 (5) A. Social and Economic History of the United States, 1815-1865. 5 cl. Miss Young
The development of economic institutions and their relation to economic growth and to movements for social and political reform.

[643] (5) S. Political Parties in the United States. 5 cl. Staff
The origin and growth of national parties and the history of party struggles with emphasis upon presidential elections.

644 (5) Su. A. The American Colonies. 5 cl. Staff
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.

645 (3) A. Latin America. 3 cl. Mr. TePaske
The Mayan, Aztec, and Inca Empires; the Spanish and Portuguese conquest; and the development of Hispanic civilization in the New World.

646 (5) W. Latin America. 5 cl. Mr. TePaske
The development of the South American republics from the Wars of Independence to the present with special emphasis upon Argentina and Brazil.

648 (5) Su. W. The American Revolution and the New Nation, 1763-1825. 5 cl. Mr. Coles
A continuation of 644 but may be taken separately. Primary emphasis is on social, intellectual and economic factors.

#649 (3) A. Greek Civilization. 3 cl. Mr. McDonald
The Hellenistic Age: A study of Greek institutions from Alexander the Great to the Roman conquest. Readings in the sources in translation.

650 (3) A. Roman Civilization. 3 cl. Mr. McDonald
A study of the Early Roman Empire, beginning with the Augustan Age, and ending with Marcus Aurelius. Readings in the sources in translation.

#653 (3) S. The Ancient History of the Near East. 3 cl. Mr. McDonald
The ancient history of Egypt, Babylonia, Assyria, and adjacent cultures. Readings in the sources in translation.

655 (5) A. Greek History. 5 cl. Mr. McDonald
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.

656 (5) S. Roman History. 5 cl. Mr. McDonald
A history of Rome from the early Bronze Age to the fall of the Roman Republic. Readings in the Roman historians in translation.

668 (5) W. The Emergency of Modern America, 1865-1898. 5 cl. Mr. Weisenburger
An intensive study of the political, social, and cultural transformation of the United States in the late nineteenth century.

675 (3) A. History of Russia (to 1801). 3 cl. Mr. Morley. 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.

676 (3) W. History of Russia (1801-1914). 3 cl. Mr. Morley
A survey from the accession of Alexander I to the outbreak of the First World War.

677 (3) S. Soviet Russia. 3 cl. Mr. Morley
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.

678 (3) A. Modern Poland. 3 cl. Mr. Morley
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.
679 (5) S. Latin America. 5 cl. Mr. TePaske
The development of Mexico, Central America, and the Caribbean from the Wars of Independence to the present with special emphasis upon Mexico since 1910.

686 (3) S. Contemporary England. 3 cl. Mr. Poirier
A study of Britain since 1900 with special emphasis on the rise of the Labour party and the development of the social welfare state. Lectures, reports, readings.

687 (5) W. The Age of Liberalism. 5 cl. Mr. Goldberg
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.

689 (3) Su,A. The History of Ohio. 3 cl. Mr. Weisenburger
A general survey of state history—social, economic, religious, and political—from the Indian period to the present time.

694 (5) A. History of the Far East to 1890. 5 cl. Mr. Grieder
The development of the civilizations of China, Korea, and Japan from the earliest time to the beginning of large-scale Western influence.

695 (5) W. History of the Far East since 1890. 5 cl. Mr. Grieder
The transformation of China, Korea, and Japan in modern times under the impact of the West.

696 (5) S. American Social Thought and Reform, 1890-1929. 5 cl. Not open for those having credit for Hist 692. Mr. Brenner
Philosophy and institutions of social reform in the United States in the late nineteenth and early twentieth century. Lectures, readings, and reports.

[697] (3) S. American Social Thought and Reform since 1929. 3 cl. Mr. Brenner
A historical examination of trends in American social thought and criticism since the Great Depression. Lectures, readings, and reports.

698 (5) S. History of Modern China. 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.

700 (1-3) Su,A,W,S. Minor Problems in History. Prereq: permission of the instructor. Staff
Individual study in some field of historical development and designed to allow the student to work upon a problem in which he is particularly interested.

711 (3) S. Studies in Russian History. 2 cl. Prereq: 6 cr hrs of Russian hist or permission of instructor. Mr. Morley
An intensive study of problems in selected periods of Russian history.

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

#177A  Catherine the Great through the Crimean War, 1762-1855.
# 771B  Alexander II through the Bolshevik Revolution, 1885-1917.

798 (5) Su,A. Contemporary Europe (1920 to the Present). 5 cl. Open only to graduate students and to seniors majoring in Hist by permission. Mr. Dorpaten
While covering the same ground as Hist 590, this course aims at an advanced and intensive study and places its emphasis on methods of historical research and document analysis.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

737 (5) S. Recent History of the United States (1898-1928). 5 cl. Mr. Dulles
The impact of modern industrialism upon American imperialism, society, government, and foreign policy. Laissez-faire and government regulations, the Progressive movement, and the First World War.
HISTORY

738 (5) W. Recent History of the United States (since 1928). 5 cl. Mr. Dulles
A 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.

809 (3) A. Seminar in European History. 1 cl. Prereq or concur: 812B.
Mr. Grimm
Research topic: To be announced.

810 (3) W. Seminar in European History. 1 cl. Prereq or concur: 812B.
Mr. Dorrapel
Research topic: To be announced.

811 (3) W. Seminar in European History. 1 cl. Prereq or concur: 812B.
Mr. Ragatz

812 (3) Introduction to Historical Research in American History or European History. 3 cl. Req'd of candidates for the Master's degree in the American or European Hist field.
A practical course dealing with the problems involved in the preparation of the Master's thesis. Should be taken during the student's first quarter in the Graduate School.

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

812A (3) Su,A. American History. Mr. Weisenburger
812B (3) W. European History. Mr. Ragatz

813 (3) A. Great European Historians. 1 cl. Req'd of candidates for the
Doctor's degree. Mr. Roberts
A study of the leading historical writers and schools of Europe, with selected readings from
representative writers.

814 (3) W. Great American Historians. 1 cl. Req'd of candidates for the
Doctor's degree. Mr. Simms
A study of the leading American writers and schools of history.

815 (3) S. Seminar in European History. 1 cl. Prereq: 812B. Reading
knowledge of French is required. Mr. Goldberg

816 (3) S. Seminar in European History. 1 cl. Prereq: 812B. Mr. Morley
Research topic: Imperial Russia.

817 (3) Su,A. Seminar in European History. 1 cl. Prereq or concur: 812B.
Mr. Roberts

819-820 (6) W.S. Two-Quarter Seminar in American History. Prereq:
812A and permission of instructor. Mr. Dulles

821 (3) W. Seminar in American History. 1 cl. Prereq or concur: 812A.
Miss Young
Research topic: To be announced.

822 (3) A. Seminar in American History. 1 cl. Prereq or concur: 812A.
Mr. Simms
Research topic: To be announced.

823 (3) S. Seminar in American History. 1 cl. Prereq or concur: 812A.
Mr. Bremmer
Research topic: To be announced.

824 (3) Su. Seminar in American History. 1 cl. Prereq or concur: 812A.
Mr. Coges
Research topic: To be announced.

825 (3) A.W.S. Seminar in History. 1 cl. As specially scheduled in any qr
with permission of the Graduate Chairman and the Chairman of the Depart-
ment. Staff
Research topic: To be announced.

(See under Interdepartmental Seminars.)
Research for thesis or dissertation purposes only.
HOME ECONOMICS
Office, 220 Campbell Hall

PROFESSORS SCOTT, DEEKS, GILMORE, HENE, HILLMAN, LEHMANN, NEWARK, PRUDENT, WILSON AND WOOD, ASSOCIATE PROFESSORS ALEXANDER, BEARD, GREEN, HAAS, HAGER, HENDRICKSON, LAPITSKY, LEWIS, LLOYD, ASSISTANT PROFESSORS BLOOM, EVERHART, KYLE, MESSIER, MILLCAN, MONTEL, SMITH, TAPSCOTT, VIVIAN, WARFIELD, AND WERTENBERGER, MRS. BAILEY, MRS. BUTLER, MRS. DAVIS, MRS. HERR, MRS. KRAUSS, MRS. PATTISON, MRS. REHL, MRS. SMITH, AND ASSISTANTS

The courses in Home Economics may be grouped as follows:


General Courses—400, 499.

FOR UNDERGRADUATES

400 (1) A. Home Economics Survey. 1 cl and 1 2 hr cl. Req'd of all 1st and 2nd yr students of School of Home Economics. Open only to students registered in School of Home Economics. Miss Alexander

Exploration of educational requirements and major programs in the School.

440 (5) A.W.S. Elements of Nutrition. 5 cl. Not open to students majoring in Home Ec. Mrs. Lewis

Exploration of nutritional requirements throughout the life cycle.

505 (5) A.W.S. Textiles. 4 cl, 1 2 hr lab. Prereq: 10 hrs Chem. Miss Lapitsky

Study of physical and chemical properties of textiles and their components as they relate to care, performance, and consumer satisfaction.

506 (5) Su.A.W. Household Equipment: Introduction. 4 cl, 1 2 hr lab. Prereq: 15 cr hrs of natural science. Miss Beard, Miss Bloom

Principles involved in the selection, construction, operation, and care of household equipment and their relation to the well-being of the family.

507 (2) W. Needle Crafts. 2 2 hr lab. For majors in Oc Ther, others by permission of instructor. Not open to majors in Home Ec. Miss Meacham

Application of principles of design. Opportunity to work in a variety of needle crafts.


Fashion, the ready-to-wear market and current developments in the field of textiles and clothing and their relation to satisfying consumer needs.

510 (3) A.W.S. Housing. 3 cl. Prereq: 582 or 10 cr hrs social science.

Housing as it affects family living and its turn affected by family needs, social and economic trends and the physical environment.

512 (3) A.W.S. Home Furnishings: Principles. 2 cl, 1 2 hr lab. Prereq: 430 and Fine Arts 430 or 451 or permission of instructor. 450 and 505 recommended preceding or concurrent. Mrs. Everhart

Application of art principles to furnishing a home with consideration of aesthetic, economic, and social factors affecting choice.

513 (3) W.S. Home Furnishings: Laboratory. 2 2 hr cl, 1 2 hr lab. Prereq: 512 or permission of instructor. Mrs. Everhart

Continuation of 512, emphasis on economic factors, trends, materials, construction and finishes. Some experiences in reconditioning and other techniques.
HOME ECONOMICS

514 (3) A. Clothing: Elementary Construction. 2 3 hr lab. For majors in Oc Ther, others by permission of instructor.
Problems of elementary garment construction.

[518] (3) A. Elements of Homemaking. 3 cl. For non-majors in Home Ec.
Prereq: junior standing. Miss Newark
Principles of home management and use of family resources in relation to family well-being.

530 (3) S. Costume Design. 2 cl, 1 2 hr lab. Prereq: Fine Arts 430 or equiv.
A critical study of aesthetic principles in relation to costume.

531 (5) A.W.S. Clothing: Design Analysis. 2 cl, 2 2 hr lab. Prereq: 530;
passing placement test or prior registration in Techniques Studio required.
Adaptation of standard patterns to individual proportions, flat pattern designing, and
application of principles of design and construction in making garments.

541 (5) A.W.S. Principles and Methods of Teaching Applied to Home
Economics. 3 cl, ½ day arr. Admission to Teaching Curriculum reqd before
registering for course. Prereq: 25 cr hrs in Home Ec and Ed 533. Staff
Consideration of curriculum, methods of teaching, management, and other problems of
the home economics teacher.

542 (10-15) A.W.S. Supervised Home Economics Teaching. Full time for
one qtr devoted to teaching. Req'd for Home Ec majors preparing to teach.
Students registering for 10 cr hrs will spend full time for ½ qtr teaching and
will be req'd to register for 543 for vocational certification. For vocational
certification, students must do their teaching in a vocational center and live
in the community. Registration with the Teacher Placement Service of the
College of Education is one of the requirements. For reservation, students must
report to Room 314, Campbell Hall. Prereq: 40 qtr cr hrs in Home Ec including
541, accumulative point hr ratio of 2.25 to be attained two qtrs prior to registra-
tion for 542, permission of instructor. Not open to students with credit for
543. Staff
Guided participation in the responsibilities and activities of the Home Economics teacher
in the regular day school and extended school program.

543 (3) Su. School-Community Problems of the Home Economics Teach-
ers. 3 cl. arr hrs for observation and participation. For students preparing
to teach in vocational home economics programs in the secondary schools. Not
open to students having 15 hrs credit for 542. Prereq: 541. Miss Dirks
Responsibilities and activities of the home economics teacher in the extended school program
with emphasis on adult education, home experience, related home economics teacher activities.

[545] (4) S. Introduction to Educational Principles of Home Economics.
1 1 hr, 1 2 hr cl, field experience. Req'd for admittance to training courses ap-
proved by the American Dietetic Association and the National Restaurant
Association. Prereq: junior standing, Miss Wood
Principles of education for students whose professional work will require knowledge of
techniques for teaching others in non-school situations.

548 (5) A.W.S. Fundamentals of Nutrition. 5 cl. Prereq: Chem 407 and 405
or equiv.
Basic information in the science of nutrition as applied to man.

549 (5) A.W.S. Food. 2 cl, 3 2 hr lab. Prereq: 10 cr hrs Chem.
Application of chemical and physical principles to food preparation and use.

550 (4) A.W.S. Foods: Meal Management. 2 cl, 2 3 hr lab. Prereq: 441.
Mrs. Wertenberger
Nutritional, aesthetic, and social aspects of planning, purchasing, preparing, and serving
food to family groups at different income levels.

552 (3) A.S. Nutrition: Recent Developments. 3 cl. Req'd of students en-
rolled in nursing education curriculum. Mrs. Messier
553 (3) A. Food in Different Cultures. 3 cl. Prereq: 10 cr hrs of social science. A basic course in nutrition recommended. Food practices of selected peoples of the world with consideration of the existing social, cultural and economic conditions.

559 (3) A.W. Home Management: The Family and the Market. 3 cl. Prereq: Econ 406 or equiv and junior standing. Miss Newark
The market from the family point of view and its relation to home management practices.

560 (5) Su,A.W.S. Home Management. 5 cl. Prereq: Econ 406 or equiv and junior standing. Miss Lloyd, Miss Newark
Management process of utilizing specific resources for family's well-being.

561 (4) A.W.S. Introduction to Child Development. 3 cl. 2 morning hrs arr for nursery school observation. Prereq: Psychol 401. Course in nutrition recommended preceding. Mrs. Davis, Miss Heye, Mrs. Hendrickson
Study of the nature, nurture and development of children with emphasis on the preschool years.

562 (5) A.W.S. Family Development. 5 cl. Prereq: 10 cr hrs of social science. Not open to juniors and seniors. Mrs. Hillman, Mrs. Reih
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.

563 (5) Su,A.W.S. Child Development. 5 cl. Prereq: 401. Req of students enrolled in the basic nursing curriculum; open to others. Not open to students with credit for 561.
Developmental patterns of children, with emphasis on physical, social, and emotional maturity, especially during the formative years. Environmental influences and appropriate guidance.

570 (2) S. Introduction to Food Service Management. 1 2 hr cl. Prereq: 441. Req for majors in dietetics and institution management, and restaurant management, and elective to others interested. Miss Harger
Orientation to the field of food service management.

571 (3) W. Menu Planning for Food-Serving Establishments. 3 cl. Prereq: 140 or permission of instructor. 441 recommended preceding or concur. Miss Harger
Principles and practices of menu planning for school, industrial, and commercial food units. Menus planned for each type of institution.

580 (5) W. Household Equipment: The Home Economist in Business. 3 cl, 2 2 hr lab. Prereq: 550, 10 cr hrs of household equipment, 5 cr hrs Speech, or permission of instructor. Miss Bloom
Evaluation and development of the individual's qualifications to meet professional requirements of a home economist in businesses related to household equipment.

585 (3-15) Su,A.W.S. Field Work in Home Economics. Prereq: permission of instructor. Credit limited to 5 hrs except in qtrs indicated. Miss Bloom, Miss Heye, Miss Millican, Miss Warfield, Miss Wood
Student participation in work of community agencies, county extension programs or business concerns to which home economics is related.

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

SSA Foods
SSSB Foods and Nutrition
SSSC Textiles
SSSD Clothing, 10 cr hrs, Autumn Qtrs.
SSSF Household Equipment
SSSG Home Management
SSSH Institution Management
SSSI Teaching
SSSJ Family and Child Development
SSSK Hospital Dietetics
SSSL Home Economics Extension. 15 cr hrs. Autumn and Winter Qtrs. Not open to students who have credit for 561.
509 (2) A.W. Home Economics as a Profession. 2 cl. Req'd of all students registered in the School of Home Economics. Miss Scott

The nature and status of home economics as a field of study and as a profession.

627 (5) Su. (4) A.W.S. Home Management. 5 cl, lab hrs arr. Each student electing the course should report to Room 201, Campbell Hall, to make application and to check for eligibility, at least two qtrs in advance. Limited facilities prevent opening this course to out-of-state students not regularly enrolled for an undergraduate degree. Prereq: 35 cr hrs in Home Ec. Miss Lloyd, Miss Newark

Application and integration of management principles to operation of a household.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

601 (3) Su,W. Clothing. 2 3 hr lab. Prereq: 502 or equiv. Miss Meacham

Application of principles of tailoring in the construction of a suit or coat.

604 (5) S. Clothing: Advanced Design Analysis. 2 cl, 2 2 hr lab. Prereq: 531 or equiv. Miss Meacham, Miss Millican

Creative interpretation of dress design terminating in finished garments developed through the media of flat pattern and draping.

610 (5) W. Nutrition. 5 cl. Prereq: 548, Physiol 422 or 507, and Agr Bio 610 or 621, or equiv. Miss Green

Modern concepts of normal nutrition.

612 (3) S. Nutrition: Diet Therapy. 3 cl, other hrs arr. Prereq: 610 or equiv or permission of instructor. Mrs. Prudent

Modern concepts of clinical nutrition and abnormalities treated by modification of the diet.

615 (5) Su,A.S. Experimental Work in Food Preparation. 2 cl, 3 3 hr lab. Prereq: 550, Agr Bio 610 or 620, or equiv. Miss Green, Mrs. Prudent

Application of experimental methods to problems involved in preparation of foods.

616 (3) Su. Nutrition of Infants and Children. 3 cl. Prereq: 551, Agr Bio 610, or equiv. Mrs. Prudent

Needs of children for good nutrition from the embryonic stage through adolescence.

619 (3) W. Household Equipment. 2 cl, 1 2 hr lab. Prereq: 506, 512 or concur. Mrs. Everhart

Application to home situations of the recent development in lighting with emphasis on selection, care, and use of home lighting equipment.

622 (5) W. Household Equipment: Performance Testing. 2 cl, 3 2 hr lab. Prereq: 506, 550 or equiv, and 15 cr hrs of natural science including 5 cr hrs of Microbiol. Miss Bloom

Experimental problems on the performance of the major types of household equipment used in preparation of food.

623 (5) A. Household Equipment: Performance Testing. 2 cl, 3 2 hr lab. Prereq: 506, 508, or equiv, senior standing in Home Ec or permission of instructor. Miss Beard

Experience in the techniques and reporting of experimental investigations dealing with household equipment used in laundering and other cleaning processes.

628 (3) S. Selection of Furnishings for the Home. 2 cl, 1 2 hr lab. Prereq: 512, Econ 402 or 406, or equiv. Mrs. Everhart

Consumers' problems in the selection of home furnishings. Field trips arranged.

630 (5) A. Selection of Food and Equipment for Institutions. 5 cl. Prereq: 570, and Econ 402 or 406, or equiv. Req'd for majors in dietetics and institutional management, and restaurant management; elective to others by permission of instructor. Miss Harger, Miss Wood

Principles and standards for selection of food, equipment, and furnishings in institutional food service, arrangement and layout.
631 (3) A.W. Quantity Food Production and Service. 1 2 hr cl, 8 hrs lab each week. Prereq: 570; 630 may be taken concur. Reqd for majors in dietetics and institution management, and restaurant management. Miss Harger, Miss Wood

Individual experience in application of food preparation principles to quantity production; use and care of large equipment; standardized formulae and costs; service to the public.

632 (5) S. Institution Organization and Management. 3 cl, 6 hrs lab arr. Prereq: 630, 631 and Bus Org or permission of instructor. Reqd for majors in dietetics and institution management, and restaurant management. Miss Harger, Miss Wood

Principles of business organization and management and principles of learning applied to the management of food service operations; supervised experience in meal management.

633. (3) Su. School Lunchroom Management. 3 cl. 1 hr arr. Prereq: 551 or 610, 570, or equiv, and permission of instructor. Miss Wood

A general course on management problems in a school lunch program.

634 (3) S. Sanitation for Food Serving Establishments. 1 1 hr, 1 2 hr cl. Prereq: Back 607 or equiv. Miss Wood

Application of principles involved in sanitary food handling. Practical problems concerned with protection of health and with prevention of food spoilage and contamination.

640 (2) S. Food and Nutrition Seminar. 2 cl. Prereq: senior standing. Not for graduate credit. Staff

Reports based on current research, recent summaries and articles which give perspective in food and nutrition.

662 (3) W. Child Development. 3 cl, 2 1 hr observation periods. Prereq: 561, or equiv. Mrs. Hendrickson

Growth and development of children from six through adolescence with emphasis on maturation patterns and individual differences.

663. (3) A. Infant Guidance and Care. 2 cl, 1 2 hr lab arr. Prereq: 440, 561, and Back 509, or equiv. Miss Heyes

Pattern of development during infancy and the second year of life, and responsibilities of adults for providing a home environment favoring optimum development.

664 (3) Su.A. Nursery School Activities. 3 cl. Prereq: 561 or 563 and 665 or concur. Reqd for majors in family and child development and home economics education. Not open to students with credit for 661 nor for graduate credit. Mrs. Hendrickson, Miss Heyes

Application of principles of development to program planning. Modification of activities for age level, ability, experience, group and individual needs.

665 (2) Su.A.W.S. Nursery School Practicum. 1 conf, 2 2 hr lab. Prereq: 561 and 664 (prior or concur). Repeatable to a total of six hours. Reqd of majors in family and child development and Home Ec education. Not open to students with credit for 661, nor for graduate credit.

Participation in the nursery school as a student teacher applying theory covered in 661.

666 (1) S. Seminar in Child Development. 1 cl. Prereq: 551, 562, 664 or permission of instructor. Reqd of majors in family and child development. Not for graduate credit.

Review, interpretation, and evaluation of current literature and research in defined areas, with emphasis on recommended professional standards in group care of children.

670 (3) Su.W. Clothing: Fashion. 3 cl. Prereq: 503, 5 cr hrs Fine Arts and 10 cr hrs social science. Miss Gilmore

Fashion as a social force—its influence on production, distribution and consumption of textiles and clothing.

671 (3) W. Textiles. 1 cl, 2 2 hr lab. Prereq: 505 or equiv and 10 cr hrs natural science. Miss Tapscott

Experience in planning and conducting textile tests and in evaluating resulting data. Development, present status, and importance of textile testing.

673 (3) Su.S. Textiles: Recent Developments. 3 cl. Prereq: 505 or equiv. and senior standing in Home Ec. Miss Tapscott. Recent developments and research. Discussion and reports based on individual assignments.

680 (2) S. Textiles and Clothing Seminar. 2 cl. Prereq: senior standing; major textiles and clothing. Not for graduate credit. Staff. 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 (5) S. Home Economics Extension Methods. 4 cl, 1 2 hr lab. Prereq: Agr Ed 526 or permission of instructor. Admission to Teacher Curriculum required before registering for course. Miss Warfield. Home Economics extension methods, relationship of extension education to other educational movements, resources of state, county, and community.

731 (3) A. Food Cost Analysis for Institutions. 2 2 hr cl. Prereq: 632. Acc 405, or equiv. Miss Harger. Records used in large quantity food service and house units and their use in budgeting and food cost control.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the 800 or 900 series except by permission of the Graduate Council.

701 (1-5) Su.A.W.S. Special Problems in Home Economics. 1 conf or more. Prereq: graduate standing or senior standing with an accumulative point hr average of 2.7 or above and permission of instructor. Students must: have at least 6 cr hrs in the area of Home Ec in which the problem is taken. Problems in various phases of home economics chosen for individual study.

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

701A Food preparation.
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.
701K Hospital and dietetic administration and therapeutics.

702 (3) Su. Supervision of Home Economics Teaching. 3 cl. 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.


715 (3) S. Introductory Food Research. 1 cl, 2 3 hr lab. Prereq: 615, Agr Bio 610 or equiv. Mrs. Prudent. Individual investigations in food preparation, processing in the home and food storage carried out in laboratory, analyzed and reported.

720 (3) S. Activity Analysis in Relation to Housing. 2 cl, 2 hrs arr. Prereq: 560 or equiv. 622 and 623, graduate standing in Home Ec 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.
735 (3) Su, S. Recent Development in Food and Nutrition Research. 3 cl. Prereq: 551, Agr Bio 610 or 620, or equiv or permission of instructor. Mrs. Pruden
Brief survey of recent research.

740 (2) A. Home Economics in American Education. 2 cl. Prereq: 541 or equiv and permission of instructor. Miss Dirks
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.

[741] (3) Su. The Teaching of Home Economics. 3 cl. Prereq: 740 or equiv and permission of instructor. Mrs. Haas
Home economics in integrated, core, experimental and other special types of programs.

742 (5) S. Evaluation in Home Economics. 3 cl. Prereq: 740. Miss Dirks
Procedure for appraising student progress in the attainment of objectives. Construction of evaluation instruments, analysis and interpretation of data from evaluation programs.

750 (3) Su, A. Research Methods in Home Economics. 3 cl. Prereq: for masters degree students in Home Ec. Miss Lehman
Nature of research in various areas of the field; criteria for setting up a research problem; techniques for collecting and analyzing data.

761 (3) Su, W. The Family: The Early Years. 2 1/2 hr cl. Prereq: Psychol 670, Soc 676 or equiv, graduate standing or permission of instructor. Mrs. Hillman
Relationships and adjustments in family living with emphasis on the early and expanding stages of the family life cycle.

762 (3) A. Administration of Day Care Centers. 3 lec-discussion cl. Prereq: 661 or equiv. Miss Heye
Program planning to meet developmental level and needs of young children. Minimum and recommended standards.

[771] (5) W. Textiles: Analysis. 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] (4) Su. Home Economics Workshop. Fulltime for 2 weeks. Repeatable to a maximum of 12 cr hrs. Prereq: advanced standing in Home Ec or a closely related field and permission of instructor.
Workshops in the following phases are scheduled at irregular intervals. See Time Schedule for offerings.

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

[799D] Clothing.
[799H] Institution Management.
[799I] Home Economics Education.

804 (1-6) Su, A, W. Seminar in Home Economics. Prereq: graduate standing in Home Ec and permission of instructor.

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

The following seminars are available as listed in the Time Schedule.
804A Foods and Nutrition. Miss Green, Mrs. Patton, Mrs. Prudent.
804B Home Economics Education. Miss Dirks, Miss Lehman, Miss Scott.
804C Textiles and Clothing. Miss Gilmore, Miss Tapecott.
804D Institutional Management. Miss Wood.
804E Child and Family Development. Miss Heye, Mrs. Hillman.
804F Household Equipment.
804G Hospital Dietetic Administration and Therapeutics. Mrs. Lewis.
804H Home Management. Miss Newark.
840 (3) W. Home Economics in Higher Education. 3 cl. Prereq: 740 or equiv. Mrs. Hans
Present status and function of home economics at the college level; problems in curriculum development; criteria for effective teaching, guidance, and testing procedures.

895 (1-5) Su, A.W.S. Research in Home Economics.
(See under Interdepartmental Seminars.)

HORTICULTURE
Department of Horticulture and Forestry
Office, 113 Horticulture and Forestry Building
PROFESSORS HOWLETT, LAURIE (emeritus), W. N. BROWN, CHADWICK, ALEX IPLUS, HARTMAN, HILL, AND GOULD, ASSOCIATE PROFESSOR KLEMZ, ASSISTANT PROFESSORS O'WEN, GEISMANN, MILLER, TOUSE AND ASSISTANTS

FOR UNDERGRADUATES

402 (5) A.W.S. General Horticulture. 5 cl. Mr. Alban, Mr. Hartman, Mr. Hill
Principles and practices underlying production and use of tree fruits, small fruits, vegetables, flowers, and ornamental plants, essential for the individual's use in everyday life.

403 (5) W.S. Fundamentals of Horticulture. 5 cl. Mr. Hartman
A study of plant materials used in the horticultural industry emphasizing the development of crop plant structures and relation to cultural practices and the environment.

1407 (3) Su. Home Gardening. Herbaceous Plants, Floral Design and Lawns. 2 cl, 1 2 hr lab. Not open to students majoring in Floriculture and Ornamental Horticulture or to students who have credit for Hort 406. Lawns, house plants, formal and informal design; selection, planting, care and use of herbaceous perennials, annuals and bulbs in the home garden.

1408 (2) Su. Home Gardening. Woody Deciduous Plants, Roses and Evergreens. 2 cl, 1 2 hr lab. Not open to students majoring in Floriculture and Ornamental Horticulture or to students who have credit for Hort 406. Offered in 1468.
The selection, planting, care and maintenance of trees, shrubs, evergreens and garden roses in the home garden. Landscape design and propagation are discussed.

423 (3) S. Principles of Food Preservation. 1 cl, 2 2 hr lab. Mr. Gould
Introduction to the food processing industry. Principles involved in the modern methods of assembling, processing, distributing, and subjective quality evaluation of man's food.

440 (5) S. Elementary Plant Propagation. 4 cl, 1 2 hr lab. Prereq or coreq: 403 and Bot 402. Mr. Miller
The principles and practices involved in the commercial propagation of florist crops, garden flowers, trees, shrubs, evergreens, small and tree fruits, and vegetables.

503 (5) A. Principles and Practices of Pomology. 4 cl, 2 hr lab. Prereq: 403. Mr. Hartman
Fundamentals of apple and pear production, including status of the industry, varieties, training habits, soil management and fertilizers, pollination, fruit setting, propagation, pruning, and spraying.

504 (5) W. Principles and Practices of Pomology. 4 cl, 2 hr lab. Prereq: 403. Mr. Hill
A study of the stone and small fruit industry including the accepted cultural practices and the fundamental principles upon which these practices are based.

522 (5) W. Principles of Vegetable and Potato Production. 4 cl, 2 lab. Prereq: 402. Mr. Alban
Practical 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.
524 (5) W. Canning, Freezing, and Dehydration. 3 cl, 2 2 hr lab. Mr. Gould
Fundamentals essential to commercial processing and utilization of fruits, vegetables, and related products. Sampling methods and physical quality evaluation techniques are studied.

526 (5) W. Vegetable Forcing. 3 cl, 4 lab hr. Mr. Alban
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.

542 (5) A. Principles and Practices of Floriculture. 4 cl, 1 3 hr lab. Pre-
req: 440 and Bot 402. Mr. Riplinger
Principles and practices of greenhouse operation including construction, heating, cooling, light, photoperiodism, temperature, humidity, ventilation, moisture, soils, fertilizers, fertilizer deficiencies and excesses, diseases, and insects.

544 (5) S. Garden Management. 3 cl, 2 2 hr lab. Prereq: 403 or permission
of instructor. Mr. Miller
The identification, culture and landscape use of bulbs, annuals, herbaceous perennials, and garden roses. Identification of lawn grasses and turf management are also covered.

550 (5) A. Ornamental Plants. 3 cl, 2 2 hr lab. Prereq: 403 and Bot 402
or permission of instructor. Mr. Chadwick, Mr. Reisch
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.

551 (5) W. Ornamental Plants. 3 cl, 2 2 hr lab. Prereq: 403 and Bot 402
or permission of instructor. Mr. Reisch
A detailed study of narrowleaf and broadleaf evergreens; their identification, growth habits, culture, adaptation to environmental conditions, uses, combinations, and management in landscape plantings.

552 (5) S. Ornamental Plants. 3 cl, 2 2 hr lab. Prereq: 550 and 551. Mr.
Reisch
A detailed study of several outstanding genera of woody ornamental plants and the use of deciduous and evergreen plants in simple designs.

570 (2) Su,A,W,S. Nursery Industry Experience. Req'd for 2 qtrs of students majoring in Agriculture Industries degree program in Ornamental Horticulture. Open to freshmen and sophomores in Hort but without credit toward graduation. Mr. Chadwick, Mr. Reisch
Ten weeks of planned and supervised practical experience in an approved nursery, including completion of a special problem with a written report.

FOR ADVANCED UNDERGRADUATES AND GRADUATES
According to University regulations, courses in this group are not open to freshmen or sophomores.

601 (3) W. Horticultural Plant Breeding. 2 cl, 1 2 hr lab. Prereq: 503 or
522 or 542. Zool 403. Mr. W. N. Brown
Plant breeding methods and genetic principles applied to horticultural plant improvement, including fundamentals of seed production, variety evaluation, certification, and maintenance.

609 (3) A. The Management of Storages for Horticultural Crops and
Plants. 2 cl, 1 2 hr lab. Prereq: 503, 504, 522, or 542.
The basic principles of post-harvest handling of flowers, fruits, vegetables, and ornamental plants will be stressed along with a review of modern pre-cooling and packaging techniques.

610 (3) S. Weed Control in Horticultural Crops. 3 cl. Prereq: 15 qtr hr
Hort and 10 qtr hrs Bot. Mr. Alban
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.

622 (5) S. Commercial Vegetable Crops. 4 cl, 1 2 hr lab. Prereq: 522. Mr.
W. N. Brown
The culture of the principal vegetable crops, including history, plant characteristics, physiology, propagation, climatic and edaphic adaptations, and specialized production technology.
624 (5) A. Specialty Products, including Pickling and Fermentation. 3 cr. 2 2 hr. lab. Mr. Geisman
The technology and commercial manufacture of jams, jellies, preserves, syrups, pickles, sauerkraut, beverages, prepared dinners, soups, condiments, dressings and dry pack items.

629 (5) W. Food Products Examination. 3 cr. 2 2 hr. lab. Prereq: 423 or Home Ec 441. Mr. Gould, Mr. Geisman
Food laws, regulations, grade standards, and the technical control of processed foods. Interpretation of laboratory analysis for control of product quality.

631 (5) Su. Commercial Management and Practices with Horticultural Products. 1 cr. 2 4 hr. lab. Prereq: 524. Mr. Gould
Technology and commercial processing of the major fruits and vegetables. Emphasis on grade relationships, yield and unit operation. Field trips to commercial processing plants.

643 (5) W. Principles and Practices in Floriculture. 4 cr. 1 3 hr. lab. Prereq: 542 and Bot 605 and 606 or Bot 606. Not open to students who have credit for Hort 545. Mr. Kiplinger
Physiological principles and environmental factors in production of azaleas, begonias, bulbs, chrysanthemums, cyclamen, geraniums, hydrangeas, polyanthas, roses, salvia, and other potted flowering and foliage plants.

645 (5) S. Principles and Practices in Floriculture. 4 cr. 1 3 hr. lab. Prereq: 542 and Bot 605 and 606 or Bot 606. Not open to students who have credit for Hort 543. Mr. Kiplinger
Physiological principles and environmental factors in production of asters, carnations, chrysanthemums, orchids, roses, snapdragons and other cut flower crops. Production costs of crops are analyzed.

650 (5) S. Principles and Practices of Nursery and Garden Store Management. 4 cr. 1 3 hr. lab. Prereq: 440, 550, 551 and Bot 605. Mr. Chadwick
Fundamental principles and practices involved in site selection, layout, soils, fertilizers, transplanting, pruning, pest control, digging, storage, grading, packaging, inventory control, merchandising and garden store management.

651 (5) S. Floral Design and Marketing of Florist's Crops. 3 cr. 2 2 hr. lab. Prereq: 542 and Econ 406. Not open to students who have credit for Hort 546. Mr. Reisch, Mr. Kiplinger
Fundamentals of floral design: flower shop management; principles and practices in handling, packaging and selling florists' crops and supplies through wholesale and retail outlets.

683 (5) A. Arboriculture. 4 cr. 1 3 hr. lab. Prereq: 550 and Bot 606. Mr. Chadwick, Mr. Reisch
Study of environmental factors affecting plant growth and the planting, fertilization, pruning, cabling, and pest control practices involved in commercial arboriculture, city forestry, and park maintenance.

Special problems in the fields of pomology, vegetable gardening, floriculture and ornamental horticulture, horticultural products or forestry.

705 (3) A. Seminar in the Historical Literature of Horticulture. 3 cr. Prereq: 503 or 622 or 643 or 683 or permission of instructor. Mr. Howlett
History and literature of horticulture from prehistoric times to the present. Trends and events during the 20th Century receive particular emphasis.

710 (2) Su. A, W. S. Theories and Techniques Employed in the Horticultural Processing Industry. Repeatable by undergraduates to a maximum of 6 cr. hrs.
(a) Su. Plant Sanitation and Waste Disposal. Mr. Geisman
(b) A. Processing Methodology. Mr. Gould
(c) W. Packaging Materials and Methodology. Mr. Geisman
(d) S. Color Evaluation and Advanced Quality Control. Mr. Gould

711 (4) A. Experimental Horticulture. 2 cr. 2 2 hr. lab. Prereq: Bot 605 and 606 or equiv and graduate standing. Mr. Howlett
Effect of deficiencies of nitrogen, phosphorus, potassium, magnesium and carbohydrates upon vegetable growth, flowering and fruiting of horticultural plants; foliar analysis included.
712 (4) W. Experimental Horticulture. 2 cl, 2 2 hr lab. Prereq: Bot 605 and 606 or equiv and graduate standing. Mr. Hill. Effect of deficiencies of nitrogen, phosphorus, potassium, magnesium and carbohydrates cultural plants, including the techniques for detecting and correcting such conditions.

713 (5) W. Advanced Plant Propagation. 4 cl, 1 2 hr lab. Prereq: 440 and 550 or equiv, and Bot 605. Mr. Chadwick. A study of the basic anatomical and physiological principles involved in the propagation of horticultural plants by cuttings, grafts, buds and seeds.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 990 group except by permission of the Graduate Council.

804 (1) A.W. Horticultural Seminar. Graduate students majoring in Hort must register for credit for at least 2 qtrs.

810 (2 or 3) A.W.S. Advanced Studies in Horticultural Science. Prereq: permission of instructor.
(a) S. Morphological and anatomical studies of flowering and fruiting. Mr. Hartman
(b) W. Morphological and anatomical studies of vegetative plant parts as influenced by environment. Mr. Hartman
(c) A. Post-harvest physiology of horticultural crops and plants.
(d) A. Advanced vegetable physiology. Mr. Alban
(e) W. Advanced horticultural crop breeding. Mr. Brown
(f) A. Fruit and vegetable processing and specialty products. Mr. Gould, Mr. Geisman
(g) S. Quality control in fruit and vegetable processing. Mr. Gould
(h) A. Advanced physiological studies with horticultural crops. Mr. Eiplinger

897 (1) A.W.S. Interdepartmental Seminar in Natural Resources.
(See under Interdepartmental Seminars.)

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

950 Su, A.W.S. Research in Horticulture and Forestry.
Research for thesis or dissertation purposes only.

INDUSTRIAL ENGINEERING
Office, 125 Industrial Engineering Building
PROFESSORS: LEBUCKZY, BAKER, CARSON, EDMONDSON, MOORE, MORRIS, AND PEP- PER, ASSOCIATE PROFESSORS: BISHOP, HOWLAND, ROCKWELL, ASSISTANT PROFESSORS: BROWN, KINBEE, AND MILLER, MR. GIFFIN, MR. HUBER, MR. ROOT, MR. TAIT, AND MR. WILLIAMS

FOR UNDERGRADUATES

4004 (3) S. Foundry Practice. 2 cl, 4 lab hrs. Prereq: 2nd yr standing in the College of Education or permission of chairman. Req'd in Industrial Arts Education. Not open to students in the College of Engineering. Safety glasses must be worn in laboratory. See footnote.

Laboratory practice in bench, floor and machine molding, casting of grey iron and nonferrous alloys with emphasis on non-ferrous technology.

4220 (5) A.S. Machine Shop Practice. 10 cl and lab hrs. Prereq: Eng Dr 400 or equiv. 2nd yr standing in the College of Education, or permission of chairman. Req'd in Industrial Arts Education. Not open to students in the College of Engineering. Safety glasses must be worn in laboratory. See footnote.

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.

2519 (5) A.W.S. Manufacturing Processes. 4 cl, 6 lab hrs. Prereq: Professional Division status in the College of Engineering or permission of Chairman. Req'd in Agr E, Indus E, Mech E, and Weld E. Safety glasses are req'd in the laboratory. See footnote.

Fundamentals and interrelationships of the principal manufacturing processes. Laboratory work in the areas of foundry, machine tools, heat treating and welding.

† See footnote, page 172.
521 (5) W.S. Machine Tool Applications. 3 cl, 4 lab hrs. Prereq: 519 or permission of chairman. Safety glasses reqd in laboratory. See footnote
Industrial Engineering aspects of machine tool usage. Emphasis upon process choice and economic factors.

602 (5) A.S. The Principles of Engineering Management. 5 cl. Prereq:
Professional Division status and permission of instructor.
A consideration from an engineering standpoint of the fundamentals of engineering management.

614 (3) A. Manufacturing Equipment and Methods. 2 cl, 2 1 hr lab. Reqd for industrial design majors. Not open to students from the College of Engineering.
A survey including lectures, laboratory demonstrations and field trips, to acquaint the student with industrial production methods and equipment.

620 (2) S. Junior Inspection Trip. One week at the end of W Qtr. Open only to majors in IndusE.
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 (3) A.W.S. Motion and Time Study. 2 cl, 1 2 hr lab. Prereq: Bus Org 676, 677 and Econ 542. Req'd of certain majors in the College of Commerce.
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 (6) Practical Experience in an Industrial Organization. Ten weeks during the summer between the 4th and 5th yrs.
To be obtained in some engineering or industrial organization. The student shall present a satisfactory report upon the work done.

663 (5) A.W. Methods Analysis and Time Study. 3 cl, 4 lab hrs. Prereq:
602, and Math 547.
Principles, applications, and purposes of methods analysis, work measurement, process and operation analysis.

664 (5) A.S. Work Measurement and Standards. 3 cl, 4 lab hrs. Prereq:
663.
Principles, applications, and purposes of work measurement and standards. Characteristics and limitations of techniques are discussed in detail, including link analysis and ratio delay.

667 (3) A. Tool Engineering. 2 cl, 4 lab hrs. Prereq: 519. Req'd in Weld E. A course in 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.

Integration of the methods and analytical techniques of industrial engineering into the design of a complete production system.

771 (3) A.W. Safety Engineering. 3 cl. Prereq: 519 and 6 hrs additional credits in other laboratory courses including mechanical equipment. Req'd Indus E and Weld E
The nature, cause, and costs of industrial accidents and occupational diseases. Methods of accident prevention, physical, supervisory, and educational. Ohio laws, regulations, and aids.

FOR UNDERGRADUATES AND GRADUATES

706 (3) W.S. Industrial Quality Control. 3 cl. Prereq: 602, Math 547. Mr. Bishop
The application of probability theory, statistics, and control theory to problems in product inspection and process control. Economic evaluation of quality control techniques.

*Courses Indus E 404, 420, 519, 521 and Weld E 415 require the use of a pair 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 Optometry Clinic, Optometry Building, or through any registered optometrist.*
709 (5) W.S. Production Engineering. 3 cl, 6 lab hrs. Prereq: 521, 663. Not open for graduate credit for Indust E majors. Mr. Edmondson
Fundamentals of production tooling and correlating with design and specifications of the product.

714 (3) S. Time and Motion Study. Prereq: advanced standing in the College of Engineering. Not open to students majoring in Indust E. Not open to students who have credit for Indust E 663, 664. Mr. Baker
Principles, aims, methods, and applications of time and motion study including job analysis, job standardization, formula construction, job evaluation and wage evaluation.

715 (4) A.W. Principles of Industrial Engineering. 4 cl. Prereq: Math 546 and advanced standing in the College of Engineering. Req'd in Mech E. Not open to students majoring in Indust E. Mr. Baker
A survey of the industrial engineering phase of manufacturing with emphasis on principles and problem solving methods.

761 (3) W.S. Engineering Economy. 3 cl. Prereq: Acc 624 or Acc 592, and Math 547. Not open for graduate credit for Indust E majors. Mr. Morris
Economic analysis of engineering projects and methods of operation. Introduction to the analysis of engineering decisions.

764 (3) A.S. Production Programming. 3 cl. Prereq: 761. Mr. Bishop
Mathematical formulation and solution of problems of scheduling, inventory control, location, etc. The course covers various linear models.

The student must register for specific classes in areas as indicated below, and may register for more than one at a time. However, he cannot accumulate more than twenty-four credit hours for the entire course.

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

788A Job Evaluation
788B Organised Labor and Industrial Methodology
788C Industrial Applications for Statistics
788D Quality Control
788E Engineering Economy
788F Production Planning and Control
788G Contemporary Problems in Plant Layout and Design
788H Materials Handling
788I Time Standards and Estimates
788J Human Factors in System Design
788K Organization of Industrial Engineering Functions
788L Production Engineering
788M Industrial Safety Problems

799 (1-6) Su,A,W,S. Special Problems in Industrial Engineering. Prereq: 5th yr standing and permission of instructor.
This course is intended to give the advanced student an opportunity to pursue special studies not offered in fixed curricula.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

801 (2) A. 802 (2) W. 803 (2) S. Seminar in Industrial Engineering.
Reqd of all graduate students majoring in Indust E. Graduate Staff

811 (3-12) Su,A,W,S. Methods Engineering. Prereq: 663 and 664. Mr. Lehoczky, Mr. Baker
Advanced work in one or more special phases of time study, motion study, job evaluation, wage analysis and payment systems, speed and effort rating. The viewpoint of unions and problems arising from labor-management relationships.

812 (3) W. Advanced Systems Design. Prereq: 793-J. Mr. Howland
Advanced work in the analysis and design of man-machine systems.

821 (3-12) A,W,S. Problems in Production Engineering. Prereq: 709. Mr. Edmondson
Advanced work in one or more phases of Production Engineering involving problems in production design, equipment planning, tool design, quantity and quality control.
Advanced work in one or more special phases of plant design and materials handling.

Industrial Engineering Graduate Faculty.
Advanced work on the methodology and techniques of Operations Research.

842 (3) A. Operations Research I. Prereq: calculus, probability theory and statistical methods, and permission of instructor. Mr. Rockwell
Introduction to the nature and problems of Operations Research and the study of actual case histories in the field.

843 (3) W. Operations Research II. Prereq: 842. Mr. Bishop
The position of the model in Operations Research and the study of the important techniques and formal approaches to research problems.

844 (3) S. Operations Research III. Prereq: 843. Mr. Howland
Consideration of topics in Operations Research including research methodology in the various sciences, and the conduct of actual Operations Research investigations.

851 (3-12) Su, A.W.S. Personnel Research in Engineering Industries. Prereq: 602, 664. Mr. Lehoczky, Mr. Baker
Advanced work on a graduate level in one of the several phases of personnel management in engineering industries.

861 (3-12) A, W.S. Research in Decision Processes. Prereq: 761 and 764. Mr. Morris
Advanced work in decision theory and processes including criterion research, decision making under uncertainty and in conflict situations, and gaming techniques.

862 (3) A.S. Decision Theory. Prereq: 706, 761 and permission of instructor. Mr. Morris
Introduction to normative decision models and their applications.

863 (3) A, W.S. Control Theory. Prereq: 706, 764, 798D. Mr. Bishop
Advanced work in the theory of control of industrial operations.

866 (3-12) Su, A.W.S. Programming and Control Research. Prereq: 706 761, 764. Mr. Bishop
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.

871 (3-12) Su, A.W.S. Safety Engineering Research. Prereq: 771. Mr. Rockwell
Advanced work in one or more phases of safety engineering; plant design, equipment design, and other accident prevention programs.

899 (1-5) Su, A.W.S. Interdepartmental Seminar.
(See under Interdepartmental Seminars.)

950 Su, A.W.S. Research in Industrial Engineering.
Research for thesis or dissertation purposes only.

INTERDEPARTMENTAL SEMINARS
FOR GRADUATE STUDENTS ONLY
Undergraduate students shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

895 (1-5) A.W.S. Interdepartmental Seminar in Radio-Astronomy. Mr. Ko, Mr. Kraus, Mr. Slettebak
Techniques of Radio-Astronomy. Present state of knowledge of the universe as determined by radio-astronomy. Given cooperatively by the Departments of Astronomy and Electrical Engineering.

896 (1-3) S. Interdepartmental Seminar in Polar and Alpine Studies. 1-3 hr cr. Prereq: permission of instructor. Repeatable to a maximum of 9 cr hrs.
A seminar on selected topics involving anthropology, biology, climatology, exploration, geology, plant, microbiology, and soils. Given in cooperation between the Institute of Polar Studies and the following departments: Agronomy, Anthropology, Botany and Plant Pathology, Civil Engineering, Geography, Microbiology, and Zoology and Entomology.
INTERDEPARTMENTAL SEMINARS

897 (1) A, W, S. Interdepartmental Seminar in Natural Resources.
A seminar in natural resources conservation. Given in cooperation between 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.

898 (1) S. Interdepartmental Seminar in Nutrition and Food Technology.

899 (1-5) Interdepartmental Seminars.
Two or more departments may collaborate in presenting seminars on subjects of mutual interest. Topics to be announced.

INTERNATIONAL STUDIES
Office, 100 University Hall

EXECUTIVE COMMITTEE: PROFESSORS KAWAI AND RANDALL, ASSOCIATE PROFESSOR NEMZER AND BOURGUIGNON, ASSISTANT PROFESSOR LOTT

410 (3) W. Basic Issues in World Affairs. 3 cl. Mr. Lott and Staff.
General introduction to contemporary international problems, conducted cooperatively by members of several departments.

520 (5) S. The Oriental World. 5 cl. Mr. Kawai and Staff.
Interdepartmental survey of contemporary Asian civilization; geographic and racial background, historical and cultural heritage, social organizations, economic and political problems, and international relations.

540 (5) A. Introduction to the Soviet Union. 5 cl. Mr. Nemzer and Staff.
A survey of the land, people, history, politics, social institutions, literature, and arts of the Soviet Union, conducted cooperatively by members of several departments.

FOR ADVANCED UNDERGRADUATES
According to University regulations, courses in this group are not open to freshmen or sophomores.

601 (3) W. Selected Problems in International Studies. 2 cl. Prereq: Pol Sci 612 or equiv. Open only to Internat S majors or those having equiv preparation. Mr. Nemzer and Staff.
Panel discussions, informal conferences, and a reading and research program arranged to meet the special needs of those enrolled.

705 (3-5) A. 706 (3-5) W. 707 (3-5) S. Honors Courses. Prereq: senior standing and 40 cr hrs in the social sciences including 15 cr hrs in courses acceptable for a major in Internat S, with a record of A in at least half of these major courses and an average of B in the remainder. At least 2 qtrs are required of candidates for the Bachelor of Arts with Distinction in Internat S.
Not open for graduate credit. Mr. Kawai and Staff.
Informal conf. The intent being to allow full scope to the initiative of the student. A special topic is assigned to each student each qtr. The results are tested by these and special reports. Failure to receive at least a B in this course is a disqualification for special honors credit.

[721] (2) Area Study Pro-Seminar. 5 cl. One of the following sections is offered from time to time in the Summer. Repeatable to a maximum of 12 cr hrs.

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

721A Europe
721B Latin America
721C The Far East
721D The Middle East
721E Africa
721F The Soviet Union
ITALIAN
Department of Romance Languages and Literature
Office, 115 Derby Hall
PROFESSOR LUIGI BORELLI, ASSISTANT PROFESSOR ANGELO, MISS LEVISI, AND ASSISTANTS

FOR UNDERGRADUATES

401 (5) A. Elementary Italian. Sections limited to 25 students. This course may not be taken simultaneously with French 401-402, Span 401-402, or by 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. Staff
- 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 (5) W. Elementary Italian. Prereq: 401. This course may not be taken simultaneously with French 401-402, Span 401-402. Staff
- 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 (5) S. Modern Italian Drama. Prereq: 402. Mr. Borelli
- Special attention given to Goldoni and Pirandello.

#504 (5) S. Modern Italian Poetry. Prereq: 402. Mr. Borelli
- Carducci, Pascoli, D’Annunzio and others.

505 (5) A. Italian Neo-Realism. Prereq: 402. Mr. Borelli
- Italian Literature since the end of the second World War.

510 (5) S. Italian Conversation and Composition. Prereq: 402 or equiv. Mr. Borelli

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

#611 (3 or 5) W. Dante. 3 cl in Engl, 2 additional cl in Ital for those earning 5 cr hrs. Prereq: permission of instructor. Mr. Borelli
- Introduction to the reading of the Divine Comedy. Analysis of major episodes.

#612 (3 or 5) W. Petrarch and Boccaccio. 3 cl in Engl, 2 additional cl in Ital for those earning 5 cr hrs. Prereq: permission of instructor. Mr. Borelli
- 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 (3 or 5) A. Modern Italian Fiction. 3 cl in Engl, 2 additional cl in Ital for those earning 5 cr hrs. Prereq: permission of instructor. Mr. Borelli
- Special emphasis on the novel from Manzoni to Svevo.

701 (1-5) A.W.S. Minor Problems in Italian. Prereq: permission of instructor. Mr. Borelli

FOR GRADUATES

950 A.W.S. Research in Italian Language or Literature.
- Research for thesis or dissertation purposes only.

JAPANESE
Division of East Asian Languages and Literatures
Office, 405-D University Hall
ASSISTANT PROFESSORS WANG, CHING, MR. HASHIMOTO, MR. LYELL

401 (5) A. Elementary Japanese. 5 cl. Staff

402 (5) W. Elementary Japanese. 5 cl. Prereq: 401. Staff

403 (5) S. Intermediate Japanese. 5 cl. Prereq: 402. Staff

404 (5) A. Intermediate Japanese. 5 cl. Prereq: 403. Staff
505 (3) W. Japanese Conversation. 3 cl. Prereq: 404 or permission of instructor. Staff
Practice in conversation.

506 (3) S. Japanese Composition. 3 cl. Prereq: 404 or permission of instructor. Staff
Practice in composition. Review of vocabulary and grammar.

695 (2-5) A.W.S. Private Reading. Prereq: permission of department. Repeatable for a maximum of 10 hrs. Staff

JOURNALISM
Office, 203 Journalism Building
PROFESSORS KENZLE, POLLARD, CULLMAN, ASSOCIATE PROFESSORS MAGUIRE, BARTON, NORTON, ASSISTANT PROFESSORS DRENTEN, HOLINGER, FULLMAN, SEIFERT, BARBE, VISITING PROFESSOR KIPLINGER, LECTURERS BOSTWICK, DEATHICK, GAUMER, McGIFFERT, INSTRUCTORS LAEUER, AND PENNINGTON

FOR UNDERGRADUATES

401 (3) Su,A,W,S. Introduction to Journalism. 3 cl. Prereq: Engl 416. Req'd of all Jour majors. Mr. Barton, Mr. Bostwick, Mr. Laeuer
An introduction to newspapers, magazines, radio-television and public relations. Lectures, readings, written reports.

402 (3) A,W,S. News Writing. 2 cl, 2 lab hrs. Prereq: 401. Req'd of all Jour majors. Mr. Barton, Mr. McGiffert, Mr. Bostwick, Mr. Laeuer.
Writing news and feature articles.

501 (3) Su,A,W,S. Editing. 2 cl, 2 lab hrs. Prereq: 402. Req'd of all Jour majors. Mr. Bostwick, Mr. Norton, Mr. McGiffert
Editing of copy, headline writing, re-writing, and general copy desk work; introduction to photo editing and make-up.

505 (3) A,S. Reporting Public Affairs. 3 cl. Prereq: 501, Pol Sci 401, 410 or 507. Req'd of all Jour majors. Mr. Bostwick
Reporting of court and governmental news. Students attend court trials, legislative and council sessions, visit governmental agencies as reporters and write news stories.

508 (3) Su,A,W,S. Technical Writing. 3 cl. Open to juniors and seniors. Not open to Jour majors. Mr. Maguire, Mr. Seifert
Writing for special, trade and professional publications. Designed for non-journalism students in Agriculture, Engineering, Business, Education, Dentistry, Law, Medicine, Home Economics.

509 (1) Su,A,W,S. Journalism Laboratory. 1 3 hr lab. Repeatable to a maximum of 5 cr hrs. Prereq: 401 and 402. Open to sophomores and juniors in any department in the University. Req'd of all Jour majors. Mr. McGiffert, Mr. Drenten, Mr. Gaumer
Laboratory in one or more of the following: reporting, news writing, feature writing, editing, makeup, critical writing, photojournalism, cartooning.

510 (3) Su,A,S. Photojournalism. 1 cl, 1 2 hr lab. Prereq: 501 and 2 hrs of 509. Req'd of all Jour majors. Mr. Drenten, Mr. Shaffer
Reporting the news with a camera. How to recognize, develop, and create picture stories. Experience in coordinating words and news pictures. Picture editing. Layout.

517 (3) S. History of U.S. Journalism. 3 cl. Mr. Pollard
Origin and growth of Journalism in the United States, with consideration of its English beginnings. Notable editors and publishers and mutual influence of the press and democracy.

519 (3) Su,A,W,S. Typography and Printing. 2 cl, 2 hr lab. Req'd of all Jour majors. Mr. Gaumer
Typographic and printing processes and their relation to Graphic Arts in the mass media.
555 (5) Su,A,W,S. Factual Writing. 5 cl. Prereq: Engl 418 or equiv. Not open to Jour majors. Mr. Barton, Mr. Kienzel.
Instruction and practice in gathering and presenting factual material. Observation, research, interviewing, critical analysis, and rewriting are stressed.

FOR ADVANCED UNDERGRADUATES AND GRADUATES
Courses in this group are not open to freshmen or sophomores.

602 (3) Su,A,W,S. Magazine Writing I. 3 cl. Reqd of all Jour majors. Open to non-majors with permission of instructor. Mr. Norton, Mr. Barton, Mr. Kienzel.
Non-fiction writing for publication in general, professional, trade or Sunday magazines.

603 (3) Su,W,S. The Writing of Reviews and Criticisms. 3 cl. Reqd of all Jour majors. Open to non-majors with permission of instructor. Mr. Norton.
Study of the work of the dramatic and literary critic, especially on newspapers and magazines. Practice in writing reviews and criticisms.

605 (3) Su,A,S. News in Broadcasting I. 2 cl, 2 hr lab. Reqd of all Jour majors. Open to non-majors with permission of instructor. Mr. Drenten.
Preparation and broadcasting of news. Study of the development of news-type programs in the broadcasting industry, both radio and television.

606 (2) A,W,S. News in Broadcasting II. 1 cl, lab arrange. Prereq: 605, or equiv. Mr. Drenten.
Practice in writing and editing news for broadcasting at various broadcasting stations, and voicing of newscasts at WOSU and WOSU-TV.

607 (3) W. Special Radio and Television News Programs. 2 2 hr lec-labs. Prereq: 605 or permission of instructor. Mr. Drenten.
Planning and production of special news programs such as the sportscasts, the interview, special events and documentaries.

608 (3) W. The Press and Basic Issues of Our Times. 1 cl, 1 2 hr seminar. Prereq: senior or graduate standing, or permission of instructor. Reqd of all Jour majors. Open to non-Jour majors. All instructors.
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.

612 (3) Su,W,S. Magazine Writing II. 3 cl. Prereq: 602. Open to non-Jour majors. Mr. Norton, Mr. Barton, Mr. Kienzel.
Continuation of Jour 602 with emphasis on the full-length magazine article.

613 (1) Su,A,W,S. Journalism Laboratory. 1 3 hr lab. Prereq: senior or graduate standing in any department. Reqd of all Jour majors. Repeatable to a total of 3 cr hrs. Mr. Derthick, Mr. McGiffert, Mr. Drenten, Mr. Gaumer.
Laboratory work in one of the following: reporting, news writing, feature writing, editing, makeup, reviews, photojournalism, or news broadcasting.

615 (2-5) Su,A,W,S. Journalism Laboratory. Prereq: 5 hrs Jour lab or permission of the Director of the School of Journalism. Repeatable to a total of 10 cr hrs. Mr. Derthick, Mr. McGiffert, Mr. Drenten, Mr. Gaumer.
Provides credit for those holding responsible positions on the Ohio State Lantern or in approved broadcasting stations.

617 (3) Su,A,S. Public Relations I. 3 cl. Prereq: junior standing. Mr. Seifert.
Survey of public relationshistory, social, economic and political implications: applications in business, industry, government, trade and professional associations and education, labor, social agencies and politics.

618 (3) W. Public Relations II. 3 cl. Prereq: 617 Mr. Seifert, Mr. Kienzel.
Study of research methods in public relations and mass media. Review of contemporary research in public opinion and attitude measurement.
619 (3) S. Public Relations III. 3 cl. Prereq: 617 or permission of instructor. Mr. Seifert
Industrial editing. The history, development and scope of institutional publications; practice in the planning and preparation of these publications.

[621] (3) A.S. The Editorial Page. 3 cl. Prereq: senior standing. Mr. Pollard
Study of the purpose, form, style and spirit of the editorial. Consideration of current events, practice in news interpretation and other editorial writing.

624 (3) Su,A,W,S. Mass Media Research. 3 cl. Prereq: senior or graduate standing. Mr. Barbe
Types and methods of qualitative and quantitative research in the news media. Analysis of methods and findings of typical studies.

625 (2-5) Su,A,W,S. Journalism Internship. Prereq: 501. Not open for graduate credit. Mr. Kienzie, Mr. Barton, Mr. Drennen
With pre-arranged approval of the Director of the School of Journalism, credit may be earned in employment on a newspaper, magazine, in broadcasting or public relations work off-campus. Not open for graduate credit.

[626] (5) A,W,S. Newspaper Management, Circulation, and Advertising. 4 cl, 3 hr lab. Prereq: senior standing. Not open for graduate credit. Mr. Callman, Mr. Pollard
Consideration of the tasks and problems of newspaper management with emphasis on circulation policies and methods and those affecting advertising.

627 (3) A. Public Relations IV. 3 cl. Prereq: 617 or permission of instructor. Mr. Seifert
Public relations methods and techniques; publicity and the mass media; preparation and production of special media.

(See under Education)

699 (3) A,W,S. Senior Reporting. 2 2 hr cl. Prereq: senior standing in Jour or permission of instructor. Mr. Derthick, Mr. Kienzie
Intensive reporting and writing.

700 (3-5) A. 701 (3-5) W. 702 (3-5) S. Honors Courses. 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. Not open for graduate credit. Mr. Barton
A reading program for students who are candidates for a degree with distinction in Journalism.

711 (2-10) Su,A,W,S. Minor Problems in Journalism. Prereq: graduate standing or permission of the Director of School. Repeatable to a maximum of 15 cr hrs. Mr. Barton, Mr. Drennen, Mr. Kienzie
This course is designed to permit students to make extensive and significant studies in the field of Journalism.

714 (3) S. Law of the Press, Radio, and Television. 3 cl. Prereq: 505, or permission of instructor. Mr. Pollard
History, principles, and provisions of the laws of libel, slander, copyright and other statutes affecting newspapers, other publications and broadcasting.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

802 (3-5) Su,A. 803 (3-5) Su,W. 804 (3-5) Su, S. Seminar in Journalism.
Integrated reading and research in the fields of Journalism.

899 (1-5) Su,A,W,S. Interdepartmental Seminar.
(See under Interdepartmental Seminars.)

Research for thesis purposes only.
LANDSCAPE ARCHITECTURE
School of Architecture and Landscape Architecture
Office, 111 Brown Hall
PROFESSOR SUTTON. ASSOCIATE PROFESSOR TOBEY, LECTURER PACKARD

FOR UNDERGRADUATES

500 (2) A. Appreciation of Landscape Design. 2 cl. Mr. Tobey
A survey course arranged especially for those who wish to gain a better understanding and appreciation of the design of outdoor areas.

#507 (3) A. History of Landscape Architecture. 3 cl. Reqd in Landscape Architecture 2nd year. Mr. Sutton
A critical and historical analysis of the organization of outdoor space to meet varying needs of man from ancient times to the Renaissance.

#508 (3) W. History of Landscape Architecture. 3 cl. Reqd in Landscape Architecture 2nd year. Mr. Sutton
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.

550 (5) S. Design of Gardens and Small Properties. 2 cl, 9 lab hrs. Mr. Tobey
Landscape design for non-professional student emphasizing the design, construction and planting of residential properties.

587 (5) A. 588 (5) W. 589 (5) S. Landscape Construction. 1 cl, 12 lab hrs. Prereq: Civil E 412. Reqd in Landscape Architecture 3rd year. Mr. Tobey
Interpretation of topography. Problems in the development of ground forms, in road alignment and construction.

FOR ADVANCED UNDERGRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

617 (5) A. 618 (5) W. 619 (5) S. Intermediate Landscape Design. 15 lab hrs. Prereq: Arch 513. Reqd in Landscape Architecture 4th year. All instructors
An intermediate course in design with original problems involving outdoor space such as residential properties, land subdivisions, parks and other public areas.

620 (5) Su. Practical Experience. Ten weeks or the equiv of approved practical experience in an office or on a landscape project. Report required. Reqd in Landscape Architecture summer following 3rd year.

688 (5) W. 689 (5) S. Landscape Construction. 1 cl, 12 lab hrs. Prereq: 617. Reqd in Landscape Architecture 4th year. Mr. Sutton
Study of the use of materials in the construction of structural elements in landscape design. Preparation of working drawings, specifications and estimates.

717 (10) A. 718 (10) W. 719 (10) S. Advanced Landscape Design. 16 lab hrs. Prereq: 619. Reqd in Landscape Architecture, 5th year. All instructors
The integration of landscape construction and planning design in the development of problems in advanced landscape design. Individual research and criticism.

720 (5) Practical Experience. Ten weeks or the equiv of approved practical experience in an office or on a landscape project. Report required. Required in Landscape Architecture summer following fourth year.

727 (5) A. 728 (5) W. 729 (5) S. Planting Design. 1 cl, 8 lab hrs. Prereq: Hort 551. Reqd in Landscape Architecture 4th year. Mr. Sutton, Mr. Tobey
A study of the use of plant material in landscape design with particular emphasis on composition and ecology.
LANDSCAPE ARCHITECTURE

759 (3) A. Professional Practice. 3 cl. Prereq: 689. Req'd in Landscape Architecture 5th year. Mr. Sutton
A study of professional practice including ethics, office organization and the preparation of contracts and specifications.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

701 (2-10) A. 702 (2-10) W. 703 (2-10) S. Special Studies in Landscape Architecture. Prereq: 4th or 5th year standing. All instructors
This course is open, by permission of the department, to students in the Graduate School and those who wish to pursue special studies in landscape architecture.

LATIN

Department of Classical Languages and Literature
Office, 217 Derby Hall

PROFESSORS TITCHENER, ROLLING (EMERITUS), ABBOTT, AND FORBES, ASSOCIATE PROFESSOR W. B. JONES, ASSISTANT PROFESSORS HOLSINGER AND LEMARDON, MR. C. W. FORNARA AND ASSISTANTS

FOR UNDERGRADUATES

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 404 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 (5) A. Elementary Latin. 5 cl. This course is for students who have not studied Latin.
Credit in 401 will be counted toward graduation only if followed by successful completion of 402, or if taken after successful completion of the fourth regular university course in another foreign language.
Grammar and practice in translation of the Latin idiom.

Continuation of grammar and selected readings.

404 (5) A, W, S. Cicero. 5 cl. Prereq: 401-402, 412 or 2 yrs of high school Latin.
Readings from Cicero with review of Syntax.

405 (5) W, S. Vergil. 5 cl. Prereq: 404 or equiv in high school Latin.
Readings from the Aenid.

406 (5) A. Horace. 5 cl. Prereq: 401-404 or 2 yrs of high school Latin.
Theodes of Horace through the first book with selected poems of the later books.

407 (5) W. Livy. 5 cl. Prereq: 405 and 406.
The first book of Livy describing the founding of the Roman state.

408 (5) S. Latin Comedy. 6 cl. Prereq: 405, or 406, or 407.
Selected plays of Plautus and Terence.

412 (5) A. Latin Review. 5 cl. Enrollment determined by placement tests.
This course is intended for those students whose elementary Latin will begin with a review and continue as a preparation for Latin 404.

501 (3) W. Tacitus, Martial. 3 cl. Prereq: 407 or 408.

502 (3) A. Letters of Pliny and Cicero, Catullus. 3 cl. Prereq: 407 or 408.
182 LATIN

503 (3) S. Ovid, Sallust on Jugurtha, or Petronius. 3 cl. Prereq: 407 or 408.

505 (3) A. Grammatical Review. 3 cl. Prereq: 407 or 408.

#540] (5) Su. Essays of Cicero. 5 cl. Prereq: 406, 407, 408 or equiv. Not open to students who have credit for 520.

#541] (5) Su. Vergil: Elegies, Georgics and Epic. 5 cl. Prereq: 406, 407, 408 or the equiv. Not open to students who have credit for 521.

542] (2) Su. Summer Lecture Series. 2 cl. Prereq: 406, 407, 408 or the equiv. Not open to students who have credit for the identical course under 522. Mr. Lenardon
(a) The archaeology of Rome.
(b) History of Medieval Literature.
(c) Literary forms, writing, materials, books and libraries.
(d) History of Medieval Literature.
(e) Roman stoicism.

#543] (5) Su. Sallust on Catiline; Livy on Hannibal. 5 cl. Prereq: 406, 407, 408 or equiv.

#544] (5) Su. Ovid, Metamorphoses. 5 cl. Prereq: 406, 407, 408 or equiv.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

603 (3) Su. Advanced Reading. 3 cl. Prereq: 16 hrs of Latin more advanced than 405.

612 (3) W. Latin Prose Composition. 3 cl. Prereq: 16 hrs of Latin more advanced than 405. Mr. Fornara
Exercises and lectures on Latin idiom and style.

615 (3) W. Proseminar I. 3 cl. Prereq: 16 hrs of Latin more advanced than 405. Mr. Lenardon
Lectures on the life and period of Cicero. Readings from the letters and essays. Latin 415 is designed especially for students preparing to teach Latin.

616 (3) Su. Proseminar II. 3 cl. Prereq: 16 hrs of Latin more advanced than 405. Mr. Abbott
Lectures on the life and works of Vergil, and his influence on modern literature; readings from the Elegies and Georgics.

617 (3) A. Proseminar III. 3 cl. Prereq: 16 hrs of Latin more advanced than 405. Mr. Titchener
Lectures on topic suggested by the study of Caesar's Gallic and Civil Wars; special consideration of literary style, political and military campaigns.

625 (3) S. Introduction to Medieval Latin. 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. Mr. Forbes
Extensive reading in texts illustrating the history of the Latin language and literature from the fourth through the thirteenth century.

627 (3) W. Vulgar Latin. 3 cl. Prereq: 16 hrs of Latin more advanced than 405, French 801 or equiv linguistic basis. Mr. Abbott
Lectures and the study of texts and inscriptions illustrating the development of the popular speech.
631 (1-6) Su,A,W,S. Private Reading and Minor Problems. Prereq: one reading course more advanced than 408. In the Summer Quarter, this course may be taken for either term or the quarter. The Staff
Passages for private reading and topics for investigation will be suggested to meet the needs of individual students.

650 (3) A. 651 (3) W. 652 (3) Su.S. History of Roman Literature. 3 cl. Prereq: three reading courses more advanced than 408. Repeatable for graduate credit. Mr. Abbott, Mr. Titchener
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.

701 (1-4) Su,A,W,S. Special Problems. Prereq: 10 hrs of 600 work in Class Lang for classical majors, for other majors, permission of instructor. Staff
Assigned reading and individual research. Registration for this course should be followed by a letter designating the field of study.
(a) Epigraphy
(b) Palaeography
(c) Topography of Rome
(d) Greek Art and Archeology
(e) History of the Latin Language
(f) History of the Greek Language
(g) Democracy in Fifth Century Athens
Latin c, d, e, f are not open to students who have had Latin 735, 736, 731, and 722, respectively.

#702 (3) A. Plautus and Terence. 3 cl. Prereq: 20 hrs of Latin more advanced than 405. Mr. Abbott
Aim and accomplishment in Rome’s earliest successful literary effort.

#703 (3) W. Horace. 3 cl. Prereq: 20 hrs of Latin more advanced than 405. Mr. Titchener
The practice of literary theory in the poetic essay and the lyric of human philosophy.

#704 (3) S. Tacitus. 3 cl. Prereq: 20 hrs of Latin more advanced than 405. Mr. Forbes
The last great literary exponent of the Greco-Roman theory of the method and value of historical writing.

705 (3) A. Seneca. 3 cl. Prereq: 20 hrs of Latin more advanced than 405. Mr. Abbott
The moral essay and philosophic drama of the Silver Latin period.

706 (3) W. Livy and Republican History. 3 cl. Prereq: 20 hrs of Latin more advanced than 405. Mr. Titchener
Early attempts at historical writing down to the culmination in the Augustan Period.

707 (3) S. Prose Fiction: Petronius and Apuleius. 3 cl. Prereq: 20 hrs of Latin more advanced than 405. Mr. Forbes
Study of the beginnings of fiction and the short story.

720 (3) A. Introduction to Historical Greek and Latin Grammar. 3 cl. Prereq: 10 hrs of 600 work in the Classics. Mr. Abbott

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

800 (3) W,S. Seminar. Mr. Abbott, Mr. Titchener
Textual criticism and research problems. The author to be studied will be assigned by the instructor.

950 (arr) Su,A,W,S. Research in Classical Languages.
Research for thesis or dissertation purposes only.
LAW

112 Law Building

PROFESSORS STRONG, LATIN, GALLAHAN, DAVIES, WILLS, FULDA, STANGEL, BALL, POLLACK, LYN, NORDSTROM, KARST, AND RUTLEDGE, ASSOCIATE PROFESSORS CARRINGTON, SELBY, VAN ALSTYNE, HERMAN, ASSISTANT PROFESSOR SLAGLE, JR., LECTURERS PLATT AND GLANDER

FIRST YEAR

OPEN ONLY TO STUDENTS REGISTERED IN THE COLLEGE OF LAW

(All First-Year Courses Are Required)

090 (0) Introduction to the Study of Law. Mr. Nordstrom, Mr. Strong
During the Autumn Orientation Period, first-year students in the College of Law meet for the discussion of matters introductory to the study of law.
Nordstrom, Introduction to the Study of Law.

091 (0) Freshman Jury Service.
During the Winter Quarter, first-year law students are required to serve as jurors in the cases tried by seniors in the course in Trial Practice.

092 (0) W.S. Appellate Practice I. Mr. Herman and Moot Court Governing Board
Procedural and substantive aspects of appellate practice. The student prepares a brief and presents an oral argument on the basis of assigned research materials. Small group instruction will be given in brief writing and appellate advocacy. See Appellate Practice II and III.

500 (9) A(3), W(3), S(3). Contracts. Mr. Stanger, Mr. Nordstrom
Remedies available for breach of contract: offer and acceptance; consideration and promissory estoppel; third party beneficiaries; the assignment of rights and delegation of duties; conditions; impossibility and frustration; the statute of frauds.

505 (5) A(2), W(3). Torts. Mr. Karst
Trespass to person and property; conversion; privileges; negligence; strict liability; nuisance; owners and occupiers of land; tort and contract; misrepresentation; defamation; right of privacy; interference with advantageous relations; waiver of sovereign immunity.

510 (6) A(3), W(3). Property I. Mr. Callahan, Mr. Lynn
The incidents of ownership as applied to both real and personal property: possession, interests; concurrent interests; marital interests; future interests; contractual modification of these interests.

511 (3) S. Property II. Mr. Callahan
The acquisition and transfer of ownership: adverse possession; easements and licenses; estoppel; wills; the recording systems; title registration.

515 (6) A(3), W(3). Civil Procedure. Mr. Wills, Mr. Carrington
A detailed survey of the basic steps in a civil action, a survey of the state and federal court systems, the abolition of the common law forms by action by the Codes; res judicata; jurisdiction of the subject matter, person, res, and personal status; venue.

516 (3) S. Civil Procedure II. Mr. Ball, Mr. Carrington

529 (4) S. Criminal Law. Mr. Herman
Survey of the substantive criminal law as a means for attaining certain socially desirable ends, such as the preservation and protection of life and property. Two major problems will be stressed: what behavior should be made criminal, and what should be done with persons who engage in the behavior.

550 (6) A(3), W(3). Constitutional Law. Mr. Karst, Mr. Van Alstyne, Mr. Strong
Fundamental study of the major substantive, methodological, and federalistic limitations upon governmental power obtaining under the practice of judicial review.

570 (2) A. Legal Research. Mr. Pollack, Mr. Selby
Study of the use of legal books, both English and American, including practical problems in the use of reports, statutes, series of selected annotated cases, texts, encyclopedia, digests, dictionaries, periodicals, and citation books.
SECOND YEAR

093 (0) W.S. Appellate Practice II. Mr. Herman and Moot Court Governing Board.

On the basis of his own research the student prepares a brief and presents an oral argument to a panel comprising members of the 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.

600 (3) Su,A,W,S. Legal Clinic. Three consecutive quarters for regular students S,A,W; for students accelerating and graduating in December, S,Su,A. Mr. Selby, Miss Daehler

Practical experience in handling actual cases for legal aid clients in conjunction with the Legal Aid Society and under supervision of the Director of the Clinic; preparing reports on each case; cooperating with the public defender, social agencies, and members of the bar; drafting legal papers; negotiations with parties; and assisting in the trial of cases.

THIRD YEAR

094 (0) A.S. Appellate Practice III. Mr. Herman and Moot Court Governing Board

The student critically evaluates 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.

695 (3) A,W,S. Seminar in Legal Planning.

This type of Seminar is designed to provide 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 Aid Clinic and Ohio Trial Practice, respectively.)

Following is a list from which Seminars in Legal Planning are drawn each year:

A. Business Planning

Planning and drafting in the field of business associations; principally concerned with problems in general and limited partnerships, business trusts, and closely held corporations.

B. Estate Planning

A consideration of the problems involved in planning an effective and economical gift distribution of property interests. Typical estates, both large and small, will be considered in the light of the results commonly sought by the donor and the techniques and restrictions suggested by the law of property, wills, future interests, insurance, and federal and state taxation.

C. Federal Tax Planning

Consideration of selected problems in business organization, corporations, partnerships and individual estates; practice in draftsmanship and negotiation. The course in Income Taxation is a prerequisite.

D. General Legal Planning

Planning of representative types of personal and business transactions which confront the general practitioner. No one area is emphasized; instead, various problems are considered in the light of results commonly sought by clients. These include employment contracts, partnership agreements, purchase agreements, chattel security agreements, real property transactions, wills and trusts.

E. Planning Through Negotiation

Considerations relating to planning for and during negotiations; weighing of legal economic and social factors and use of techniques for attainment of objectives. Problems involve resolution of conflicting interests and rights, and drafting appropriate embodiment of agreed-upon solutions.

F. Legislative Planning

The role of the lawyer in advocating or opposing state and federal legislation. Group discussion of bills and supporting briefs drafted by individual members of the seminar will include problems selected from past and current proposals of the Ohio State Bar Association.

G. Planning Seminar in Law

Topics will change as specially scheduled in any quarter. Repeatable to a maximum of six credit hours.
696 (3) A.W.S. Seminars in Legal Research.

This type of Seminar is designed to provide 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, or relevant social, economic, and other non-legal materials.

Following is a list from which Seminars in Legal Research are drawn each year:

A. Antitrust Law and Economics
   An evaluation of domestic antitrust law on the basis of current economic thinking. Individual research topics normally take the form of industry studies of the likely effect of given industries in the enforcement of antitrust policy. An inter-departmental seminar of the Economics and the College of Law.

B. Antitrust Law and International Cartelization
   Critical examination of the application of domestic antitrust policy to foreign operations of American corporations. Continued adherence of the United States to the economic philosophy of antitrust presents difficult economic-legal problems in the regulation of American business engaged in international trade.

C. Constitutional Problems
   Individual research into, combined with group discussion of, problems of a constitutional nature not fully considered in regular course work. Areas of investigation include requirements for raising constitutional questions, the evolution of judicial review, intergovernmental relationships, the protection of civil liberties, special problems under the Ohio Constitution.

D. Employee’s Rights
   Problems arising under federal wage and hour legislation, such as: nature of the employment relation; coverage of Fair Labor Standards Act in respect to interstate commerce and production for commerce; exemptions; nature of compensable time, regular rate of pay and overtime on fluctuating workweek; employment of child labor.

E. Legal Problems in Foreign Trade and Investment
   A consideration of the legal problems encountered by American business enterprises engaged in foreign trade or investment. Particular consideration will be given to problems met in day to day operation of importers and exporters, transportation, motion picture, oil and mining companies, under American and international law.

F. Legal Regulation of Business Practice
   A study of legal regulations of competitive practices through legislative, administrative, and judicial actions to maintain fair standards for business rivalry, and equality of opportunity for small business; the Robinson-Patman Act forbidding price discrimination and selected problems from other regulatory statutes involving government and private litigation and counseling.

G. Legal Regulation of Devolution of Property
   A consideration of the socio-legal problems raised by the devolution of wealth through such institutional arrangements as public, welfare, programs, union welfare funds, insurance, foundations, charitable trusts, and pension trusts. An attempt will be made to determine the impact of these arrangements and the implication of governmental encouragement of welfare programs.

H. Problems in the Law of Evidence
   Intensive examination into selected problems in the law of Evidence. Each member of the group will prepare and present a review of selected readings, and an original paper.

I. Problems in Local Government Finance
   Legal and practical problems in taxing by and financing of both general function and special function local governmental units, including the power of and procedure for taxing, expending funds, financing improvements or services.

J. Problems in Public Contracts
   Distinctions between public and private contracts; types of government contracts; authority of governments to make contracts; limitations; advertising; bids, and awards of contracts; formal requisites; standard clauses; contractors’ bonds; assignment of contracts; performance and termination; liabilities on public contracts. Seminar problems will be chosen from the described areas.

K. The Functional Approach to Law
   An attempt, by a detailed analysis of certain so-called rules of law and of the situations to which they relate, to arrive at a basis for a critical evaluation of the rules and of the assumptions of cause and effect commonly made as to those rules.

L. Legal and Economic Problems in State and Local Taxation
   A critical and comparative analysis of state taxation and intergovernmental tax relations in terms of law and fiscal economics, with particular attention to the State of Ohio and its local governments. Each member of the seminar will present an oral report and a written paper on a selected research topic. An interdepartmental seminar of the Department of Economics and the College of Law.
M. Medical-Legal Problems
A study of the distribution of governmental powers in democratic and totalitarian countries; the relation of power to the expressed will of the people; the concept of justice and a fair hearing; and the capacity of personal freedom to survive legislative and executive encroachments.

N. The Individual and His Government
A study of the distribution of governmental powers in democratic and totalitarian countries; the relation of power to the expressed will of the people; the concept of justice and a fair hearing; and the capacity of personal freedom to survive legislative and executive encroachments.

O. Comparative Labor Law
The subject matter will relate to significant problems in American labor law, each viewed from the standpoint of both American and foreign law. Opening with a brief series of lectures on the principal areas of contrast between American and foreign solutions, the seminar will proceed with a succession of student research problems in three principal fields: collective bargaining, the use of economic force, and internal and inter-union affairs.

P. Right of Privacy
A study of the protection afforded by law for the individual's interests in freedom from publicity and in physical seclusion. Particular attention will be given to the legal response to social and technological changes which threaten these interests.

Q. Regulated Industries
A study of the work of the principal regulatory agencies, both federal and state (Interstate Commerce Commission, Civil Aeronautics Board, Federal Communications Commission, Public Utilities Commission, and others), with respect to licensing, rate-making, mergers, and general supervision of business practices. The aim of the study is an exploration of the purpose of government control of specific industries within the framework of free competition.

R. International Law of Shareable and Strategic Resources
An examination of the processes of interaction, claim, and decision with respect to resources largely open to use by all states, including the ocean, "outer" space, air space, international rivers, canals, and polar areas. Emphasis will be placed upon major recurring legal problems in the use of these resources and upon the role of the United Nations in the exercise of major international responsibility.

S. Selected Problems in Criminal Law and Procedure
Purposes and effects of punishment; wiretapping; Uniform Crime Reports; right to counsel; habeas corpus and other post-conviction remedies; plea bargaining and plea negotiations.

T. Research Seminar in Law
Topics will change as specially scheduled in any quarter. Repeatable to a maximum of six credit hours.

ELECTIVES
In addition to the required courses set out above, each student who is a candidate for a degree will elect from the following courses a sufficient number of hours to complete the hour requirements for graduation. Each student must earn credit in one of the following electives: 502, Comparative Law; 511, International Law; or 677, Legal Problems of Foreign Trade and Investment. Electives will not be scheduled for the following:

[525] (3) Agency-Partnership.
Establishment of the relation of simple agency and partnership, risks of tort in contract liability, estoppel, ratification, and instability of each relation, together with devices to mitigate these risks through special powers, insurance, and variations in the form of employment or partnership contract.

[530] (4) Administrative Practice. Mr. Strong
Introduction to the administrative process, with emphasis upon the recondensation of the primary features of this process, with traditional political-legal theories of the separation of governmental powers. Analysis of the problems presented is followed by consideration of the major solutions effected through legislative and judicial action.

545 (4) A. Legal Process. Mr. Fulda
A comparative evaluation of law-making by private parties, courts, legislatures, and administrative agencies; problems of retroactivity; adherence to precedent; purposes of legislation; and a study of statutory interpretation.

555 (6) A(3), W(3). Evidence. Mr. Ball
A survey of the rules of evidence and consideration of the problems of demonstrative, testimonial, and circumstantial proof in the resolution of disputes of fact. Special emphasis on qualification and examination of witnesses; privilege; relevancy; documents; and the hearsay rule and its exceptions.
550 (4) W. Restitution. Mr. Nordstrom, Mr. Carrington, Mr. Slagle
A study of restitutionary remedies available for vindication of substantive legal rights, including comparison of such remedies with types of compensatory and specific relief. Examined will be: reformation, rescission and restitution, at law and in equity; remedies for fraudulent and honest misrepresentation; benefits conferred by mistake of fact or law; benefits conferred under partially-performed contracts; benefits voluntarily conferred; benefits conferred under duress.

565 (3) A. Pleading. Mr. Wills
Pleading under the codes and the Federal Rules of Civil Procedure. General requirements of pleadings; variance and amendments; manner of statement; defenses in abatement and in bar; denial of new matter; particular defenses; counterclaims; the reply; the demurrer; motions; interrogatories; real party in interest; joinder of parties.
Wills, Ohio and Federal Pleading.

575 (3) A. Negotiable Instruments Law. Mr. Lynn
Types of Commercial or Negotiable paper transfer; purchase and payment in due course, discount and security.
Britton, Cases on Bills and Notes, 4th Ed.

580 (4) S. Income Taxation. Mr. Van Alstyne
A study of the federal income tax; the concept of taxable gross income; deductions; methods for reporting income; capital gains and losses; treatment of corporations and shareholders, partnerships, and trusts.
The course is taught by the problem method.

585 (6) W.S. Private Corporations. Mr. Davies
A consideration of the business corporation as a device for the furtherance of trade and manufacture, with emphasis on the law of corporate finance and upon problems of present-day importance.

605 (4) A(2), W(2). Trial Practice. Prereq: 555 and 565. Mr. Herman, Mr. Slagle
The Autumn Quarter will consist of casebook instruction in state and federal procedure in a civil case. Winter Quarter will be devoted to individual practice in the jury trial of a civil case.

610 (4) A. Labor Law. Mr. Rutledge
Establishment of collective bargaining processes, including representation procedure under the Labor-Management Relations Act, and the duty to bargain; the collective bargaining process together with grievance arbitration; legal limitation on economic pressures of both management and unions, including interference with bargaining, strikes, picketing and boycotts.

615 (4) W. Trusts. Mr. Lynn
The nature, creation, and elements of Trusts; charitable, resulting and constructive trust; rights and liabilities of parties. The course will be taught by the problem method.
Scott, Cases on Trusts, 4th Ed.

625 (4) W. Conflict of Laws. Mr. Nordstrom, Mr. Karst, Mr. Carrington
A study of rules of private law pertaining to jural relations which contain one or more foreign elements; more particularly to matters of jurisdiction, foreign judgments, domicil, choice of law, torts, workmen's compensation acts, contracts, property, family law, and decedents' estates. This course will be taught by the problem method.

650 (2) Administration of Criminal Justice. Mr. Herman
This course is concerned with the process of criminal justice from arrest to parole and probation.

651 (3) Administration of Decedents' Estates. Mr. Wills
Probate and contest of wills; jurisdiction and relation of courts; effect and necessity of administration; inventory and assets; contracts, sales and investments by personal representatives; claims against estate; accounting and distribution.

652 (3) Admiralty Law.
A study of admiralty jurisdiction; injuries to seamen and maritime workers; bills of lading; charter parties; salvage; general average; limitation of liability.

653 (3) Advanced Legal Research. Mr. Pollack
Through instruction in varied research techniques and through practice in legal writing, to provide students with basic experience in analyzing legal questions, in selecting and using appropriate publications, and in reaching competent solutions to problems within the framework of realistic legal situations. Instruction will be augmented by assignments in constitutional, statutory, case, administrative and international law.
654 (3) Arbitration Law and Practice. Mr. Rutledge
A study of the administration and enforcement of commercial and labor arbitration agreements under the Ohio and federal arbitration statutes. The drafting of arbitration clauses, initiation and conduct of arbitration proceedings, the problem as to what issues are arbitrable, the function of courts before and during the arbitration and the enforcement or impeachment of awards.

655 (3) Bankruptcy. Mr. Davies
A study of the methods used for the liquidation of debtors’ estates. Most of the time is spent on the first seven chapters of the Bankruptcy Act.

655A (3) Comparative Law—Western Europe. Mr. Pulda
A study of the substantive and procedural aspects of foreign legal systems in comparison with American law. Code systems and the common law are compared historically and analytically.

655B (3) Comparative Law—Latin America. Mr. Earst
A comparative study of selected aspects of Latin-American and Anglo-American law. Significant similarities and differences in the Civil-Law and Common-Law systems will be explored through examination of concrete legal problems which the systems share. An attempt will be made to relate such similarities and differences as may be found, to their causes in history and in present social needs.

659 (3) Corporate Organization and Finance. Prereq: 585. Mr. Davies
A study of the 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 (3) Domestic Relations. Mr. Selby
The law pertaining to the organization and disorganization of the family, such as marriage, annulment, divorce, alimony, custody, intra-family relationships and relations of family members with others. An attempt will be made to integrate data from the various social disciplines which deal with the problems of the family.

661 (3) Estate-Gift Taxation. Mr. Glander
A consideration of the law of federal gift and estate taxation, and a survey of federal tax practice. Interrelationships of death and gift taxes with Federal income taxes will be stressed.

662 (3) Federal Courts. Mr. Wills

663 (3) Future Interests. Mr. Lynn, Mr. Callahan
Future interests in real and personal property; their classification, creation, and characteristics; class gifts; powers; the rule against perpetuities.

664 (3) Insurance. Mr. Lynn
A study of insurance law and practice with particular reference to fire, life, and automobile insurance. Discussion of the underlying principles of insurance, such as insurable interest, warranties and representations, waiver and estoppel as well as a construction of the specific clauses of the standard policies.

665 (3) International Law. Mr. Stanger, Mr. Burke
An intensive study of current problems in selected fields of international law, such as its source, international agreements, status of states and individuals, recognition, jurisdiction and procedural prerequisites to assertion of international claims.

666 (3) Jurisprudence. Mr. Pollack
A study of jurisprudential thought as represented by the various general theories of or about law. The course aims to provide a critical and a comparative assessment of the leading juridical doctrines and of their relationship to social control policy and to the historical and contemporary development of legal perceive (judicial, legislative, and administrative).

667 (3) Local Government Law. Mr. Van Alstyne
Types and organization of local government units; intergovernmental relations; “home rule” power of Ohio municipalities; personnel, lawsmaking; community planning; taxing and finance; contracts; legal liability.

668 (2) A.S. Appellate Practice IV. Mr. Herman

669 (2) Public Utilities.
The public utility concept as developed at common law and by statute; the obligations of the public utility status and their enforcement.
670 (3) Real Property Mortgages. Mr. Callahan, Mr. Ball
The law of mortgages and their use as a security device in real property transactions, including study of common mortgage provisions and the methods of enforcement of rights. Consideration of "equitable" mortgages—the effect of departure from accepted mortgage practice.

671 (2) Receivership and Reorganization. Prereq: 585. Mr. Davies
A study of the equity receivership, corporate reorganization under Chapter X of the Bankruptcy Act, and arrangement under Chapter XI of the Act.

673 (3) State and Local Taxation. Mr. Glander
A study of the legal problems arising in present-day property, excise, income, and estate-inheritance taxation. Problems of tax administration and procedure also are considered.

674 (3) Advanced Federal Income Taxation. Prereq: 580. Mr. Platt
Open only to third-year students, this advanced study of Federal Income Taxation deals with Corporations and Shareholders; Partnerships; Trust and Decedents' Estate; Practice and Procedure.

675 (8) A(3), W(3). Commercial Transactions. Mr. Carrington
The legal process in its application to the problems and disputes of merchants and consumers of goods; the Uniform Commercial Code and pertinent federal legislation.

677 (3). Legal Problems of Foreign Trade and Investment. Mr. Fulda
A study of the principal problems confronting Americans engaged in export and import trade and in doing business abroad. Emphasis on Western Europe.

678 (3). Federal Antitrust Law. Mr. Fulda
A study of the prohibition of monopoly and restraint of trade by the Sherman and Clayton Antitrust Acts, the Federal Trade Commission Act and related statutes, including consideration of some statutory exemptions.

679 (2). Business Regulation. Prereq: 673. Mr. Fulda
A study of the prohibition against price discrimination and of the regulation of certain industries with respect to rates and control of entry by certificates of public convenience and necessity.

693 (1-2) Individual Studies.
By special arrangement with the Dean's office, special problems or projects may be taken for credit under the supervision of members of the faculty. The credit granted varies in proportion to the magnitude of the project. In general, assignment of Special Problems will be limited to instances of exceptional student specialization, scheduling difficulties, and curricular irregularity.

LINGUISTICS
405-D University Hall

ASSISTANT PROFESSOR WANG, PROFESSOR UTLB, ASSOCIATE PROFESSORS GRIF-FIN, LIHTE, MEYERS, FIMBLEUR, ASSISTANT PROFESSORS CHING, FILLMORE, GROENKE, JOHNSON, MR. JUNTER, MR. HASHIMOTO, MR. KAUFMAN

(See also the course listings in English, the foreign languages and Romance Linguistics in this Bulletin, and Linguistic Studies in the Graduate School Bulletin.)

FOR ADVANCED UNDERGRADUATES AND GRADUATES

601 (5) A. Introduction to Linguistics. 5 cl.
A broad introduction to the categories and techniques of general linguistics: phonemic, morphemic, and syntactic analysis; applied historical and comparative linguistics.

602 (3) W. Syntactic Structures. 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 (5) S. Phonological Structures. 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 (5) S. Field Methods in Linguistics. 5 cl. Prereq: 601.
Techniques for describing languages by the use of native informants.
LINGUISTICS 191

671 (5) A. Linguistics and Language Learning. 4 cl. Prereq: 601. Staff
The application of general linguistics to the problems of learning foreign languages, including English as a foreign language.

672 (3-5) A,W,S. Languages of the World. 3-5 cl. May be repeated. Prereq: 601.
Under direction of the linguistics staff, informant and laboratory techniques will be employed to teach a selected language not otherwise offered at the University.

701 (1-5) A,W,S. Minor Problems in Linguistics. Staff

720 (3-5) A.S. Seminar in Linguistics. 3-5 cl. Prereq: 602 and 603 or permission of instructor. Staff
Topics include the history of linguistics, grammatical theory, mathematical models in linguistics, history or structure of individual languages.

Research for thesis purposes only.

MATHEMATICS
Office, 150 Mathematics Building

UNIVERSITY RESEARCH PROFESSOR RADO, PROFESSORS EBBER, HELSENM, KRENZ, KUHN (EMERITUS), MAN, MICKLE, MILLER, MORENB (EMERITUS), REICH-ELDERR, ROSS (CHAIRMAN), SALTZER, WHITNEY, ZISSENHAUS, ASSOCIATE PROFESSORS ABADIN, BOPEC, COLSON, CRONHEIM, FISHER, HILDEBRANDT, JONES (EMERITUS), LYEVE, MARGARIS, MEYERS, KEEVES, RUSEL, SHAPIRO, SUCHSTON, TULL (ON LEAVE) WOODS, ASSISTANT PROFESSORS ANVIL, BNATTY (EMERITUS), NUMER, CARB (EMERITUS), CARROLL, KAPPE, LELAND, BAE, KINER, LOWR, YAFF, ZILBER, INSTRUCTORS BARNES, GRAFF, HUFFMAN, LANIER, LYNN, TANG, ASSISTANT INSTRUCTORS, AND GRADUATE ASSISTANTS.

FOR UNDERGRADUATES

400 (5) Su,A,W,S. Arithmetic and Elementary Algebra. 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.

401 (5) Su,A,W,S. Intermediate Algebra and Trigonometry. 5 cl. Five cr hrs will be added to graduation requirements of any students taking this course. An additional fee will be charged.
A review of material which is usually contained in a second high school algebra course and in one semester of high school trigonometry.

410 (3) Su,W,S. Principles of Mathematics. 3 cl. Prereq: 400 or satisfactory score on O.S.U. Math Test. Open only to students in elementary education.
The course develops basic ideas of arithmetic, algebra, and geometry through the study of the structure of selected mathematical systems.

416 (5) Su,A,W,S. First Year College Mathematics. 5 cl. Prereq: 400 or a satisfactory score on O.S.U. Math Test. Not open to students who have credit for 421 or 439.
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, and vector spaces.

417 (5) Su,A,W,S. First Year College Mathematics. 5 cl. Prereq: 416. Not open to students who have credit for Math 422 or 439.
417 is a continuation of 416. It contains an introduction to analytic geometry, linear programming, trigonometry, matrix algebra, and limits.

418 (5) A,W,S. Calculus. 5 cl. Prereq: 417 or 439. Not open to students who have credit for 423 or 440.
The sequence 415, 416, 417, 418 comprises a rigorous treatment of the fundamentals of the calculus. 416 covers functions, limits, derivatives and applications.
426 (5) S. Introduction to Calculus, Probability and Statistics. 5 cl. Prereq: 416 and 417. Not open to students with credit for 418, 435, 536, 537, 538, 541, 542, or 543.

Differentiation, integration of polynomials, maxima, mean value theorems, probability spaces, density functions, introduction to estimation, testing hypotheses.

429 (5) W.S. Mathematics of Finance. 5 cl. Prereq: 416 or permission of the department.

The principles of interest and discount with applications to annuities, sinking funds, capitalization, depreciation, valuation of bonds.

435 (5) S. Elementary Mathematical Statistics. 5 cl. Prereq: 416 or permission of the department.

Elementary principles of probability and introduction to the use of the binomial and normal distributions.

439 (5) Su.A.W.S. Algebra and Trigonometry. 5 cl. Prereq: 401 or a 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. Not open to students who have credit for Math 417 or 422.

Inequalities, functions, graphs, exponential and logarithmic and trigonometric functions and their graphs, complex numbers, inverse functions.

440 (5) Su.A.W.S. Calculus and Analytic Geometry. 5 cl. Prereq: 417 or 422 or 428. Not open to students who have 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 (5) Su.A.W.S. Calculus and Analytic Geometry. 5 cl. Prereq: 440. Not open to students who have 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.

536 (5) A.W.S. Calculus. 5 cl. Prereq: 418.

A continuation of 418 including definite integrals, transcendental functions, and applications.

537 (5) A.W.S. Calculus. 5 cl. Prereq: 536. Not open to students who have credit for 542.

A continuation of 536, including sequences, series, vectors, partial differentiation, and multiple integrals.

538 (5) A.W.S. Calculus. 5 cl. Prereq: 537. Not open to students who have credit for 543.

A continuation of 537 including sequences, series, vectors, partial differentiation, and multiple integrals.

542 (5) Su.A.W.S. Calculus and Analytic Geometry. 5 cl. Prereq: 541 or 411. Not open to students who have 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 (5) Su.A.W.S. Calculus and Analytic Geometry. 5 cl. Prereq: 542. Not open to students who have credit for 538.

Continuation of 542. Partial derivatives, multiple integrals, infinite series.

544 (5) Su.A.W.S. Differential Equations and Their Applications. 5 cl. Prereq: 538 or 543. Not open to students who have 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 (5) W.S. Applications of Mathematics. 5 cl. Prereq: 536 or 541 or 441.

Open only to College of Education students.

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 (3) A.W.S. Introduction to Statistics. 3 cl. Prereq: 538 or 543. Combinatorial probability, fundamental concepts of probability distributions, sample statistics, estimation and testing hypotheses, roots of statistical theory.

547 (5) A.W. Statistical Methods in Engineering. 5 cl. Prereq: 546. Indus E, 3rd yr. Topics included are probability, frequency distributions, testing hypotheses, and estimation.

590 (5) Su,A.W.S. Introduction to Digital Computer Programming. 3 cl, 2 2 hr. lab. Prereq: 415 or 439. Mr. Reeves, Mr. Hildebrandt, and Staff. Introduction to programming language: laboratory experience with computers installed in Numerical Computation Laboratory. Scientific, statistical and business applications.

608 (3) A. Differential Equations for Engineers. 3 cl. Prereq: 543. Not open to students who have credit for 544 or 611. Ordinary differential equations and systems of equations, with applications.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

601 (5) Su,A.W.S. Advanced Calculus. 5 cl. Prereq: 538 or 543. A rigorous presentation of limits, derivatives, mean value theorems, definite integrals, sequences, and series.

605 (5) W.S. The Mathematical Approach. 5 cl. A course dealing with fundamental concepts in mathematics.

607 (5) Su,W. Introduction to the Theory of Functions of a Complex Variable. 5 cl. Prereq: 601. Not open to students who have credit for 624. Topics discussed include power series expansions, the formula of Cauchy, residues, conformal mappings, and elementary functions in the complex domain.

609 (3) A.W. Fourier Series and Boundary Value Problems for Engineers. 3 cl. Prereq: 608 or 544 or 611. Not open to students who have credit for 626. Fourier series, applications of Fourier series to the solution of boundary value problems involving partial differential equations, Bessel functions.

611 (5) A.W. Differential Equations. 5 cl. Prereq: 538 or 543. Not open to students who have credit for 544 or 608. Equations of first and second orders, linear equations, series solutions, approximate solutions, systems of ordinary equations, Legendre and Bessel equations.

621 (5) A.W. Advanced Geometry. 5 cl. Prereq: 536 or 541 or 441. Mr. Miller. Advanced topics from Euclidean Geometry.

622 (3) A.W. Vector Analysis for Engineers. 3 cl. Prereq: 608 or 544 or 611. Not open to students who have credit for 651. Vector algebra, vector operators, line integrals, vector integral theorems, curvilinear coordinates, applications.

624 (5) W.S. Complex Variables for Engineers. 3 cl. Prereq: 622 or Elec E 617 or Elec E 617 concur. Introduction to complex variables, analytic functions, complex integral theorems, power series, residues, conformal mapping.

626 (5) W.S. Fourier Series and Boundary Value Problems. 5 cl. Prereq: 508 or 611 or 544. Not open to students who have credit for 721 or 609. Expansion of function in Fourier series and in series of Legendre polynomials or Bessel functions; solution of boundary value problems from physics.

631 (5) Su,A.S. History of Mathematics. 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 (4) A. 636 (4) W. 637 (4) S. Fundamentals of Mathematics. 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.

641 (5) A.S. Elementary Modern Algebra. 5 cl. Prereq: 537 or 542.
An introduction to abstract algebra with topics from elementary ring, field, and group theories. Special emphasis on ring of integers, congruences, polynomial domains, permutation groups.

651 (5) Su,A,W. 652 (5) W.S. Fundamental Ideas in Mathematics. 5 cl. Prereq: 536 or 541 or 441.
Basic ideas concerning: number systems, sets, fields, axiom systems, finite geometries, projective geometry.

661 (5) Su,W,S. Vector Analysis. 5 cl. Prereq: 601. Not open to students who have credit for 622.
The algebra and calculus of vectors with applications to mechanics. Differential operators and integral theorems. Introduction to potential theory.

665 (5) S. [666] (5) S. Mathematical Logic. 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 Church; recursive function theory and idealized digital computers.

670 (5) Su,W. Matrices and Determinants. 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 (5) A. 673 (5) W. Mathematical Statistics. 5 cl. Prereq: 538 or 543.

674 (5) S. Theory of Probability. 5 cl. Prereq: 672.
Discrete probability spaces, random walk, Markov chains, stochastic processes, strong laws of probability.

680 (5) S. Elementary Number Theory. 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 (5) A.S. Numerical Analysis I. 4 cl, 1 2 hr lab. Prereq: 590 or Eng Mech 650, or equiv, and 544 or 611 or equiv, or permission of instructor. Mr. Reeves, Mr. Hildebrandt, and Staff
Basic techniques of numerical analysis; finite differences, interpolation, solution of equations, integration, difference and differential equations. Laboratory use of computers.

694 (5) S. Numerical Analysis II. 4 cl, 1 2 hr lab. Prereq: 692, and 670 or 728, or permission of instructor. Mr. Reeves or Mr. Hildebrandt

695 (5) Su,W. Programming for Digital Computers. 4 cl, 1 2 hr lab. Prereq: 590 or 692 or Eng Mech 650, or equiv. Mr. Reeves, Mr. Hildebrandt, or Staff
# [698] (5) S. Numerical Solution of Differential Equations. 3 cl. 2 2 hr lab. Prereq: 692 and 611 or permission of instructor. Mr. Reeves, Mr. Hildebrand.


700 (1-5) Su,A,W.S. Minor Problems.

Conferences, assigned readings, and reports on minor investigations.

701 (5) Su,A,W. 702 (5) S. Introduction to Analysis. 5 cl. Prereq: 601. Mr. Helsel, A.

The main objective is to train students to understand and apply the basic ideas and methods of analysis. Topics discussed include points sets, the real continuum, Riemann integration, interchange of limit processes, sequences, series, and measure.

721 (5) A. Mathematical Methods in Science I. 5 cl. Prereq: 601 and 611; or 609, 622 and 624; or permission of instructor.

Linear differential equations, solutions about singular points; Fourier series; Sturm-Liouville problems; Bessel functions and Legendre polynomials; boundary value problems associated with Laplace's equation.

722 (5) S. Mathematical Methods in Science II. 5 cl. Prereq: 670 or 723 or permission of instructor. 722 may be taken without 721.

Introduction to tensor analysis with applications to geometry. Elements of the calculus of variations with applications to physical problems.

723 (5) W. Mathematical Methods in Science III. 5 cl. Prereq: 15 hrs Math of 600 or 700 level or permission of instructor. 723 may be taken without 721 or 722.

Theory of determinants and matrices, real quadratic and Hermitian forms, groups and vector spaces, applications to physics and engineering.

# [725] (5) A. Integral Equations and Their Applications. 5 cl. Prereq: 608 or 611 or 544.

Orthogonal functions, linear, integral equations of first and second kinds, relations to ordinary differential equations, Volterra's equation, boundary value problems, practical methods of solution.

# [726] (5) W. Eigenvalue Problems. 5 cl. Prereq: 606 or 611 or 544.

Distribution of eigenvalues, self-adjointness, definiteness, Green's functions, minimal properties, approximation of eigenvalues, eigenfunction expansions, Ritz method, iteration method, matrix eigenvalue problems, finite differences.

# [727] (5) S. Applied Operational Calculus. 5 cl. Prereq: 608 or 611 or 544, and 624 or 607.

Laplace transformation in real domain, applications in physics and engineering; differential equations; Laplace transformation in complex domain, application to partial differential equations; Fourier transform, applications.

# 728 (5) A. Special Functions. 5 cl. Prereq: 624, or 607 and 611. Mr. Kreyszig.

Power series developments, asymptotic expansions, gamma functions, cylindrical functions, spherical harmonics, orthogonal polynomials, hypergeometric functions, theta functions, elliptic functions and integrals, numerical techniques.

# 729 (5) W. Applied Complex Analysis. 5 cl. Prereq: 624, or 607 and 611. Mr. Kreyszig.

Basic facts of complex analysis; conformal mapping properties of elementary functions, Schwarz-Christoffel formula; distortion theorems; uniformization; applications to electromagnetic fields, fluid dynamics, heat flow.

# 730 (5) S. Non-Linear Differential Equations. 5 cl. Prereq: 608 or 544 or 611. Mr. Kreyszig.

Existence and uniqueness of solutions; initial conditions; periodic solutions; Krylov-Bogoliuboff method; graphical and numerical methods; applications to vibrational problems, relaxation theory, and nonlinear mechanics.

731 (5) W. Probability and Statistics. 5 cl. Prereq: 601. Mr. Shapiro.

General probability distributions, Stieltjes integral, characteristic functions, limit theorems.
733 (5) A. Statistics: Design and Analysis of Experiments. 5 cl. Prereq: 673 or 784. Mr. Mann
Analysis of variance distribution, tests of linear hypotheses, analysis of variance in an r-way classification, non-orthogonal data, latin squares, and lattices.

734 (5) S. Statistical Inference. 5 cl. Prereq: 721. Mr. Shapiro
Point, interval estimation, maximum likelihood estimators, principles of estimation, tests of hypotheses, Neyman-Pearson theory, power function non-parametric tests, sequential tests, decision functions.

741 (5) W. 742 (5) S. Introduction to General Topology. 5 cl. Prereq: 701 or permission of instructor. Mr. Mickie
This sequence is designed to give training in the areas of modern geometry, particularly in analytic topology.

743 (5) S. Projective Geometry. 5 cl. Prereq: 762. Mr. Kleinfield
The combinatorial and algebraic aspects of projective geometry, including non-Desarguesian and finite projective planes, coordinatisation, the theory of collineations, incidence, matrices, latin squares.

761 (5) A. 762 (5) W. 763 (5) S. Introduction to Higher Algebra. 5 cl. Prereq: permission of instructor. Mr. Mann
Groups, rings, fields, ideals; selected topics from Galois theory, lattice theory, and the theory of rings with minimum condition.

790 (5) W. Advanced Computer Systems Programming. 5 cl. Prereq: 595 or permission of instructor. Mr. Reeves
Symbolic programming, Design of symbolic programming systems, and algebraic compilers. Dynamic Storage assignments, Symbol manipulation, Information retrieval, and related topics. Classroom exercises involve use of computers.

793 (3) A. 794 (3) W. 795 (3) S. Mathematical Foundations of the Design and Use of Automatic Systems. Prereq: graduate standing or permission of instructor. Mr. Rado
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.

798 (2-5) Su, A, W, S. Advanced Studies in Mathematics. Prereq: permission of instructor. Repeatable. Staff
When student need is sufficient, the Department will offer under this number a course on some phase of mathematics not covered in its regular offerings.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

642 (5) A. Principles of Mathematics for Science and Mathematics Teachers. 5 cl. Prereq: permission of instructor. (NSF students only)
Introduction to modern mathematics, sets, functions, Topology.

645 (5) Su. Modern Geometry for High School Teachers. 5 cl. (NSF students only). Mr. Fisher
Coordinate geometry use of vectors in geometry, matrices and coordinate transformations, matrix-vector operations, characteristic values, diagonalization of quadratic forms.

646 (5) Su. Modern Algebra for High School Teachers. 5 cl. (NSF students only). Mr. Riner
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 (5) Su. Analysis for High School Teachers. 5 cl (NSF students only). Mr. Fisher
Extension of the rational number concept to the real number concept, functions, limit concepts, sequences, continuous functions, derivative, integral series, applications of the calculus.

#501 (5) W. #502 (5) S. Theory of Functions of a Complex Variable. 5 cl. Prereq: 701 or permission of instructor. Mr. Carroll
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.
#807 (3) A. #808 (3) W. Partial Differential Equations and Their Applications. 3 cl. Prereq: 702 or permission of instructor. 807 A., Mr. Saltzer; 808 W., Mr. Saltzer

#815 (5) A. Dimension Theory. 5 cl. Prereq: 702, 742, and 762. Mr. Reichelderfer
Dimension in separable metric spaces with application to Euclidean spaces. Covering theorems, embedding theorems, and approximation theorems. Relationships between the concepts of dimension and measure.

#817 (3) W. #818 (3) S. Potential Theory. Prereq: 607 and permission of the instructor. Mr. Saltzer

#819 (5) S. Theory of Rings. 5 cl. Prereq: 763 or permission of instructor. Mr. Abian
The modern structure theory of rings, rings with minimum conditions, simple and semi-simple rings, Jacobson radical, nonassociative rings, applications to geometry and combinatorial analysis.

821 (3) A. 822 (3) W. 823 (3) S. Functional Analysis. Prereq: 702. Mr. Saltzer
Metric spaces, Hahn Banach Theorem, Banach and Hilbert Spaces, Spectral Theory, Approximation Theory, Banach Algebras.

#826 (5) A. #827 (5) W. #828 (5) S. Measure and Integration.
5 cl. Prereq: 702.

830 (5) A. 831 (5) W. Transfinite Arithmetic. Prereq: 701 and 761. Mr. Abian

#841 (3) A. #842 (5) W. Differential Geometry. 5 cl. Prereq: permission of instructor. Mr. Reichelderfer
Curves, tensor calculus, surfaces, first and second fundamental forms, mappings, length and area, variations problems, parallelism of Levi-Civita and its generalization, special surfaces.

#844 (5) W. #845 (5) S. Combinatorial Topology. 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 Coh theory and singular theory. Applications in geometry and analysis.

#849 (3) W. #850 (3) S. Advanced Topics in Mathematical Statistics.
3 cl. Prereq: permission of instructor. Mr. Whitney
Topics to be taken from the following: multivariate analysis, stochastic processes, analysis of variance, components of variance models, advanced test design.

#851 (3) A. #856 (3) W. #857 (3) S. Advanced Theory of Probability. 3 cl. Prereq: 702. Mr. Shapiro
Selected topics from foundations, distribution functions, limit theorems of probability, stochastic processes, weak and strong laws, infinitely divisible distributions, stable laws.

#862 (5) A. Theory of Matrices. 5 cl. Prereq: 762. Mr. Ryser, Mr. Margaris
Advanced topics in the theory of matrices.
# [864] (5) A. Combinatorial Analysis. 5 cl. Prereq: 762 or permission of instructor.
Permutations, combinations, partitions; enumerations by recursions or generating functions; block design and tactical configurations such as Latin squares, Steiner triples, finite geometries; incidence matrices.

An introduction to partially ordered sets and lattices, distributive and modular lattices, relations to Boolean algebras and projective geometries, applications to groups and rings.

Basic theorems on subgroups, normal subgroups, homomorphisms, automorphisms; Sylow theorems; composite series and chief series; selected topics from free groups, extension theory, and other areas of current research.

# [873] (5) S. Analytic Number Theory. 5 cl. Prereq: permission of instructor. Mr. Mann
The distribution of prime numbers, Waring's problem, and selected topics.

# [880] (5) A. # 881 (5) W. Theory of Algebraic Numbers. 5 cl. Prereq: 762. Mr. Mann
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.

# [898] (5) W. Mathematical Logic. 5 cl. Prereq: 701 and 761.
Topics include: pure and applied predicate calculus; formal number theory; Gödel's completeness and incompleteness theorems; selections from recursive function theory, set theory, and intuitionism.

950 (arr) Su,A.W.S. Research in Mathematics.
Research for thesis or dissertation purposes only.

MECHANICAL ENGINEERING
Office, 2075 Robinson Laboratory

PROFESSORS MARCO, KEITLER (EMERITUS), BOLZ, BUCHER (EMERITUS), HAN, MARQUIS (EMERITUS), MOFFAT (EMERITUS), NORMAN (EMERITUS), STARKEY, STINSON, AND ZIMMERMAN, ASSOCIATE PROFESSORS JONES AND SMITH, ASSISTANT PROFESSORS BOYD, BUXTON, DOEBELIN, POSTER, HORNUNG, JORDAN, MLARAN, AND SEFFY, MR. BARON, MR. BRIDGE, MR. DAVIDSON, MR. LEFKOWITZ, MR. LUNARDINI, AND MR. WOLGEMUTH, LECTURER BEANS

FOR UNDERGRADUATES

621 (5) W.S. Heat Transfer and Fluid Flow. 5 cl. Prereq: 601. Req'd of 4th yr students in Elec E. Mr. Jones, Supervisor
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.

627 (4) A.W. Materials of Engineering, 4 cl. Prereq: admission to the Professional Division. Req'd of 3rd yr students in Agr E and Mech E. Mr. Marco, Supervisor
A study of the structure of engineering materials and of their properties as used in engineering design.

672 (1) A. Hydraulic Laboratory. 1 3 hr lab. Prereq: concur with Civil E 728. Req'd of 4th yr students in Civil E. Mr. Buxton, Supervisor
A study of incompressible fluid flow through various primary elements and through a centrifugal pump.

770 (1) A. Professional Aspects of Mechanical Engineering. 1 cl. Prereq: 5th yr standing in Mech E. Req'd of 5th yr students in Mech E. Mr. Marco, Supervisor
A study of the code of ethics, licensing law, responsibilities to professional societies and the relationships to labor and management of the professional engineer.
MECHANICAL ENGINEERING
FOR ADVANCED UNDERGRADUATES AND GRADUATES

[500] (3) A.W. [604] (5) W.S. 605 (5) A. Thermodynamics. 600: 3 cl. 604 and 605: 5 cl. Prereq: 600: admission to the Professional Division; 604: 600 or Physics 603. Req'd of 3rd yr students in Mech E. Not open for graduate credit for students majoring in Mech E. Mr. Zimmerman, Supervisor
A study of basic engineering thermodynamics, including an integrated treatment of fluid flow.

601 (5) A.W. Thermodynamics. 5 cl. Prereq: Math 543 and Physics 432 or 532. Service course for 3rd yr students in Agr E and Elec E and for 4th yr students in Min E. Not open for graduate credit for students majoring in Mech E. Mr. Zimmerman, Supervisor
A study of the principles of thermodynamics as an engineering science.

607 (5) A.W. 608 (5) W.S. 609 (3) S. Thermodynamics and Fluid Dynamics. 607 and 608: 5 cl; 609: 3 cl. Prereq: 607; admission to the professional division. 608: 607, or Chem 681 and Physics 603. 609: 608. Req'd of 3rd yr students in Mech E. Not open for graduate credit for students majoring in Mech E. Not open to students who have credit for 600-604-605. Mr. Zimmerman, Supervisor
A study of basic engineering thermodynamics, including an integrated treatment of fluid flow.

610 (5) A.W. Heat Transfer. 5 cl. Prereq: 605 or 606. Req'd of 4th yr students in Mech E. Not open to students who have credit for 611. Not open for graduate credit for students majoring in Mech E. Mr. Jordan, Supervisor
A study of the fundamental laws of heat conduction, radiation, and convection, including an introduction to transient conduction.

614 (3) W.S. Principle of Heat Generation. 3 cl. Prereq: 610 or 611. Req'd of 4th yr students in Mech E. Not open to students who have credit for 606. Not open for graduate credit for students majoring in Mech E. Mr. Marco, Supervisor
A quantitative and qualitative study of heat generation including molecular and nuclear processes.

615 (5) A.S. Kinematics of Machines. 3 cl, 2 3 hr. labs. Prereq: admission to the Professional Division. Req'd of 3rd yr students in Mech E. Not open for graduate credit for students majoring in Mech E. Mr. Jordan, Supervisor
A study of displacements, velocities, and accelerations of machine members using graphical and numerical methods of analysis.

616 (4) A.W. Dynamics of Machinery. 4 cl. Prereq: 615, Eng Mech 607, and Math 544 or 608. Req'd of 4th yr students in Mech E. Not open to students who have credit for 620. Not open for graduate credit for students majoring in Mech E. Mr. Starkey, Supervisor
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.

703 (3) A. Internal Combustion Engines. 3 cl. Prereq: 625, or 614 and 722. Elective in Mech E. Mr. Stinson, Supervisor
A study of combustion chambers, valve mechanisms, and the dynamic balance of internal combustion engines.

704 (3) W. Internal Combustion Engines. 3 cl. Prereq: 625, or 614 and 722. Elective in Mech E. Mr. Stinson, Supervisor
Force analysis as related to the design of engine components such as pistons, bearings, valve springs, and crankshafts.

710 (4) A. Heating, Ventilating, and Air Conditioning. 4 cl. Prereq: 610 or 611, and 723. Elective in Mech E. Mr. Sepp, Supervisor
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.

716 (3) W. Refrigeration and Air Conditioning. 3 cl. Prereq: 610 or 611, and 723. Elective in Mech E. Mr. Sepp, Supervisor
A study of fundamentals, processes and equipment associated with refrigeration systems using vapor compression, air cycle, absorption, magnetic and thermoelectric cooling.
721 (4) W.S. Principles of Energy Conversion in Turbomachinery. 4 cl. Prereq: 605 or 609. Req'd of 4th yr students in Mech E. Not open to students who have credit for 720. Not open for graduate credit for students majoring in Mech E. Mr. Zimmerman, Supervisor
A study of the principles of energy conversion and transfer, performance and physical characteristics of power-absorbing, power-generating and power-transmitting turbomachinery.

722 (4) A.S. Principles of Energy Conversion in Positive Displacement Machinery. 4 cl. Prereq: 605 or 609, and 606 or 614. Req'd of 4th yr students in Mech E. Not open to students who have credit for 625. Not open for graduate credit for students majoring in Mech E. Mr. Jones, Supervisor
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.

723 (3) A.S. Principles of Environmental Control. 3 cl. Prereq: 610 or 611, and 616 or 620. Req'd of 4th yr students in Mech E. Not open to students who have credit for 710. Not open for graduate credit for students majoring in Mech E. Mr. Sepsy, Supervisor
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.

725 (3) S. Diesel Engines. 3 cl. Prereq: 625, or 614 and 722. Elective in Mech E. Mr. Stinson, Supervisor
An advanced study of Diesel engine design, operation, and economics.

726 (3) A. Gas Turbine Power Plants. 3 cl. Prereq: 606 or 614, and 720 or 721. Elective in Mech E. Mr. Zimmerman, Supervisor
A study of the principles, performance, and design of gas turbine power plants.

736 (5) W.S. Machine Design. 5 cl. Prereq: Eng Mech 602. Req'd of 4th or 5th yr students in Chem E, Met E, and Weld E. Not open for graduate credit for students majoring in Mech E. Mr. Starkey, Supervisor
A study of the application of the general principles and empiricism of mechanics of solids to the creative design of mechanical equipment.

745 (3) A. Vapor Power Cycles. 3 cl. Prereq: 605 or 609, 610, and 614. Elective in Mech E. Mr. Buxton, Supervisor
A descriptive and analytical study of elementary and advanced power plant cycles.

755 (3) S. Nuclear Power Plants. 3 cl. Prereq: 610 or 611, and 727 or 736 or 767, and Physics 602 or 615. Elective in Mech E and Eng Phys. Mr. Jones, Supervisor
A study of the thermal and mechanical design aspects of nuclear power plants and processes.

756 (3) S. Cryogenic Systems. 3 cl. Prereq: 601 or 605, or 609, and 610 or 621. Elective in Mech E. Mr. Marco, Supervisor
Study of low-temperature processes and equipment; physical properties at low-temperatures; practical application of low-temperature techniques and processes in engineering systems.

761 (4) W. Advanced Mechanical Engineering Instrumentation. 3 cl, 1 2 hr lab. Prereq: 664 or 778, or equiv. Effective in Mech E. Mr. Doebelin, Supervisor
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.

762 (4) W.S. Principles of Automatic Control. 3 cl, 1 2 hr lab. Prereq: 664 or 609, 610 or 611, 616 or 620, and 778. For non-Mech E students, permission of instructor. Req'd of 5th yr students in Mech E. Not open to students who have credit for 760. Mr. Doebelin, Supervisor
A theoretical and experimental study of the principles of operation of feedback control systems, including servomechanisms and process controls.
768 (4) S. Control Systems Design. 3 cl, 1 2 hr lab. Prereq: 760 or 762. For students not in Mech E, permission of the instructor. Elective in Mech E. Mr. Doebelin
A study of the theoretical and experimental procedures involved in the design of feedback control systems including servomechanisms and process control.

767 (4) A.W.S. 768 (4) W.S. 769 (4) A.S. Principles of Mechanical Design. 4 cl. Prereq: for 767: 627 or Met E 631, Eng Mech 695 or 606, Indus E 519 and Math 546. For 768 and 769: 616 or 630 and 767. Req'd of 4th yr students in Mech E. Not open to students who have credit for 727-728-744, 727-728-743, or 727-728-743. Not open for graduate credit for students majoring in Mech E. Mr. Starkey, Supervisor
A study of the application of the general principles and empiricism of mechanics of solids to the creative design of mechanical equipment.

771 (3) A.W. 772 (3) W.S. 773 (3) A.S. Preliminary Design. 3 2 hr lab. Prereq: 720 or 721, 722, 723, 725 or 768, and 744 or 769. Req'd of 5th yr students B.M.E. program. Not open for graduate credit for students majoring in Mech E. Mr. Foster, Supervisor.
Engineering design of a selected piece of mechanical engineering equipment involving professional type problems and encompassing all the basic disciplines of mechanical engineering.

778 (3) A.W. Mechanical Engineering Measurements, 1 cl and 1 4 hr lab. Prereq: 605 or 606, 610 or 611, and 616 or 620. Req'd of 5th yr students in B.M.E. program and 4th yr students in Mech E combined program. Not open to students who have credit for 664 and 665. Not open for graduate credit for students majoring in Mech E. Mr. Doeblein, Supervisor
A theoretical and experimental study of the principles of operation and performance characteristics of measuring instruments used in mechanical engineering.

779 (3) W.S. 780 (3) A.S. Mechanical Engineering Laboratory. 2 2 hr lab and 5 hrs lab planning and report writing. Prereq: 665 or 778. Req'd of 5th yr students in B.M.E. program. 779 req'd of 4th yr students in combined program. Not open for graduate credit for students majoring in Mech E. Mr. Buxton, Supervisor
The study and application of methods of experimental analysis.

798 (3-5) A.W.S. Advanced Studies in Mechanical Engineering. Prereq: permission of instructor. Staff
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.

799 (2-10) A.W.S. Special Problems in Mechanical Engineering. Prereq: permission of instructor. Repeatable to a maximum of 24 qtr hrs with no more than 10 qtr hrs in any one subdivision. Staff
This course is intended to give the advanced student opportunity to pursue special studies not otherwise offered. Work undertaken will be selected from automotive and internal combustion machinery, combustion and fuels, heat transfer, heating, ventilating, and air conditioning, industrial hydraulics, machine design, refrigeration, steam power plants, and thermodynamics.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 890 or 900 group except by permission of the Graduate Council.

801 (3) A. Advanced Applied Thermodynamics. 3 cl. Prereq: 601 or 605, and Math 544, or equiv. Mr. Zimmerman, Mr. Jones
An analytical study of the thermodynamics of fluid flow.

802 (3) W. 803 (3) S. Advanced Applied Thermodynamics. 3 cl. Prereq: 501 or 606 and Math 544 and 546, or equiv. Mr. Zimmerman, Mr. Jones
A study of classical thermodynamics, systems in equilibrium, and the thermodynamics of irreversible phenomena.
807 (3) W. 508 (3) S. Advanced Heat Transfer. 3 cl. Prereq: 610 or 611, and Math 544 and 608, or equiv. Mr. Marco, Mr. Han
A study of the general heat transfer equations and their application to heat transfer in solids and through fluids. The use of numerical and graphical analysis will be included.

809 (3) A. Advanced Heat Transfer. 3 cl. Prereq: 508 and Math 544, or equiv. Mr. Han, Mr. Marco
A study of phase change and radiative heat transfer processes.

810 (3) A. Internal Combustion Power Plants. 3 cl. Prereq: 722, or equiv. Mr. Stinson
An advanced study of reciprocating internal combustion power plants.

811 (3) W. Advanced Principles of Energy Conversion in Turbomachinery. 3 cl. Prereq: 721 or equiv. Mr. Zimmerman
An advanced study of power-absorbing, generating, and transmitting turbomachinery.

812 (arr) A.W.S. Preliminary Design of Power Systems. Conf. Prereq: permission of the instructor. Mr. Stinson, Mr. Zimmerman
Preliminary design and evaluation of novel systems including analysis, synthesis, and possible experimental verification.

820 (3) A. Advanced Principles of Refrigeration. 3 cl. Prereq: 710 or equiv. Mr. Sepsey
An advanced study of conventional and novel processes including thermoelectric, magnetic, and gas systems.

821 (3) W. Advanced Environmental Control. 3 cl. Prereq: 723 or equiv. Mr. Sepsey
An advanced study of conventional and unique systems used to control the environment for occupancy by people, equipment, and material.

822 (arr) A.W.S. Advanced Environmental Control Problems. Conf. Prereq: permission of the instructor. Mr. Sepsey
A study of methods of synthesis and analysis pertaining to the creative design of environmental control systems, including conferences and theoretical and/or experimental investigations.

830 (3) A. Advanced Steam Power Cycle and Turbine Analysis. 3 cl. Prereq: 605 or 609, 610, and 721. Mr. Buxton
An advanced study of steam power cycles and design of steam turbine nozzles and blading.

831 (3) W. Advanced Combined Vapor Power Cycle Analysis. 3 cl. Prereq: 608 and 830, or permission of the instructor. Mr. Buxton
A study of conventional and novel binary vapor cycles and combined vapor-gas power cycles.

832 (arr) A.W.S. Advanced Vapor Power Cycle and Component Studies. Conf. Prereq: 830 or 831, or permission of the instructor. Mr. Buxton
Courses to be conducted on a conference basis with problems assigned to each student based on his needs and area of interest.

840 (3) A. Advanced Mechanical Design. 3 cl. Prereq: 767 and Math 544, or equiv. Mr. Starkey
A study of concepts, principles, and phenomenological theories related to the failure-prevention aspect of mechanical design.

841 (3) W. Dynamics of High Speed Machinery. 3 cl. Prereq: 768 or 769, and Math 544, or equiv. Mr. Starkey
An advanced study of the interrelationships among forces, motions, and masses as related to rigid or elastic machine members.

842 (arr) A.W.S. Advanced Machine Design Problems. Prereq: permission of the instructor. Mr. Marco, Mr. Starkey
A study of methods of synthesis and analysis pertaining to the creative design of high-performance machinery, involving student adviser conferences, and individual theoretical and/or experimental investigations.

850 (3) S. Advanced Fluid Mechanics. 3 cl. Prereq: 605 and Math 544, or equiv. Mr. Han
An advanced study of dynamics of fluids.
852 (arr) A,W,S. Advanced Hydraulic Problems. Conf. library, drawing board, lab work. Prereq: permission of instructor. Mr. Zimmerman, Mr. Han

860 (3) A. Lump Parameter System Analysis. 3 cl. Prereq: Math 544 or equiv. For non-Mech E students: permission of the instructor. Mr. Doebelin Lump parameter system analysis of mechanical, thermal, hydraulic, pneumatic, and electromechanical systems. System response to periodic, transient, and random excitation. Computer and physical system demonstrations.

890 (1) A,W,S. Mechanical Engineering Seminar. 2 cl. All graduate students in Mech E reqd to take 3 qtrs per graduate degree. Mr. Nash A group study of the frontiers of knowledge in Mech E by assignment of reading in technical literature, student presentations, and related group discussions.

950 (arr) Su,A,W,S. Research in Mechanical Engineering. Research for thesis or dissertation purposes only.

MEDICINE

Office, N-1018 University Hospital

PROFESSORS WARREN, ASHER, BROWNING, DELORE, DOAN, FANCHEER, HAMWIT, HEISEL, KESSING, KNIES, MITCHELL, MYERS, NELSON, OGDEN, PALMER, PRIOR, ROTHBERG, RYAN, SASLAW, SCHIEVE, SHIBURNE, SHILLITO AND WILSON, ASSOCIATE PROFESSORS ATWELL, AYRES, BEMAN, BOUGNON, BRADLEY, BURK, FORMAN, FULTON, HAYNE, JOHNSON, KUGER, MCCOY, MITCHELL, SCHOENEO, SILBERSTEIN, STOW AND WALL, ASSISTANT PROFESSORS BARTHOLOMEW, BOWERS, CASSEL, CLODFELTER, CONN, DEMERIT, DENKO, DONNERBERG, FELDMAN, FRAJOLA, GANTT, GIFORD, GOULDER, GRAVES, GREEN, GRIER, GUREK, GUYTON, HARD, HATCHER, C. HATFIELD, HUMMEL, HUMPHREY, HUSTON, JACOBS, KIRK, KESS, KUPLER, LANEY, LEIDEN, LONG, LOVE, MATELE, MEKELSON, MEKEL, MEKEL, MORRIS, MURPHY, OBERTZ, PARKER, PHILLIPS, PHILIPS, PINE, POLACHEK, PRAYER, PRITCHETT, READ, ROSENBERG, ROSENW, ROSS, SEYLER, SHARKEY, SHEPHERD, SIMON, TAGUCHI, TIBER, TOMASHEFSKI, TRONSTRA, VINCENT, WISENBURG, WEISSBEK

OPEN ONLY TO STUDENTS REGISTERED IN THE COLLEGE OF MEDICINE

670 (0) A. Clinical Medicine. 1 cl. Med., 2nd yr. Staff

The courses consist of lectures and clinical demonstrations. The lectures attempt to correlate the elemental sciences of medicine already studied with clinical medicine and at the same time serve to stimulate interest in those sciences. The clinical demonstrations are such as to illustrate those subjects discussed in the lectures.

675 (0) W. Introduction to Clinical Medicine (Medical History). 1 cl. Med., 1st yr. Staff

The development of modern methods of diagnosis and treatment. The consideration of the art as well as the science of medicine.

677 (2) S. Physical Diagnosis. 1 cl, 2 conf hrs. Med., 2nd yr. Staff

Special techniques of examination of eyes, ears, nose, and throat, introduction to X-ray, diagnosis, and correlation of radiologic abnormalities with those found by physical examination. Seminar sessions demonstrating application of the medical history and altered physical findings with the patho-physiology of disease processes.

678 (3) A,W. Physical Diagnosis. 2 cl, 4 demonstrations hrs. Med., 2nd yr. Mr. Prior and Staff

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.

679 (1) W. Medical Genetics. 1 cl. Med., 2nd year. Desirable prereq: a general course in heredity (Zool 604 or equiv). Staff

The practical applications of human heredity to medicine, with special reference to diagnosis, prevention, medicolegal cases, and genetics prognosis. The interaction of heredity and environment in health and disease will be stressed.
MEDICINE

Each student serves as a Ward Clerk, spending an appropriate length of time at the University Hospital, Psychiatric Institute and Hospital, and the Ohio Tuberculosis Hospital. This comprehensive rotation makes it possible for him to see and study both full-pay and service patients.

The student will regard each patient assigned to him as his own patient, that he will take a complete case history, perform a thorough physical examination, and carry out certain routine laboratory tests. The written record of these procedures will become a part of the patient’s permanent hospital record. In addition, the student will be expected to visit his patients daily and to write progress notes at regular intervals; to give certain treatments under supervision, as indicated by the supervising staff. The student will be responsible, at any time, for the presentation of the case history and pertinent physical findings, at the regularly scheduled teaching clinic and ward rounds for any patient assigned to him. He will be expected to become familiar with the nature of the patient’s illness with respect to its pathologic physiology, differential diagnosis, and the current concepts of therapy.

Additional instruction in the form of daily lectures, seminars, and demonstrations serve to introduce the student to the various sub-specialties of medicine as well as the psychiatric aspects of internal medicine.

Formal instruction is done between 8:00 a.m. and 5:00 p.m., but each student is expected to be available throughout the entire twenty-four hours, and should consider the course a full-time pursuit. All students are expected to attend the daily departmental conferences.

723 (1) Su,S. Medical Law. 1 cl. One qtr reqd. Med, 4th yr. Mr. Dinman, Mr. Selby, and Staff
The civil and criminal aspects of legal medicine.
The following topics are covered in the course: the relation and legal rights of physicians, the relation of physicians and their patients, including a discussion in restraint of patients, the right of examination or operation, contracts, malpractice, etc.; medical testimony in the court; expert witnesses; wills and nuncupations; insanity laws; legal responsibility for crime; personal injuries; coroner’s court; murder, suicide; rape; pregnancy abortion; prostitution; marriage, divorce, etc.

The student is assigned to a case history and a physical examination of various patients, and in the clinic is assigned to a case history and a physical examination of various patients. The student is expected to take a history and do a physical examination of as many as possible. He then presents his findings to the attending physician who discusses the case with him, and in terms of both the diagnosis and the therapeutic approach. The student’s diagnosis, his suggestions for further study, and his proposed therapeutic approach are reviewed. The student is responsible for referrals to other diagnostic clinics and for orders requesting special studies such as X-rays, electrocardiograms, etc. He also is expected to arrange a return visit to a patient when he will be in the clinic. Each student is required to prepare a term paper derived from a study of the current literature on a selected subject in internal medicine.

Formal instruction is held at a minimum during Dispensary Clinic Hours. However, at any time, the student may be asked to present any patient whom he may have seen during that day, for explanation and/or discussion by a member of the staff.

The Dispensary Clinics are open from 9:00 a.m. to 12 m., and from 1:00 p.m. to 4:00 p.m., Monday through Friday.

749 (4) Su,A,WS. Medical Specialties. One qtr reqd. Med, 4th yr. Staff
Instruction in the newer and more advanced techniques of diagnosis and therapy.

FOR ADVANCED UNDERGRADUATES AND GRADUATES
The following courses in the Department of Medicine are offered in preparation for a Master of Medical Science degree.

760 (1-5) Su,A,WS. Minor Problems. Prereq: adequate preclinical training, satisfactory scholarship in regular reqd course work and permission of chairman.

FOR GRADUATES
950 (arr) Su,A,WS. Research in Medicine.
Research for thesis or dissertation purposes only.

FOR STUDENTS IN COLLEGE OF DENTISTRY ONLY
661 (2) S. Principles of Medicine. 2 cl. Dent, 3rd yr. Staff
A survey course in medicine for dental students in which are considered the infectious, the deficiency, and the systematic diseases. From each group representative diseases are selected for detailed consideration from which general principles may be outlined. Wherever the clinical material is available, patient demonstrations are made before the class.
METALLURGICAL ENGINEERING
Office, 125 Chemical Engineering Building
114 Lord Hall
(For Mining Engineering Courses, see page 211)
PROFESSORS FONTANA, MUELLER (EMERITUS), NOID (EMERITUS), BECK (E.E.S.), MELCHMANN, (BATTELLE VISITING PROFESSOR), SPEISER AND SPETNAK, ASSOCIATE PROFESSORS ST. PIERRE, HIRTH (Mershon Professor), WILLIAMS AND POWELL, ASSISTANT PROFESSORS FRANTZ AND MOAZED, AND MR. VERNER

FOR UNDERGRADUATES

420 (5) A. Industrial Experience. 5 cr hrs for each summer's work. Two summers or 20 weeks of approved work in metallurgical industries. Report due during middle of qtr following Summer involved. Mr. Williams. Register for course and submit report on experience during the Autumn Quarter following the summer in which industrial experience was obtained.

501 (4) W. Foundry Technology. 3 cl, 1 2 hr lab. Prereq: 560. Mr. Williams. Survey of melting procedures, fundamentals of freezing metals, bases in metals, cast structures and properties, production of machine components by casting techniques.

560 (4) A. Introductory Metallography. 2 cl, 2 3 hr lab. Mr. Moazed. Binary phase diagrams. Phase rule. Relationship of microstructure to the phase diagram and to the physical and mechanical properties of binary alloys.

611 (4) W.S. Elements of Materials Science. 4 cl. Mr. Hirth (Mershon Professor). Metals and alloys, plastics, ceramics, and corrosion.

645 (2) S. Inspection Trip. Taken between W and S Qtr's. All Instructors. One week trip to visit industrial plants and laboratories. Report required. Maximum expense, $90.00.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

630 (3) W. Physical Metallurgy I. 3 cl. Prereq: 560. Not open for graduate credit for students majoring in Met E. Mr. Powell. States, crystal structure, and properties of single crystals of pure metals.

631 (3) S. Physical Metallurgy II. 3 cl. Prereq: 560. Not open for graduate credit for students majoring in Met E. Mr. Moazed. Polycrystalline aggregates. Alloerring of metals and precipitation of second phases.


642 (3) A. Casting Manufacturing Procedures. 3 cl. Prereq: 501. Not open for graduate credit for students majoring in Met E. Mr. Williams. A description and analytical study of investment, die, centrifugal, permanent, mold, shell, vacuum, and sand casting methods.

661 (4) A. Principles of Metallurgical Processes I. 4 cl. Prereq: Chem 681 or concur. Not open for graduate credit for students majoring in Met E. Mr. St. Pierre. Introduction to the quantitative description of metallurgical processes including mineral beneficiation. Particular emphasis on stoichiometry and thermochemistry.

The laboratory portion of this course requires that safety glasses be worn by everyone. Safety glasses can be secured by payment for same at Laboratory Supply Store, McPherson Laboratory, and then being fitted with glasses at the tool room, Room 100, Industrial Engineering Building. In the event that the student must have prescription safety lenses, he shall obtain his safety glasses during the quarter preceding his enrollment in the course. This may be done through the Optometry Clinic, Room 15, Optometry Building, or through any registered optometrist.
662 (4) W. Principles of Metallurgical Processes II. 4 cl. Prereq: 661, concur Chem 682. Not open for graduate credit for students majoring in Met E. Mr. Moazed
Application of the Second Law of thermodynamics and reaction rate theory to metallurgical processes.

663 (3) S. Principles of Metallurgical Processes III. 3 cl. Prereq: 662. Not open for graduate credit for students majoring in Met E. Mr. St. Pierre
Mass and heat transfer problems associated with metallurgical processes.

703 (4) W. Advanced Metallography. 3 cl, 1 3 hr lab. Prereq: 632. Not open for graduate credit for students majoring in Met E. Mr. Moazed

704 (4) S. Physical Metallurgy IV. 3 cl, 1 3 hr lab. Prereq: 703. Mr. Powell

710 (1-6) A.W.S. Metallurgical Investigations. 1 cl, 2 to 4 3 hr lab. Prereq: permission of the department. This course may be repeated for a maximum of nine hours credit. Staff
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) powder metallurgy. All investigations are under the close direction of instructors. Comprehensive report required.

712 (3) A. Metallurgical Thermodynamics. 3 cl. Prereq: Chem 683. Mr. St. Pierre
The application of thermodynamics to the study of metallurgical systems.

720 (3) W. Advanced Ore Dressing. 3 cl. Prereq: 662. Mr. St. Pierre
A treatment of the unit operations and design of the flow sheets for mineral separation.

721 (3) A. Foundry Molding Materials. 3 cl. Prereq: 501, Mineral 505.
Mr. Williams
A study of materials used in compounding of sand mixtures and the effect of thermal shock upon the properties of molded masses.

722 (3) W. Foundry Molding Methods, Gating, and Risering. 3 cl. Prereq: 501, 663. Mr. Williams
The manufacture of sand molds by various methods. Gating and risering—a study of fluid flow and solidification to produce sound castings.

724 (3) S. Casting Control. 3 cl. Prereq: 721 or 722. Mr. Williams
A study of the factors involved in the elimination of defective products.

730 (3) A.S. Corrosion. 2 cl, 1 2 hr lab. Prereq: 4th yr standing in engineering. Mr. Fontana

731 (3) W. Advanced Corrosion. 3 cl. Prereq: 730. Mr. Fontana
Theories and mechanisms of corrosion.

735 (3) A. Mechanical Metallurgy. 3 cl. Prereq: 703 and Eng Mech 602.
Mr. Spretnak
Behavior of metals under simple and combined stress systems. Elements of elastic theory, plastic deformation, dislocation theory, strength theories, and fracture.

740 (3) A. Advanced Physical Metallurgy I. 3 cl. Prereq: 704. Mr. Moazed
Detailed discussion of nucleation theory, preparation of single crystals, metallic crystals and grains, interpretation of microstructure in terms of interfacial tensions, grain growth, alloying.

741 (3) W. Advanced Physical Metallurgy II. 3 cl. Prereq: 740. Mr. Powell
Treatment of phase diagrams, alloying theory, solid solution, diffusion in metals.

742 (3) S. Advanced Physical Metallurgy III. 3 cl. Prereq: 741. Mr. Spretnak
Classification of phase transformations, precipitation from solid solution, martensitic transformations, decomposition of austenite, order-disorder.
METALLURGICAL ENGINEERING    207

745 (3) W. Shaping and Forming Metals. 3 cl. Prereq: 735. Mr. Spretnak
Fundamental aspects of deformation of metals by forging, rolling, wire drawing, tube
drawing, extrusion, piercing, and deep drawing.

759 (3) A. 760 (3) W. Engineering Metallurgy I and II. 3 cl. Prereq:
703. Mr. Spretnak
Basic properties of metals and alloys, cost structure, design factors, specifications, statistical
methods. Selection of metals and alloys, service failures.

761 (3) W. Principles of Extractive Metallurgy I. 3 cl. Prereq: 663, 712,
or permission of instructor. Mr. St. Pierre
Unit processes in metal extraction and refining.

762 (4) S. Principles of Extractive Metallurgy II. 3 cl, 1 3 hr lab. Prereq:
761. Mr. St. Pierre
High-temperature reactions between pyrometallurgical phases.

763 (3) W. Process Metallurgy. 3 cl. Prereq: 762. Mr. St. Pierre
The production and refining of metals.

770 (3) A. 771 (3) W. 772 (3) S. Theory and Properties of Metals. 3 cl.
Prereq: 704, Chem 683, ad Math 544, or permission of instructor. Mr. Speiser
Dependence of physical properties on structure; regularities in the structure of alloy sys-
tems; stability of alloy systems, transport phenomena in metals and alloys; magnetic phenomena.

774 (3) S. Electrical Properties as Related to Materials Science. 3 cl.
Prereq: Elec E 769 or permission of the department. Mr. Hirth
Relationship of crystal structure, defect structures, and deformation to the electrical prop-
erties of metals, alloys, insulators, and semiconductors. Diffusion and nucleation.

780 (3) S. Structures of Metals and Alloys. 3 cl. Prereq: 652 and 704,
Math 544, Chem 683, or permission of instructor. Mr. Powell
Application of X-ray diffraction and electron diffraction theory to the study of the structure
of metals and alloys. Discussion of phase diagrams of alloys by X-ray methods. Determination
of pole figures and orientation.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group
except by permission of the Graduate Council.

801 (1) A.W.S. Graduate Seminar. Reqd of all graduate students in the
Department of Metallurgical Engineering. Repeatable to a maximum credit
of 6 hrs. Mr. Fontana and Staff
Discussion of current thesis problems and outstanding current literature in metallurgical
engineering. Round table discussion of selected metallurgical topics.

#815 (2) S. Physical Chemistry of Process Metallurgy. 2 cl. Prereq:
763, or permission of instructor. Not offered 1963-1964. Mr. St. Pierre
Detailed discussion of current literature related to the refining of metals.

820 (3) A. Quantitative Dislocation Theory. 3 cl. Prereq: Math 544 and
permission of the instructor. Mr. Hirth
Mathematical treatment of dislocation theory and its application to flow and fracture phe-
nomena in solids.

835 (3) S. Advanced Mechanical Metallurgy. 3 cl. Prereq: 735. Mr.
Spretnak
Detailed discussion of elasticity, plasticity, plastic deformation, dislocation theory of plastic
flow, and fracture. Effect of state of stress on plastic flow.

#843 (3) A. Metallurgical Kinetics. 3 cl. Prereq: 712. Mr. Speiser
Application of rate theory to transport phenomena in metals and alloys, and to metallur-
gical reactions.

844 (3) W. Advanced Metallurgical Thermodynamics. 3 cl. Prereq: 712.
Mr. Speiser
Thermodynamics of Hysid and solid alloy systems. Numerous problems.
METALLURGICAL ENGINEERING

845 (3) S. Metallurgical Thermodynamics. 3 cl. Prereq: 844. Mr. Speiser
Continued emphasis on practical applications. Numerous problems.

850 (3) A. 851 (3) W. 852 (3) S. Theoretical Metallurgy. 3 cl. Prereq:
Graduate standing in Met E or permission of instructor. Repeatable to a
maximum of 3 hrs per course.
Current topics in the field of specialization of the Visiting Battelle Professor of Metallurgy.

#833 (3) A. Theory and Properties of Metals. 3 cl. Prereq: 772 or Elec E
769, or permission of instructor. Not offered in 1964-1965. Mr. Speiser
Continuation of 770-771-772.

S60 Su,A,W,S. Research in Metallurgy. The Staff
Research for thesis or dissertation purposes only.

MICROBIOLOGY
Office, 210 Pharmacy and Bacteriology Building
PROFESSORS BIRKELAND, BALDWIN, BOHL, DODD, HUDSON (EMERITUS), MACPHERSON, RANDLES, RHEINS, RIDDE, SASLAW, STAHL, WEISER, WHEELER, AND WOOLPERT, ASSOCIATE PROFESSOR SUZE, ASSISTANT PROFESSORS BOYD AND WEAVER, AND INSTRUCTOR C. ROSSI

FOR UNDERGRADUATES

409 (3) W. Microbiology for Dental Hygienists. 2 cl, 2 2 hr lab. Open
only to students in the dental hygiene curriculum. Mr. Baldwin
A survey of techniques and principles of bacteriology with reference to sterilization, sepsis,
disease prevention.

509 (5) Su,A,W,S. Microbiology in Relation to Man. 3 cl, 2 1 hr lab.
Prereq: 10 hrs of natural science. Not open to students who have credit for 600
courses in Microbiol. May not be taken with Microbiol 607. Not recommended for students who intend to take other courses in Microbiol. Mr. Birkeland,
Mr. Baldwin, Mr. Randles, Mr. Weiser, Mr. Boyd, and Assistants
A general course designed to give the student an understanding of microorganisms which
have a bearing on the physical and economic well-being of man.

510 (5) Su,W. Microbiology for Nurses. 3 cl, 2 3 hr lab. Open only
to students in the four year curriculum leading to the degree Bachelor of Science
in Nursing. Mr. Baldwin
A survey of the principles and techniques of microbiology and immunology with special
emphasis on their applications to nursing.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or
sophomores.
Prerequisite, 15 hours Chemistry and 10 hrs of Biological Science.

602 (5) W. Veterinary Microbiology. 3 cl, 3 2 hr lab. Prereq: 607. Open
for graduate credit only to students who are doubly registered in the College
of Veterinary Medicine and the Graduate School. Mr. Bohr, Mr. C. Rossi and
Assistants
A study of the mechanisms of infection and resistance to disease, followed by discussion
and laboratory exercises on characteristics of bacteria pathogenic for animals.

603 (5) S. Veterinary Microbiology. 3 cl, 3 2 hr lab. Prereq: 602. Open
for graduate credit only to students who are doubly registered in the College
of Veterinary Medicine and the Graduate School. Mr. Bohr, Mr. C. Rossi and
Assistants
A continuation of Microbiol 602. Lectures and laboratory exercises deal with the characteristics of bacteria, fungi, rickettsiae, and viruses that are pathogenic for animals.
605 (5) W. Basic Microbiology for Science Teachers. 3 cl, 3 2 hr lab. Open only to undergraduate majors in biological science in the College of Education, to student teachers in the Academic Year Institute and to graduate teachers of the biological sciences. Mr. Stahly

Biology and Physiology of bacteria. Their applications to foods, soil, fertility, sanitation, and disease. Laboratory exercises including those designed for limited equipment in high schools.

607 (5) Su.A.W.S. General Microbiology. 3 cl, 3 2 hr lab. May not be taken concur with 509. Not open to students who have credit for Bact 550. Not open for graduate credit to students majoring in Microbiol. Mr. Stahly, Mr. Weiser, Mr. Randles, Mr. Baldwin, Mr. Boyd, and Assistants

The lectures deal with the characteristics of bacteria and their experience in isolating and identifying microorganisms.

608 (3) S. Introduction to Pathogenic Microbiology. 3 cl. Not recommended for premedical students or Microbiol majors. Prereq: 607. Mr. Birkeland, Mr. Rheims

A general course dealing with the mechanism of infection and resistance, and the epidemiology of microbial diseases of man.

610 (3) W. Dairy Microbiology. 3 cl. Prereq: 550 or 607. Mr. Weiser

Microorganisms involved in desirable and undesirable fermentations and methods of control. Emphasis is placed upon milk-borne diseases in relation to the public health.

611 (3) W. Dairy Microbiology: Laboratory. 3 2 hr lab. Prereq or concur: 610. Mr. Weiser, and Assistants

A study of standard methods used to control microorganisms discussed in Microbiol 610. Normal and abnormal fermentation are studied in detail.

622 (3) Su.A.W. Principles of Infection and Resistance. 3 cl. Prereq: 607 or equiv. Mr. Dodd

A study of host-parasite relationships, with emphasis on pathogenicity and immunity.

623 (5) Su.A,W*S. Serology. 3 cl, 3 2 hr lab. Prereq or concur: 622. Mr. Dodd and Assistants

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.

633 (5) A. Advanced General Bacteriology. 3 cl, 2 3 hr labs. Prereq: 607 and 1 Qtr Organic Chem. Mr. Baldwin and Assistants

A course concerned with an advanced and detailed study of the basic phenomena of bacterial morphology, composition, growth, cultivation, variation, and classification.

634 (3) W. Sanitary Microbiology. 2 cl, 2 2 hr lab. Prereq: 550 or 607. Mr. Weiser, and Assistants

The microbiology of municipal water purification. The role of microorganisms in treatment of domestic sewage and industrial wastes.

635 (3) W. Physiology of Bacteria. 3 cl. Prereq: 633 and 2 Qtrs of Organic Chem. Mr. Randles

Nutritional requirements of bacteria, mechanisms of anaerobic dissimilation of carbon compounds, and industrial fermentation.

636 (3) A.S. Food Microbiology. 3 cl. Prereq: 607. Mr. Weiser

The role of microorganisms in normal and abnormal fermentation in foods and related sanitation and public health problems are discussed.

637 (3) A. Food Microbiology: Laboratory. 3 2 hr lab. Prereq: 607: prereq or concur: 636. A previous course in Pathogenic Bact is recommended or may be taken concur. Mr. Weiser, and Assistants

Laboratory work on organisms discussed in Microbiol 635.

638 (3) S. Physiology of Bacteria. 3 cl. Prereq: 635 and 2 Qtrs of Organic Chem. Mr. Randles

Bacterial enzymes, mechanisms, and energy relationships in respiration, nitrogen, metabolism, and bacterial synthesis.

* Winter Quarter registration open only to students in Medical Technology.
210 MICROBIOLOGY

641 (5) S. Medical Microbiology. 3 cl, 8 lab hrs. Open for graduate credit only to students who are doubly registered in the College of Medicine and the Graduate School. Mr. Weaver, and Assistants

642 (5) A. Medical Microbiology. 4 cl, 4 lab hrs. Open for graduate credit only to students who are doubly registered in the College of Medicine and the Graduate School. Mr. Weaver, and Assistants
A continuation of Microbiol 641, including a consideration of the pathogenic fungi and the viruses.

649 (3) W. Viruses. 3 cl. Prereq: 622 and 623, and either 654 or 659, or equiv. Mr. Randles and Mr. Bohl
Lecture and demonstration course on the nature and action of viruses as ultra-microscopic parasites of man, animals, and plants.

652 (6) W. General and Pathogenic Microbiology for Dental Students. 4 cl, 3 2 hr lab. Open for graduate credit only to students who are doubly registered in the College of Dentistry and Graduate School. Mr. Weaver, and Assistants
A survey of the techniques and principles of microbiology and immunology with special reference to the bacteriology of the oral cavity.

654 (5) A.S. Pathogenic Bacteriology. 3 cl, 3 2 hr lab. Prereq: 507 and 622. Mr. Rheins and Assistants
A discussion of the pathogenic cocci and enteric bacilli causing diseases of man with emphasis on properties associated with infection and on epidemiologic and immunologic relationships.

659 (5) W. Pathogenic Bacteriology. 3 cl, 3 2 hr lab. Prereq: 622. Mr. Rheins and Assistants
A discussion of the mycobacteria, Corynebacteria, escherichia, pasteurella, and spirchetae causing diseases of man with epidemiologic and immunologic relations.

701 (1-5) Su,A,W,S. Minor Investigations. Prereq: satisfactory courses in the field of the problem undertaken. Repeatable. Department Staff
Graduate course designed for undergraduate students who have completed equiv of 2 yrs in Bact. Work outlined by instructor to meet individual student's needs.

710 (3) S. History of Microbiology and Allied Fields. Lectures, confs, and library work. Prereq: advanced graduate standing in Microbiol or permission of instructor. Mr. Hudson
This course is designed for students specializing in microbiology. The historical development of bacteriology, immunology, and allied fields.

735 (5) S. Bacterial Physiology Laboratory. 3 cl, 2 2 hr lab. Prereq: 683 and permission of instructor. Mr. Randles, Mr. Boyd, and Assistants
Laboratory study of bacterial physiology by a variety of techniques.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

720 (3) S. Viruses: Laboratory. 2 3 hr labs. Prereq: 622, 654, 659, 649, and permission of instructor. Mr. Bohl, Mr. Baldwin, and Assistants
Laboratory study of viruses and some of the virus diseases of animals and man. Methods of isolation, propagation, identification, diagnosis, and control are considered.

722 (3) S. Immunology. Prereq: 622, 623, 654, and 659, and suitable courses in biochemistry and Phys Chem. Permission of instructor. Mr. Dodd
Advanced studies of immunological phenomena, with emphasis on the physical, chemical aspects of antigens and antibodies.

807 (1) A. 808 (1) W. 809 (1) S. Seminar in Microbiology. Reqd of all graduate students majoring in Microbiol. Department Staff

888 (1) S. Interdepartmental Seminar in Nutrition and Food Technology. (See under Interdepartmental Seminars)

950 Su,A,W,S. Research in Microbiology.
Research for thesis or dissertation purposes only.
MILITARY SERVICE
Army Reserve Officers Training Corps
Office, 204 Military Science Building
COLONEL VAUGHAN AND STAFF

BASIC MILITARY SCIENCE (Freshmen and Sophomores)

401 (2) A.W. American Military History. 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 (2) W.S. American Military History. 1 2 hr cl, 1 drill hr. Prereq: 401.
American military history from 1865 to the present. Military drill.

403 (2) Su,A,W.S. Individual Weapons and Marksmanship. 1 2 hr cl, 1
hr.

501 (2) Su,A. Map and Aerial Photograph Reading. 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 (2) W. U.S. Army and National Security. 1 2 hr cl, 1 drill hr. Prereq:
401, 402, 403.

503 (2) Su,S. Introduction to Operations and Basic Tactics. 1 2 hr cl, 1
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.

ADVANCED MILITARY SCIENCE (Juniors and Seniors)

601 (3) A. Military Leadership and Instruction Methods. 2 2 hr cl, 1 drill
hr. Prereq: 401 through 503 or equiv.
Study of psychological, physiological, and sociological factors affecting human behavior;
study of the principles, methods, and techniques fundamental to military instruction. Leadership,
command and conduct of military drill.

602 (3) W. Branches of the Army. 2 2 hr cl, 1 drill hr. Prereq: 601 or
permission of chairman.
Familiarization with the role played by the various branches of the army in its overall
mission. Leadership, command and conduct of military drill.

603 (3) S. Small Unit Tactics and Communications. 2 2 hr cl, 1 drill hr.
Prereq: 602 or permission of chairman.
Study of the principles and fundamentals of small unit tactics in combat operations, includ-
ing communications and communication systems. Leadership, command and conduct of military
drill.

701 (3) A. Military Operations. 2 2 hr cl, 1 drill hr. Prereq: 601, 602,
603, or permission of chairman.
Study of division and lower staff organization and operations to include estimates and or-
ders with emphasis on military intelligence, and tactics to battalion group level. Leadership, com-
mand and conduct of military drill.

702 (3) Su,W. Logistics and Administration. 2 2 hr cl, 1 drill hr. Prereq:
701 or permission of chairman.
Study of supply, evacuation, troop movements, motor transportation and army administra-
tion. Leadership, command and conduct of military drill.

703 (3) S. Military Justice and The United States in World Affairs. 2 2
hr cl, 1 drill hr. Prereq: 702 or permission of chairman.
Study of Military Justice and student presentations on the role of the United States in
world affairs considering world economic, political, geographic, and resource factors. Leadership,
command and conduct of military drill.
MINERALOGY
Office, 140 Lord Hall

PROFESSOR FOSTER, ASSOCIATE PROFESSORS EHlers AND WENDEN, ASSISTANT PROFESSOR TETTENHORST

FOR UNDERGRADUATES

506 (5) A.W.S. Crystallography and Descriptive Mineralogy. 3 cl, 2 2 hr lab. Prereq: Chem 412 or 405. Not open to students who have credit for 511, or 512. Mr. Ehlers, Mr. Foster, Mr. Tettenhorst

An elementary course covering crystallography, physical, and chemical properties of minerals, their associations, occurrences, and uses. Chemical reactions involved in mineral formation and utilization.

511 (5) A. 512 (5) W. Crystallography and Descriptive Mineralogy. 3 cl, 2 2 hr lab. Prereq: Chem 412 or 405. Req'd of all Geol majors. Not open to students who have credit for 506. Mr. Tettenhorst, Mr. Wenden

Principles of crystallography, using models, crystals, and cleavage fragments. Physical and chemical properties, origin, association, occurrence, and sight identification of about 160 of the most important minerals. Emphasis on crystallochemical principles.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

601 (5) A. Advanced Crystallography. 3 cl, 2 2 hr lab. Prereq: 506, 511, or equiv. Mr. Wenden


605 (4) A. (5) S. Thermochemical Mineralogy. 4 or 5 cl. Prereq: Chem 683 or equiv, or permission of instructor. Mr. Foster

Thermal properties of minerals. Application of high temperature equilibrium to problems of petrology and technology, using phase diagrams.

611 (3) S. Microscopy of Opaque Minerals. 3 2 hr lab. Prereq: 506 or 512, 621. Mr. Wenden

Application of the petrographic microscope to the study of opaque minerals and ores, their identification, textures, and parageneses. Polished section preparation, thin section tests, and mineralogical tests.

621 (5) A.W. Microscopic Mineralogy. 2 cl, 2 2 hr lab. Prereq: 506 or 512 and Physics 412 or equiv. A. Geol graduates; W, Cer E Majors. Not open to students who have credit for 625. Mr. Ehlers


701 (3-5) A.W.S. Mineralogical Investigations. 6-10 hr lab and conf. Repeateable to a maximum of 15 cr hrs. Prereq: Satisfactory courses in field of problem, and permission of instructor. Mr. Ehlers, Mr. Foster, Mr. Tettenhorst, Mr. Wenden

Special problems in petrological, thermochemical, crystallochemical, X-ray or clay mineralogy, or other advanced non-thesis research.

706 (3) W. Advanced Thermochemical Mineralogy. 3 cl. Prereq: 605. Mr. Foster

Derivation and interpretation of phase diagrams of ternary and quaternary systems of importance in petrology and technology.

722 (4) W. Microscopic Petrography. 2 cl, 2 2 hr lab. Prereq: 621. Mr. Ehlers

Petrogenesis of common rock-forming systems. Microscopic thin-section investigations of igneous, metamorphic, and sedimentary rocks, correlating texture, mineral composition, alteration, and geological agencies.
725 (3) A. Advanced Optical Mineralogy. 3 2 hr lab. Prereq: 722 or equiv. Mr. Ehlers
Theory and determination of optical constants and directional features using Universal Stage. Includes determination of optic angles, feldspar compositions, double variation technique and phtolectric analysis.

730 (3) W. Clay Mineralogy. 3 cl and conf. Prereq: 754 and Chem 683, or permission of instructor. Mr. Tettenhorst
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.

754 (3) W. X-ray Crystallography. 3 cl, 2 3 hr lab. Prereq: 505, 511, or equiv. Not open to students who have credit for Chem 654. Mr. Wenden
Principles of X-ray crystal analysis. Phase identification by powder film and diffractometer methods, X-ray fluorescent analysis. Particle size determination. Unit cell and space group by rotation and Weissenberg methods.

755 (3) S. Crystallochemical Mineralogy. 3 cl. Prereq: 505, 512, or permission of instructor. Mr. Wenden
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.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

801 (1-3) A,W,S. Seminar in Mineralogy. 2-6 hr conf. Repeatable to a maximum of 9 cr hrs. Staff
Conference and reports on the developments in mineralogical research and their application to the problems of mineralogy and mineral technology.

950 (arr) Su,A,W,S. Research in Mineralogy and Petrography.
Research for thesis or dissertation purposes only. Staff

MINING ENGINEERING
Department of Metallurgical Engineering
Office, 212 Lord Hall

PROFESSORS FONTANA, MUELLER (EMERITUS), NOLD (EMERITUS), BECK (E.E.S.), SPEISER, SPRENTAK, ASSOCIATE PROFESSORS HIRTH, POWELL, ST. PIERRE, AND WILLIAMS, ASSISTANT PROFESSORS FRANTZ, AND MOAZED, AND MR. VERNER

FOR UNDERGRADUATES

431 (5) A. Industrial Work. Ten weeks of approved summer work in the mining industries. Mr. Frantz
A written report on the operation and design of the plant, including flow sheet and drawings, is required by November 1. Employe evaluation letter is required.

504 (3) S. Introduction to Mining Engineering. 3 cl. Prereq: 3rd yr standing in engineering. Mr. Frantz

632 (2) A. Inspection Trip. Prereq: 4th yr standing in Min E. Staff
A trip to coal, metallic, and non-metallic mines and mineral processing and preparation plants. A written report is required by November 1.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

602 (3) S. Explosives and Rock Work. 3 cl. Prereq: Chem 406, Geol 401 or 435. Not for graduate credit for students majoring in Min E. Mr. Verner
Explosives and the principles of application to mining.

603 (3) W. 604 (3) S. Mining Systems Engineering. 3 cl. Prereq: 607. 603 is not open for graduate credit for students majoring in Min E. Mr. Verner
Fundamentals of mining systems for bedded, massive, vein, and surface deposits.
MINING ENGINEERING


Rock characteristics, evaluation of mine rock structure, basic theories of rock action in mines.

641 (3) A, 642 (3) W, 643 (3) S. Mining Evaluation and Analysis. 3 cl. Prereq: 604. Mr. Frantz

Theory of mining sampling, calculations of ore reserves, present and future worth analysis in mining, mining economics.

704 (3) A. Mine Gases and Ventilation. 3 cl. Prereq: 603, Eng Mech 610, Chem 681. Mr. Verner

The principal mine gases including poisonous and explosive gases. Principles of fluid mechanics as they apply to ventilation of mines.

707 (4) A, 708 (3) W, 709 (3) S. Mining Plant Engineering. 3 cl, 1 3 hr lab. A, 3 cl, W, S. Prereq: 604, Eng Mech 607, 610. Mr. Frantz, Mr. Verner

Principles of mining haulage, hoisting, pumping, and energy transmission systems. Applications to mining problems.

750 (2-10) A, W, S. Mining Investigations. Prereq: senior standing in Min E or permission of instructor. Repeatable to a maximum of 12 cr hrs. Mr. Frantz, Mr. Verner

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

801 (3-10) Su, A, W, S. Mine Planning and Design. Prereq: satisfactory background in mining engineering, mineral benefication, and the earth sciences, and permission of instructor. Mr. Frantz and Staff

Engineering analysis and design of a mining property.

950 Su, A, W, S. Research in Mining Engineering.

Research for thesis purposes only.

MUSIC

Office, 105 Hughes Hall

The School of Music is a member of the National Association of Schools of Music

PROFESSORS BRUINSMA, DIERCKE, EVANS, GILLILAND, HADDAD, HARDESTY, HELD, HOPPIN, LIVINGSTON, McIRRIER, McGINNIS, PHELPS, SCHNEIDER, STAIGES, WEIGEL (EMERITUS), WILSON (EMERITUS), ASSOCIATE PROFESSORS ANAWALT, BARNES, BARR, DIERKIER (EMERITUS), DUFFEY, HARDY (EMERITUS), JONES, KUEHNEFUS, MAIN, McCURRICK, MOONEY, POLAND, SLAWSON (EMERITUS), SPORN, THOMAS, TITUS, WEDDER, WALKER, ASSISTANT PROFESSORS BENNER, BROEKEMA, BURKHALTER, CADY, DAVIS, KEARNS, MIXTER, MUSCHICK, RASMUSSEN, SEXTON, SOREL, WHALLON, WILSON, INSTRUCTORS BAKER, BARNES, BEECH, CHAMBERS, GREEN, HENNING, MANLEY, SUDDENDORF

UNIVERSITY REGULATIONS

(1) MUSIC LABORATORY FEE of $25 per quarter is assessed, in addition to the University Incidental and University Matriculation fee, for all undergraduate and graduate students majoring in music or music education. See details in the School of Music Bulletin.

(2) Courses numbered 400 to 599 are open to undergraduate students.

(3) Courses numbered 600 to 799 are open to advanced undergraduate and graduate students.

(4) Courses numbered 800 and above are open to graduate students only.

REVIEW COURSES AND SPECIAL COURSES

Preceding the class sessions of Mus 401 and Mus 408 A, B, C, D, E, F, or G, placement tests will be given to determine the ability of students in these subjects. (See School of Music bulletin for details of time and place.) Students with less than the expected ability will be requested to change from the original registration to Mus 400X, or Music 400 A, B, C, D, E, or G.

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

400 A, B, C, D, E, or G. (0) Applied Music A, W, S. Applied Music Staff

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.
MUSIC  215

400 K, L, M, N, P, and R.  Introduction to Music.  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 (400 R).  Mrs. Mooney

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.

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

<table>
<thead>
<tr>
<th>Orientation</th>
<th>Concert Attendance</th>
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<tbody>
<tr>
<td>400K A.</td>
<td>400N A.W.S.</td>
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<tr>
<td>400L W.</td>
<td>400P A.W.S.</td>
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<tr>
<td>400M S.</td>
<td>400R A.W.S.</td>
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Concerts and recitals approved for attendance credit include all Marshon Auditorium and Hughes Hall events.

[400X]  (0) A. Review of the Fundamentals of Music Theory.  6 lab hrs.  Mr. Poland

This course is designed for students who do not qualify in placement tests for Music 401.

401 (3) A. Music Theory.  6 lab hrs.  Prereq: passing of Placement Tests or 400X.  Theory Staff

The elements of music.  Development of aural and notational skills.

402 (3) W. Music Theory.  6 lab hrs.  Prereq: 401.  Theory Staff

Interval studies, rhythmic drill, sight-singing, dictation, keyboard practice, detailed study of primary harmonies and the dominant-seventh chord.

403 (3) S. Music Theory.  6 lab hrs.  Prereq: 402.  Theory Staff

Complex interval studies, rhythmic drill, sight-singing, dictation, keyboard practice, non-chordal tones, the introduction of secondary triads.

404 (3) Su, A.W.S.  Introduction to Music.  3 cl.  Not open for credit to Music majors.  Mr. Main, Mr. Broekema

A consideration of the materials of music, the instruments of the orchestra, and specific masterpieces from the Renaissance to the present.

408 Applied Music.  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 qtrs hrs.

Instruction in Applied Music for the purpose of developing musicianship, performance and 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 2:06 p.m. during the 3rd, 5th, 7th and 9th week of each quarter.  Open to other qualified students within the limits of instructional facilities by permission of the Director of the School of Music.  See Mr. Bruinsma.

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

<table>
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<tr>
<th>408A Piano (1) Su (other term)</th>
<th>408B Voice (1) Su (other term)</th>
<th>408C Strings (1) Su (1st term)</th>
<th>408D Woodwinds (2) A.W.S.</th>
<th>408E Brass (2) A.W.S.</th>
<th>408F Organ (2) A.W.S.</th>
<th>408G Percussion (2) A.W.S.</th>
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<tbody>
<tr>
<td>409 A, W, S. Mr. Hadad, Miss Jones, Mrs. Mooney, Mr. Whitt on, Miss Sorel</td>
<td>409B A, W, S. Mr. Gilliland, Mr. Staiger, Mr. Muschick, Mr. Diercks, Mrs. Chambers</td>
<td>409C A, W, S. Mr. Hardey, Mr. McClure, Mr. Epperson, Mr. Ruckhalter</td>
<td>409D A, W, S. Mr. McGinnis, Mr. Titus, Mr. Green, Mr. Wilson, Mr. Baker</td>
<td>409E A, W, S. Mr. Evans, Mr. Kearns, Mr. Suddendorf, Mr. Moore</td>
<td>409F A, W, S. Mr. Held</td>
<td>409G A, W, S. Mr. Spohn</td>
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</table>

451 (3) A.W.S.  Introduction to the History of Western Music I.  3 cl.  Not open for credit to Music majors.  Prereq: 404.  Mr. Kearns

An historical survey of music from classical antiquity to about 1750.
452 (3) W.S. Introduction to the History of Western Music II. 3 cl. Not open for credit to Mus majors. Prereq: 451. Mr. Kearns

An historical survey of music from 1750 to the present.

508 Applied Music. Prereq: 408 A, B, C, D, E, F, or G. Concur: 400 N, P or R. Required of students in B.Sc. in Edu. (Music) curriculum to a minimum of 12 qtr hrs.

Instruction in Applied Music for the purpose of developing musicianship, performance and a wide reading knowledge of music literature.

Instruction is given in individual lessons of two one-half hour periods each week. In addition, students are required to attend the Studio Classes and Honors Recitals on Tuesday and Thursday at 1:00 p.m. during the 3rd, 5th, 7th and 10th week of each quarter. Open to other qualified students within the limits of instructional facilities by permission of the Director of the School of Music. See Mr. Bruinisma.

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

508A Piano (1) Su (either term); (2) A.W.S. Mr. Haddad, Miss Jones, Mrs. Mooney, Mr. Whallon, Miss Sorel
508B Voice (1) Su (either term); (2) A.W.S. Mr. Gilliland, Mr. Stalger, Mr. Muschick, Mr. Diercks, Mrs. Chambers
508C Strings (1) Su (1st term); (2) A.W.S. Mr. Hardesty, Mr. McClure, Mr. Kipper, Mr. Burkhalter
508D Woodwinds (2) A.W.S. Mr. McGinnis, Mr. Titus, Mr. Green, Mr. Wilson, Mr. Baker
508E Brass (2) A.W.S. Mr. Evans, Mr. Kearns, Mr. Suddendorf, Mr. Moore
508F Organ (2) A.W.S. Mr. Held, Miss Lenpold
508G Percussion (2) A.W.S. Mr. Spohn


Required of all students in B.Mus. Curriculum to a minimum of 36 qtr hrs.

Instruction is given in individual lessons of two one-half hour periods each week. In addition, students are required to attend the Studio Classes and Honors Recitals on Tuesday and Thursday at 1:00 p.m. during the 3rd, 5th, 7th and 10th week of each quarter. Open to other qualified students within the limits of instructional facilities by permission of the Director of the School of Music. See Mr. Bruinisma.

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

509A Piano (2) Su (either term); (4) A.W.S. Mr. Haddad, Miss Jones, Mrs. Mooney, Mr. Whallon, Miss Sorel
509B Voice (2) Su (either term); (4) A.W.S. Mr. Gilliland, Mr. Stalger, Mr. Muschick, Mr. Diercks, Mrs. Chambers
509C Strings (2) Su (1st term); (4) A.W.S. Mr. Hardesty, Mr. McClure, Mr. Kipper, Mr. Burkhalter
509D Woodwinds (4) A.W.S. Mr. McGinnis, Mr. Titus, Mr. Green, Mr. Wilson
509E Brass (4) A.W.S. Mr. Evans, Mr. Kearns, Mr. Suddendorf, Mr. Moore
509F Organ (4) A.W.S. Mr. Held
509G Percussion (4) A.W.S. Mr. Spohn

510 (1) Su (either term); (2) A.W.S. Graduating Recital. Prereq: 509.

Total of 6 cr hrs reqd in B. Mus. curriculum. Applied Music Staff

This course provides special preparation for the presentation of the applied music graduating recital for the B. Mus. degree.


INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

511A Piano (1) Su (either term), 4 cl; (1 or 2) A.W.S. 2 or 4 cl. Miss Anawalt, Miss Sexton
511B Voice (1) Su (either term), 4 cl; (1 or 2) A.W.S. 2 or 4 cl. Mr. Gilliland, Mrs. Chambers, Mr. Manley
511C Strings (1) Su (1st term), (2) A. 4 cl. Mr. Burkhalter
511D Woodwinds (2) S. 4 cl. Mr. Wilson
511E Brass (2) W. 4 cl. Mr. Evans, Mr. Suddendorf, Mr. Kearns
511F Percussion (2) S. 4 cl. Mr. Spohn

512 Applied Music, Methods and Materials. Req'd of all Mus students in B.Sc. in Edu. (Music) Curriculum to a minimum of 4 qtr hrs. Prereq: 511.
IN INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

512C Strings (2) W. 4 cl. Mr. Burkhart
512D Woodwinds (2) A. 4 cl. Mr. Wilson
512E Brass (2) B. 4 cl. Mr. Evans, Mr. Sudendorf

514 (2) S. Music for Group Recreation. 8 hrs. Miss Sexton
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.

515 (2) A.W.S. Fundamentals of Opera. 4 lab hrs.
Instruction and laboratory experience in rehearsal techniques, study of operatic literature, and coaching and study of operatic roles.

517 (2) A. Ear-Training I. 4 lab hrs. Prereq: 403. Miss Kuehefuhs, Mr. Vedder
Sight-singing, dictation and keyboard harmony.

518 (2) W. Ear-Training II. 4 lab hrs. Prereq: 517 and 527. Miss Kuehefuhs, Mr. Vedder
Intermediate sight-singing, dictation and keyboard harmony.

519 (2) S. Ear-Training III. 4 lab hrs. Prereq: 518 and 528. Miss Kuehefuhs, Mr. Vedder
Advanced sight-singing, dictation and keyboard harmony.

522 (4) A. Elementary School Music. 4 cl. Prereq: junior standing in Mus. Not open to students who have credit for Mus 622. Miss Thomas, Mr. Ramsey
The function of music in the elementary schools and the introduction to music material and teaching procedures for this level.

523 (3) W. Music for Children. 3 cl. Prereq: 522. Not open to students who have credit for Mus 623. Miss Thomas, Mr. Wilson
Singing and listening materials suitable for the elementary classroom and for school and public performances.

524 (4) S. Vocal Music for Junior and Senior High Schools. 4 cl. Prereq: 522. Not open to students who have credit for Mus 624. Mr. Barr, Mr. Ramsey
The function of vocal music in the junior and senior high school and the introduction to music material and teaching procedures for this level.

527 (3) A. Harmony I. 3 cl. Prereq: 403. Miss Kuehefuhs, Mr. Vedder, Mr. Beck
Seventh chords, common-chord modulation, borrowed tones and borrowed chords.

528 (3) W. Harmony II. 3 cl. Prereq: 527. Miss Kuehefuhs, Mr. Vedder, Mr. Beck
Secondary dominants, modulation to remote keys and elementary instrumentation.

529 (3) S. Harmony III. 3 cl. Prereq: 528. Miss Kuehefuhs, Mr. Vedder, Mr. Beck
Chromatic chord forms, chromatic modulation, composition.

530 (3) Su.A. Form and Analysis. 3 cl. Prereq: 529. Miss Kuehefuhs, Mr. McClure, Mr. Vedder
Introduction to the study of the formal structure of music. Song-form and Trio, Rondo, Theme and Variation, Sonata forms included. Standard works analyzed.

532 (3) W.S. Instrumentation. 3 cl. Prereq: 529. Mr. McClure, Mr. Barnes
An elementary course in scoring for the instruments of the orchestra, the band, and for small choral groups.

540 (3) A. Beginning Conducting. 3 cl. Prereq: 527. Mr. Gilliland, Mr. McGinnis
The basic technique of the baton. A syllabus of selected literature and reading assignments will be used as a basis of study.
541 (4) W. Instrumental Music for the Junior and Senior High School. Prereq: 522. Mr. Benner, Mr. Wilson
The function of instrumental music in the junior and senior high school and the introduction to music material and teaching procedures for this level.

546 (2) A,W,S. Survey and Appreciation of Music Literature. 4 cl. Req'd of, and open only to students in curriculum in elementary education. Miss Sexton and others
Lectures, illustrations and analyses of elements involved in active, intelligent listening, understanding and appreciation of representative works of the great masters of music.

547 (3) Su,A,W,S. Fundamentals of Music. 5 cl. Req'd of students in the curriculum in elementary education. No prereq: Miss Sexton and others
This course includes ear-training, music reading, creative writing, voice production, and some instrumental experience. School song materials are used for this work.

548 (3) Su,A,W,S. Music Education. 5 cl. Req'd of students in the curriculum in elementary education. Prereq: 547. Miss Sexton and others
Music literature and teaching aids for children, including singing, rhythm, creative, and listening experiences, and their presentation.

551 (3) A. Music History. 4 cl, 1 lab hr. Prereq: 403. Mr. Davis
A study of the development of music from the earliest times through the sixteenth century with a special emphasis on the historical, social, and cultural background.

552 (3) W. Music History. 4 cl, 1 lab hr. Prereq: 551. Mr. Davis
A study of the development of music in the seventeenth and eighteenth centuries with special emphasis on the historical, social, and cultural background.

553 (3) S. Music History. 4 cl, 1 lab hr. Prereq: 552. Req'd of all Mus majors and minors. Mr. Davis
A study of the development of music in the nineteenth and twentieth centuries.

562 (3) A. Counterpoint. 3 cl. Prereq: 529. Mr. Barnes
A fundamental course in counterpoint including species counterpoint, double counterpoint, imitation, and two-voice canon.

576 (2) A,W,S. Field Experience in Church Music. Prereq: 540 and 671, or concur 671. Mr. Held
Supervised experience in the actual church situation. This course may be repeated to a total of three quarters.

581 (3) W,S. Composition. 3 cl. Prereq: 529. Mr. Vedder, Mr. Barnes
Creative writing in the small forms.

FOR ADVANCED UNDERGRADUATES AND GRADUATES
According to University regulations, courses in this group are not open to freshmen or sophomores.

601 (3) W. The Romanticists. 3 cl. Prereq: 530 or 562 and 553. Mr. Livingston
The music of the romantic period in Germany and France.

602 (3) W. The Opera. 3 cl. Prereq: 530 or 562 and 553. Mr. McClure
A survey of the antecedents of opera and a study of representative works from each of the major periods in the history of opera.

603 (3) S. Modern Music. 3 cl. Prereq: 530 or 562 and 553. Staff
Impression, realism, atonality, polytonality, and other contemporary trends in music.

604 (3) S. Organ Literature. 3 cl. Prereq: 530 or 562 and 553. Mr. Held
A comprehensive survey from the earliest compositions to the works of present-day composers.

607 (3) Su,A. The Classic Period. 3 cl. Prereq: 530 or 562 and 553. Mr. Davis
A critical study of chamber, orchestral and keyboard music, and opera of the middle and late eighteenth century.
MUSIC 219

609 (3) A. Medieval Modes. 3 cl. Miss Kuechefs
A study of the historical background and characteristics of plainsong, including the technical aspects of notation, modes, rhythm, and chironomy.

#610 (3) Su, (1st term) S. Piano Literature. 3 cl. Prereq: 530 or 562 and 553. Mr. Haddad, Miss Sorel.
A study of the piano sonata and other characteristic forms from the pre-piano period to the present time.

[611](3) S. The Baroque Era. 3 cl. Prereq: 530 or 562 and 553. Mr. Mixter.
An intensive survey of the development of musical styles from Monteverdi through Bach.

612 (3) Su. Music in the Renaissance. 3 cl. Prereq: 530 or 562 and 553. Staff.
An historical study of representative musical masterpieces of the period from Dufay through Palestrina and Lassus.

[613] (3) A. Music in the Middle Ages. 3 cl. Prereq: 530 or 562 and 553. Mr. Hoppsin.
An intensive survey of the development of musical style from the eleventh century through the fourteenth century.

[614] (3) W. Choral Literature. 3 cl. Prereq: 530 or 562 and 553. Mr. Livingston.
A comprehensive survey from the earliest compositions to the works of present-day composers.

615 (3) S. The Literature of Chamber Music. 3 cl. Prereq: 530 or 562 and 553. Mr. Livingston.
A survey of the chamber music of the Classic and Romantic periods with performance, analysis, and discussion.

616 (3) W. Symphonic Literature. 3 cl. Prereq: 530 or 562 and 553. Mr. Mixter.
A survey of orchestral music from the classic period to the present.

[617] (3) Individual Composers: Their Life and Works (name of composer to be inserted each year). 3 cl. Prereq: 530 or 562 and 553. History Staff.
A comprehensive study of the works of an individual composer. Topic varies from year to year.

620 (3) Su.A. Introduction to Bibliographic Method. 3 cl. Prereq: 530 or 562 and 553. Mr. Mixter.
The collection, examination and documentation of information about music. The study includes general as well as music library materials.

621 (3) Su (2nd term), A. Basic Concepts in Music Education. 3 cl. Prereq: graduate standing and Ed 520 or 536. Mr. Schneider, Mr. McBride.
A study of 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.

622 (3) Su (1st term). Music Education in the Elementary School I. 5 cl. Mr. Ramsey.
The role of the general vocal music program in elementary schools including the relationship of music to the total learning program.

623 (3) A. Music Education in the Elementary School II. 5 cl. Mr. Ramsey.
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.

624 (3) Su (1st term). Vocal Music in the Secondary School. 5 cl. Mr. Ramsey, Mr. Barr.
The organization, direction and purpose of the vocal music program in the secondary schools.

[625] (3) Su (1st term). The study and use of literature for vocal music education. 5 cl. Mr. Ramsey, Mr. Barr.
A study of vocal literature for choral groups in the secondary school music program.
626 (3) Su (2nd term), S. General Music I. 3 cl. Prereq: graduate standing or permission of instructor. Mr. Ramsey
This course is designed to prepare teachers for teaching general music courses in junior and senior high schools.

627 (3) Su (1st term). General Music II. 3 cl. Prereq: 553, Fine Arts 494 or 497, and graduate standing or permission of instructor. Mr. Barr
This course is designed to prepare teachers for teaching courses in which the appreciation and understanding of music are taught with reference to other art forms.

630 (3) Su, W. Form and Analysis. 3 cl. Prereq: 550 and 553. Mr. Barnes
An analytical study of larger compositions from the Classic and Romantic literature.

632 (3) Su, A. Orchestration. 3 cl. Prereq: 532. Mr. Barnes
Scoring for the concert band.

633 (3) Su, A. Orchestration. 3 cl. Prereq: 532. Mr. Barnes
Scoring for the orchestra band.

641 (3) Su (1st term), Principles and Practices in Instrumental Music Education. 5 cl. Mr. Benner
Role of instrumental music in the public schools: relationship to society, and the total music program; historical development, evaluation, and future trends.

642 (3) W. The Study and Use of Literature for Instrumental Music Education. 5 cl. Mr. Wilson
Selection of literature, interpretation, rehearsal procedures, conducting problems, attainment of musical understanding through literature.

643 (3) S. Advanced Conducting (Instrumental). 3 cl. Prereq: 530 and 540. Mr. McGinnis
This course aims to develop the power to interpret the larger forms of instrumental literature and to read from full score.

646 (3) Su (1st term), W. Advanced Conducting (Vocal). 3 cl. Prereq: 530 and 540. Mr. Gilliland
This course aims to develop the power to interpret the larger forms of choral literature and to read from full score.

650 (1-5) Su, A.W.S. Minor Problems. Prereq: permission of instructor. Graduate Staff
Investigation of minor problems in the field of music.

650X (2) Su (1st term), A. Research Techniques. 3 cl. Mr. Benner

650Z (2) Su (2) A.W.S. Collegium Musicum. Mr. Main
Study and performance of vocal and instrumental music from the Medieval, Baroque, and Renaissance periods. Practical study of the early musical instruments.

656 (3) Su (1st term), W. Principles of Music Learning. 3 cl. Mr. Schneider
An analysis of the factors in learning to appreciate and perform music in early childhood and through adult life.

662 (3) W. Counterpoint. 3 cl. Prereq: 562, Mr. Barnes, Mr. Walker
Counterpoint based on the contrapuntal practices of the eighteenth century. Writing of two-part inventions. Some work in three-part counterpoint.

663 (3) Su (2nd term), S. Fugue. 3 cl. Prereq: 662. Mr. Walker
Detailed study of the fugue: writing of three-voice and four-voice fugues.

667 (3) W. Advanced Keyboard Harmony. 3 cl. Prereq: 529 Mr. Vedder
Practice in harmonizing melodies, realizing figured bass, improvisation and modulation at the keyboard.

670 (3) W. Music in the Church. 3 cl. Prereq: 45 qtr hrs of Mus courses. Mr. Held
A consideration of the role of music in the development of liturgy and worship. A study of hymnology. Workshop experience, with contemporary liturgical music.
671 (3) S. Techniques and Materials for Church Choirs. 3 cl. Prereq: 45 qtr hrs of Mus courses or permission of instructor. Mr. Held
A study of methods and materials for church choir, chanting, hymns, etc., with consideration of anthem selection and performance.

703 (3) W. Notation of Fourteenth and Fifteenth Centuries. 3 cl. Prereq: 702. Mr. Hoppin
A study of Ars Nova Notation, Mannered Notation, and the transition to white notation.

704 (3) S. Notation of the Late Fifteenth and Sixteenth Centuries. 3 cl. Prereq: 703. Mr. Mixter
The study of proportions, keyboard notation, and lute tablatures.

707 (5) S. Musical Sources and Historiography. 3 cl. Prereq: 620. Mr. Mixter
A study of music historiography, supplemented by the examination of musical documents from each of the periods of music history.

The study of applied music at the graduate level. 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 School of Music. See Mr. Bruinisse.
Instruction is given in individual lessons of two one-half hour periods each week or the equivalent.

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

709A Piano (2) su (either term); (4) A, W.S. Mr. Haddad, Ms Jones, Mrs. Mooney
709B Voice (2) Su (either term); (4) A, W.S. Mr. Gilliland, Mr. Dierkes, Mr. Stalger
709C Strings (2) Su (either term); (4) A, W.S. Mr. Hardesty, Mr. McClure
709D Woodwinds (4) A, W.S. Mr. McGinnis, Mr. Wilson
709E Brass (4) A, W.S. Mr. Evans
709F Organ (4) A, W.S. Mr. Hold

#712 (3) Su (2nd term). Supervision of Music in the Elementary Schools. 3 cl. Open to seniors and to graduate students majoring in music. Mr. Barr
A study of the specific problems of music supervision with special attention given to curriculum construction in the elementary schools.

#713 (3) Su (1st term). Supervision of Music in Secondary Schools. 3 cl. Open to seniors and to graduate students majoring in Mus. Mr. Barr
This course is designed to study evaluation criteria and the problems of the music supervisor in the secondary school.

717 (3) Su (2nd term). Song Literature. 3 cl. Mr. Gilliland
The study of Song Literature including historical and philosophical backgrounds selected to meet the needs of the student, artist, or teacher; program building.

719 (3) Su (1st term). Theory Pedagogy. 3 cl. Prereq: senior standing in Mus. Mr. Walker
The teaching of music theory in colleges and secondary schools.

#720 (3) Su (1st term). Piano Pedagogy. 5 cl. Prereq: minimum of 6 qtr hrs of applied study in piano and graduate standing in Mus. Mr. Haddad
An analysis of the principles and practices current in the teaching of piano.

721 (3) Su (1st term). Vocal Pedagogy. 3 cl. Prereq: minimum of 6 qtr hrs of applied study in voice and graduate standing in Mus. Mr. Gilliland
An analysis of the principles and practices current in the teaching of voice.

722 (3) Su (1st term). String Instrument Pedagogy. 3 cl. Prereq: minimum of 6 qtr hrs of applied study in string instruments and graduate standing in Mus. Mr. Burkhalter
An analysis of the principles and practices current in the teaching of strings.

[723] (3) Su (1st term). Woodwind Instrument Pedagogy. 3 cl. Prereq: minimum of 6 qtr hrs of applied study in woodwind instruments and graduate standing in Mus. Mr. Wilson
An analysis of the principles and practices current in the teaching of woodwinds.
MUSIC

(3) Su (1st term). Brass Instrument Pedagogy. 3 cl. Prereq: minimum of 6 qtr hrs of applied study in brass instruments and graduate standing in Mus.
An analysis of the principles and practices current in the teaching of brass instruments.

730 (3) A. Advanced Analysis. 3 cl. Prereq: 650. Mr. Walker
Detailed analytical study of representative works of selected twentieth-century composers.

747 (1-5) Su,A,W,S. Problems in Vocal Music Education. Prereq: permission of instructor. Repeatable to a maximum of 10 cr hrs. Graduate Staff
Study of problems encountered in the teaching and supervising of music.

748 (1-5) Su,A,W,S. Choral Problems. Prereq: permission of instructor. Repeatable to a maximum of 10 cr hrs. Graduate Staff
Study of the problems encountered in developing choruses and church choirs.

749 (1-5) Su,A,W,S. Problems in Instrumental Music Education. Prereq: permission of instructor. Repeatable to a maximum of 10 cr hrs. Graduate Staff
Study of problems encountered in teaching, supervising, and organization of the instrumental music program.

761 (3) W. Modal Counterpoint. 3 cl. Prereq: 530 and 553. Miss Kuehifesku
Counterpoint based on the vocal polyphonic style of the sixteenth century. Analysis of representative works and practice in motet writing.

781 (3) Su,A,W,S. Composition. 3 cl. Prereq: 581. Repeatable to a maximum of 9 cr hrs. Mr. Barnes, Mr. Walker
Opportunity for, and guidance in, creative writing. Analysis, discussion, and employment of devices used in contemporary music.

FOR GRADUATES

701 (5) W. The History of Performance Practices. 3 cl. Prereq: permission of the instructor. Mr. Livingston
A study of primary sources pertaining to contemporary attitudes and practices in the performance of music from the Middle Ages to the present.

702 (5) A. Notation to 1300. 3 cl. Prereq: 613 or concur. Mr. Hoppin.
A study of neumes, the development of staff and square notation, primitive systems, rhythmic modes, Frascanian notation, and the innovations of Petrus de Cruco.

750 (5) A. Development of Music Theory I. 3 cl. Mr. Phelps
A study of the principal treatises on music theory before 1400.

751 (5) W. Development of Music Theory II. 3 cl. Mr. Phelps
A study of the principal treatises on music theory from 1400 to 1700.

752 (5) S. Development of Music Theory III. 3 cl. Mr. Phelps
Critical study of music and theory texts from 1700 to 1900.

784 (5) A. Studies in Medieval Music. 3-5 cl. Mr. Hoppin
Problems and research in music before 1400.

785 (5) W. Studies in Renaissance Music. 3-5 cl. Mr. Mixter
Problems and research in music between 1400 and 1600.

786 (5) S. Studies in Baroque Music. 3-5 cl. Mr. Livingston
Problems and research in music between 1600 and 1700.

[787] (5) Studies in Classic Music. 3-5 cl. Mr. Davis
Problems and research in music of the late eighteenth century.

[788] (5) Studies in Romantic Music. 3-5 cl. Mr. Hoppin
Problems and research in music of the nineteenth century.

[789] (5) Studies in Modern Music. 3-5 cl. Mr. Main
Problems and research in music of the twentieth century.

850 (3) Advanced Studies in Music.
IN Clude letter with number on schedule card

[850C] (8) Supervision and Administration of School Music. Prereq: permission of instructor.

#(850D) (3) Su (2nd term). The Instrumental Program in the Public Schools—Elementary grades. Prereq: permission of instructor, Mr. Schneider.

#(850E) (3) Su (2nd term). The Instrumental Program in the Public Schools—Secondary Grades. Prereq: permission of instructor, Mr. Schneider.

850F (3) W. Factors in Music Education. Prereq: permission of instructor, Mr. Schneider.
A study of sociological and psychological factors which affect instruction of music.

850J (3) A. Music Education and the Curriculum. Prereq: permission of instructor, Mr. McBride.
A study of the application of music education in the school curriculum.

850K (3) Su (1st term). Music in Higher Education. Prereq: permission of instructor, Mr. McBride.

850N (3) A. Counterpoint. Prereq: 65H and 65S or permission of instructor, Mr. Walker.
Counterpoint techniques in the works of sixteenth-century composers.

850Q (3) A. Seminar in Music: Factors in Choral Tone Production. 3 cl. Prereq: permission of instructor, Mr. Diercks.
A study of choral blend and other vocal techniques.

850 (3) Su,A,W,S. Seminar in Music. 3 cl. Repeatable to a maximum of 15 cr hrs.

IN Clude letter with number on schedule card

880B Music Theory. Mr. Barres, Mr. Phelps, Mr. Walker.

880C Music Education. Mr. McBride, Mr. Schneider.

881 (5) Su,A,W,S. Seminar in Music History. Repeatable to a maximum of 15 cr hrs. Mr. Brumna, Mr. Livingston, Mr. Hoppin.

Individual research projects not connected with the dissertation.

Research for thesis or dissertation purposes only.

TRYOUTS FOR CAMPUS MUSICAL ORGANIZATIONS

To enroll in Music organizations, students should observe the following:

FOOTBALL MARCHING BAND—Open to men students only.

STADIUM BAND ROOM—Monday, September 23, 9:30 a.m. See Mr. Evans.

Please note that this tryout is scheduled before the start of Welcome Week. Rehearsals begin the same day, and candidates should be prepared to spend mornings, afternoons, and evenings in preparation for the first football game. Conflicts with required Welcome Week Projects may be adjusted at the band rehearsals.

Check Freshman Handbook or contact the directors of the following organizations:

ROTC BAND (AIR-ARMY)—ROTC students only. Mr. Spohn, Room 306, Hughes Hall.

UNIVERSITY CONCERT BAND—Men and women students. Mr. McGinnis, director, Room 306, Hughes Hall.

UNIVERSITY BUCKEYE BAND—Men and women students. Mr. Evans, director, Room 306, Hughes Hall.

UNIVERSITY ORCHESTRA—Men and women students. Mr. Hardesty, director, Room 310, Hughes Hall.

Students should bring their own instruments to the tryouts except string and brass basse and percussion instruments.

UNIVERSITY CHORUS—Music A-1—Men and women students of all colleges. Mr. Diercks, director, Room 204, Hughes Hall.

SYMPHONIC CHOIR—Music A-3—Men and women students of all colleges. Mr. Diercks, director, Room 204, Hughes Hall.

WOMEN'S GLEE CLUB—Music A-4—Women students of all colleges. Mr. Muschick, director, Room 204, Hughes Hall.

MEN'S GLEE CLUB—Music A-4—Men students of all colleges. Mr. Stagler, director, Room 215, Hughes Hall.

CAMPUS MUSIC GROUPS

University Campus Music Groups are open to all students in the University who may receive full credit according to regulations of the college in which they are enrolled.
Music A. University Choruses. (1) Three or more hrs of rehearsal each week.

A1 University Chorus. Su (1st term), A,W,S. Open to students in any department of the University. Admission is through audition only. Mr. Diercks Oratorio and large choral works are studied and performed.

A3 Symphonic Choir. A,W,S. Admission is by audition only. Application should be made directly to the director. Mr. Diercks Symphonic Choir is a concert organization singing a variety of literature.

A4 Women’s Glee Club. A,W,S. Mr. Muschick. Membership in this concert group is open to all women students in the University by audition. Auditions are held at stated periods, and vacancies in the club are filled with the best available voices.
Study and performance of choral literature for women’s voices.

A5 Men’s Glee Club. A,W,S. Mr. Staiger. Membership in this concert group is open to all men students in the University by audition only. Auditions are held at stated periods, and vacancies in the club are filled with the best available voices. Most admissions occur in the Autumn Qtr.
Study and performance of choral literature for men’s voices.

Music B. University Orchestras. (1) Three or more hrs of rehearsal each week. Admission by tryout and permission of the director.

B1 University Symphony Orchestra. Su (1st term), A,W,S. Mr. Hardesty. 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.

B3 University Little Orchestra. A,W,S. Mr. Kearns. Open to any University student. Admission by audition and approval of the director.
A selected group giving public and broadcast performances. Professional orchestral techniques are emphasized.

Music C. University Marching Bands. (1) Three or more hrs of rehearsal each week. Admission by tryout and permission of the director. Open to men students of any yr or department in the University.

C1 University Football Marching Band. A. Mr. Evans. The University Marching Band is a selected group of 120 brass, wind and percussion players which performs at football games and rallies during the Autumn Qtr.

C2 ROTC Band (Air-Army). W,S. Mr. Spohn

Music D. University Bands. (1) Three or more hrs of rehearsal each week.

D1 The University Concert Band. A,W,S. Mr. McGinnis
A selected group of limited membership devoted to the preparation and performance of the best band literature. Gives public concerts and performs the University functions.
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.

Music F. Small Ensembles. (1) Two or more hrs of rehearsal each week.
Admission by tryout and permission of the instructor.

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

F1 Opera Ensembles. A,W,S.
F2 Vocal Ensembles. A,W,S.
F4 String Ensembles. Su (1st term) A,W,S.
F5 Woodwind Ensembles. A.W.S.
F6 Brass Ensembles. A.W.S.
F7 Miscellaneous Ensembles. A.W.S.

Music J. Choral Music. (1) S. 2 cl. Mr. Barr
A choral music laboratory designed to provide experiences in teaching music through practice in the selection and presentation of literature and the critique of teaching performance.

Music K. Instrumental Music. (1) W.S. 2 cl. Mr. Benner, Mr. Burkhallter
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.

NATIONAL SECURITY POLICY STUDIES
Office, 112 Law Building

CHAIRMAN, ROBERT J. NORDSTROM

FOR ADVANCED UNDERGRADUATES AND GRADUATES

The general prerequisite for these courses is the same as required in the Bulletin of the Graduate School, i.e., at least junior standing and prerequisites that amount to twenty quarter hours in the same and allied subjects of which a minimum of at least ten quarter hours must be in the same subject; or thirty hours in not more than two allied subjects.

701 (3) A.W.S. Minor Problems in National Security Policy. Informal conf on selected topics. Permission of Chairman Sherman and Staff
A special national security topic is assigned to each student for reading and a report.

702 (3) A. 703 (3) W. 704 (3) S. National Security Policy. 1 cl. Prereq: undergraduates with permission of Chairman Sherman and Staff
An analytical study of contemporary and future problems of national security; an interdepartmental approach.

NAVAL SCIENCE
Naval Reserve Officers Training Corps
Office, 179 Navy Annex, Physical Education Building

CAPTAIN JOE W. BEADLES, JR., U.S.N., 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: (N.S. unless otherwise indicated.)

First Year:
All candidates—441, 442, 443

Second Year:
All candidates—541, 542, 543

Third Year:
Line candidates—441, 442, 443
Marine candidates—551, 552, 553
Supply candidates—561, 562, 563

Fourth Year:
Line candidates—741, 742, 743
Marine candidates—751, 752, 753
Supply candidates—761, 762, 763

441 (3) A. Naval Orientation. 3 cl, 2 1 hr lab.
The basic study of naval lore, covering organization, customs, discipline, vessels of the U.S. Navy, introduction to seamanship, leadership, and tactics.

442 (3) W. Naval History, Part I. 3 cl, 1 2 hr lab. Prereq: 441.
The study of Naval History from earliest recorded history up to World War I, with particular emphasis on the principles of war and influence of sea power upon history.

443 (3) S. Naval History, Part II. 3 cl, 1 2 hr lab. Prereq: 442.
The continued study of Naval History from the beginning of World War I to the present time.

541 (3) A. Naval Weapons, Part I. 3 cl, 1 2 hr lab.
A broad basic study of naval gunnery, including the fire control problem. An introduction to anti-submarine warfare.
543 (3) S. Naval Weapons, Part II. 3 cl, 1 2 hr lab. Prereq: 541.
More advanced study of Naval Weapons and their employment, including guided missiles and nuclear weapons, and a basic study of the technology of space.

641 (3) A. Naval Operations. 3 cl, 1 2 hr lab.
A study of fleet operations, including tactics, tactical communications, meteorology, Rules of the Nautical Road, and the principles of relative motion.

642 (3) W. Naval Operations and Introduction to Navigation. 3 cl, 1 2 hr lab.
A study of the Naval Communications System, shipboard organization, administration and the electronic and dead reckoning methods of marine navigation.

643 (3) S. Celestial Navigation. 3 cl, 1 2 hr lab.
The determination of position by celestial methods of navigation.

651 (3) A. Evolution of the Art of War, Part I. 3 cl, 1 2 hr lab.
A study of the evolution of weapons and tactics, illustrating the principles and variables of war used in certain battles from Alexander through the Mexican War.

652 (3) W. Evolution of the Art of War, Part II. 3 cl, 1 2 hr lab.
A continuation of the study of the Evolution of the Art of War from the beginning of the Civil War to the end of World War II.

653 (3) S. Modern Basic Military Strategy and Tactics. 3 cl, 1 2 hr lab.
A survey of modern strategic and tactical principles, and current military developments.

661 (3) A. The Navy Supply System and Supply Management Afloat, Part I. 3 cl, 1 2 hr lab.
A study of the system of procurement, control and distribution of materials required by the Navy; introduction to Supply Management procedures afloat.

662 (3) W. Supply Management Afloat, Part II. 3 cl, 1 2 hr lab.
A continuation of supply management afloat, including the procedures for receipt and storage of stock and the naval accounting system afloat.

663 (3) S. Supply Management Afloat, Part III. 3 cl, 1 2 hr lab.
A continuation of the study of supply management afloat, including the expenditure and control of material and financial management afloat.

741 (3) A. Naval Engineering. 3 cl, 1 2 hr lab.
Principles of ship stability and buoyancy in the practice of damage control. Theory of construction, installation and operation of a modern naval steam engineering plant.

742 (3) W. Naval Engineering and Introduction to Naval Administration. 3 cl, 1 2 hr lab.
A study of electricity, naval auxiliary systems and shipboard organization and administration.

743 (3) S. Naval Administration. 3 cl, 1 2 hr lab.
Uniform Code of Military Justice. The psychology of human relations and the techniques of leadership; career planning.

751 (3) A. Amphibious Warfare, Part I. 3 cl, 1 2 hr lab.
The history of amphibious warfare and its development from Gallipoli through Korea.

752 (4) W. Amphibious Warfare, Part II. 3 cl, 1 2 hr lab.
A familiarization with the doctrinal techniques and present concepts of amphibious warfare including the planning phase.

753 (3) S. Leadership and the Uniform Code of Military Justice. 3 cl, 1 2 hr lab.
Survey of the UCMI and a study of the psychology of human relationships and techniques of leadership as applied by Marines.

761 (3) A. Retail Sales. 3 cl, 1 2 hr lab.
A study of the clothing and small stores afloat organization, accounting procedures and related reports; introduction to Ship's Store Afloat.

762 (3) W. Advanced Retail Sales and Naval Administration. 3 cl, 1 2 hr lab.
A continuation of the study of Ship's Store Afloat, including stock control, sales procedures and related reports, the psychology of human relations and the techniques of leadership.
NURSING

Office, B-201 Starling Loving Hall

MEDICAL STAFF: PROFESSORS BAXTER, BROWNING, MAKLEY, PATTERTSON, SAUNDERS, ULLERY, WARREN, AND ZOLLINGER

NURSING STAFF: PROFESSOR NEWTON, ASSOCIATE PROFESSORS FEASE, SHIRE, CHAMBERS, DORSCH, HARVEY, LEAZENBEE, LEWIS, McDOWELL, PRICE, ASSISTANT PROFESSORS BALLARD, BELLAM, BENNER, BUCKERIDGE, CLARK, COLLIER, CURREY, DILLEY, ELLIOTT, GRISER, KRUMAN, KRUSE, MARTIN, MILLER, ROLLER, SHAW, THOMAS, WALLACE, WITTMAYER, YAUGER, INSTRUCTORS BRESEE, BUENOS, COREY, FAIR, FRANCIS, PRESTOE, GOODE, HYDE, KOG, LINKENBACH, MCKAY, MOUSAD, MUNJAS, O'SHEA, PETIT, PETERS, PLUMMER, POLCYN, SCHNEIDER, SPARKMAN, STEPHENS, WILLIAMS, WRIGHT, WEBSTER, ASSISTANT INSTRUCTORS AMS, AUGENSTEIN, BRYANT, CLARK, DOLLIVER, EVANS, NELSON, NICELY, WOLFE

OPEN ONLY TO STUDENTS REGISTERED IN THE SCHOOL OF NURSING

Prior to enrolling in the clinical courses, the basic student shall have completed the following courses or their equivalent: Anat 504, Chem 407, 409, Home Ec 440, Microbiol 510, Psychol 401, Soc 401, Zool 406 and Encl 416, 417, 418.

421 (1) A.W.S. Nursing Survey. 1 cl. Reqd of students enrolled in the 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 (2) A.W.S. Problem Solving Methods in Nursing. 2 cl. Prereq or concur: 421. Reqd of students enrolled in the Gen Nurs curriculum.

Guided use of problem solving methods as a means of meeting patients' needs.

529 (2) S. Human Relations in Nursing. 2 cl. Reqd of students enrolled in the general Nursing curriculum.

Introduction to basic psychiatric concepts as applied to human relations; discussion of culture and personality as related to health and sickness.

539 (6) A. Fundamentals of Nursing. 3 cl and average of 12 hrs clinical study per week (ward conf, discussion groups, clinical practice, and human relations lab). Prereq: Anat 504, Microbiol 510, Home Ec 440.

Study of basic needs of hospitalized adult patients and the functions of the nurse in meeting these needs.

547 (8) W.S. Medical Nursing I. 4 cl and average of 15 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 gastro-intestinal conditions; or diabetes mellitus.

548 (8) W.S. Surgical Nursing I. 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 (2) Su. Introduction to Clinical Experiences for Medical Technologists. 2 cl. Reqd in Med Tech, 4th yr. Open only to seniors in Med Tech curriculum. Mrs. Price and Staff

This course acquaints the medical technology student with hospital and health center functioning and helps develop selected patient-care skills.

570 (10) Su.A. Maternity Nursing. 6 cl, 30 hrs clinical experience. Prereq: 518 and Pharm 505.

Study of management of pregnancy and its effects on the mother and family and participation in the care of the hospitalized mother and the newborn.
571 (7) Su,A. Medical-Surgical Nursing. 8 cl, 30 hrs clinical experience. Prereq: 518 and Pharm 505.
Application of basic concepts and skills previously acquired to the study and care of medical-surgical patients. Includes principles of diet therapy applied to patient care.

572 (10) Su,A. Medical Nursing. 6 cl, 30 hrs clinical experience. Prereq: 518 and Pharm 505.
Study of the medical and nursing care of patients with tuberculosis, acute communicable diseases, and blood dyscrasias.

573 (10) Su,A. Pediatric Nursing. 6 cl, 38 hrs clinical experience. Prereq: 518 and Pharm 505.
Study of physical and emotional needs of children and adaptation of previously acquired skills to the care of sick children.

591 (4-16) Su,A,W,S. Basic Clinical Nursing. 2 conf, 10 hrs clinical experience. Not open to students who have not had supervised experience in this area.
This course is designed to meet the needs of graduate nurses in various clinical areas.

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD
591A (4) Obstetric Nursing.
591C (4) Medical Surgical Nursing.

592 (5) Su,A,W,S. Tuberculosis Nursing. 6 cl, 20 hrs clinical experience. Course completed in first half of qtr. Open only to students in the Gen Nurs curriculum.
Consideration of the total program of medical and nursing care of adult patients with tuberculosis.

Study of basic concepts underlying public health nursing practice and an introduction to public health organization and services.

613 (8) Su,A,W,S. Maternity Nursing. 614 (8) Su,A,W,S. Pediatric Nursing. 4 cl and average of 16 hrs clinical study per week (ward conf, discussion groups, nursing laboratory, clinical practice, and human relations laboratory). Prereq: 547, 548.
Two quarter sequence: Knowledge, understanding, and skill necessary in providing nursing care to the mother in the ante-partal, intra-partal, and post-partal periods in one quarter. In the second quarter focus is on the effects of illness on the child and his family in the hospital, home, and community.

615 (8) Su,A,W,S. Coordinated Nursing Care. 4 conf. 20 hrs clinical experience. Prereq: 591 or equiv, Psychol 404. Req'd of students enrolled in Gen Nurs curriculum. Not open for graduate credit.
Consideration is given to the components of effective nursing care, the functions of health personnel, and the methods of promoting good working relationships.

617 (5) Su,A,W,S. Public Health Nursing. 5 cl. Prereq: 591 or equiv, 613, 614, 647, 648. Req'd of students enrolled in Basic and Gen Nurs curriculum. Not open to students who have credit for 602 and 639. Not open for graduate credit.
A study of the development and trends of public health nursing and the basic principles underlying its practice.

Supervised experience is provided in a public health agency which offers a generalized program emphasizing family health.

620 (3) A.S. Foundations of Nursing Education. 3 cl. Prereq: Psychol 401 and 404, and Soc 401.
The historical development of nursing education, surveys used to evaluate its progress, levels of nursing, and essential characteristics of a good school of nursing.
NURSING

636 (10) Su,A,W,S. Nursing the Psychiatric Patient. 6 cl, 30 hrs clinical experience. Prereq: 570, 571, 572, 573.
This course emphasizes nursing applied to the care of the psychiatric patient as an interpersonal process that is therapeutic and educative.

637 (7) Su,A,W,S. Medical-Surgical Nursing. 3 cl, 30 hrs clinical experience. Prereq: 570, 571, 572, 573. Not for graduate credit.
Advanced study and care of adult medical-surgical patients with particular attention to planning and directing care given by other nursing personnel.

638 (7) Su,A,W,S. Surgical Nursing. 3 cl, 30 hrs clinical experience. Prereq: 570, 571, 572, 573. Not for graduate credit.
Participation in planning and executing nursing care of patients before, during, and after surgery.

Supervised nursing experience in a public health agency offering a generalized program in which the family, as the unit of service, is emphasized.

646 (5) A,W,S. Nursing in the Social Order. 5 cl. Not for graduate credit.
Effect of religious, military, secular, and educational influences on the development of nursing; growth of specialized fields; requirements and responsibilities in present day practice.

647 (8) Su,A,W,S. Medical Nursing II. 4 cl and average of 16 hrs clinical study per week (ward conf, discussion groups, nursing laboratory, clinical practice, and human relations laboratory). Prereq: 547, 548.
Continuation of Medical Nursing I, and in addition, study of patients with disturbed function of the endocrine, integumentary, musculo-skeletal, hematologic, and respiratory (including tuberculosis) systems.

648 (8) Su,A,W,S. Surgical Nursing II. 4 cl and average of 16 hrs clinical study per week (ward conf, discussion groups, nursing laboratory, clinical practice, and human relations laboratory). Prereq: 547, 548.
Continuation of Surgical Nursing I and, in addition, nursing study of patients with neuro-surgical, orthopedic, thoracic, gynecological, or genitourinary problems in the setting of the Operating Rooms, Recovery Room, and patients units.

The effect of religious, military, secular, and educational influences on the development of nursing.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

[610] (3) W. Management and Supervision in the Nursing Unit. 2 cl.
Prereq: 615, Psychol 401, 404, or 407, and Soc 401. Miss Chambers
Study of the principles of management and supervision used by the head nurse. Students have opportunity to solve management problems of interest to them.

611 (3) S. Analysis and Evaluations of Nursing Procedures. 1 2 hr cl,
and completion of an action research study of a nursing procedure. Prereq: Anat, Physiol, Chem, Microbiol. Mrs. Pease
Emphasis is on the application of the scientific method to the development of sound nursing procedures. Work simplification methods are included.

701 (1-5) Su,A,W,S. Minor Problems in Nursing. Prereq: 4 cr hrs for 746
and permission of instructor. Staff
Reading, conferences, and minor investigations by individual arrangement for qualified students who desire to study a particular nursing problem intensively.

736 (3) A. 737 (3) W. Interpersonal Aspects of Nursing. 3 cl. Prereq:
736 is prereq for 737. Miss Lewis
Influence of modern psychiatry on nursing practice. Emphasis given to nursing as a significant interpersonal process. Independent study, conferences, and seminars.

740 (3) A.S. 741 (3) W. Advanced Medical-Surgical Nursing. 3 cl. Miss Chambers
Intensive study of selected medical-surgical problems. Students do independent study and participate in conferences and seminars.
NURSING

746 (4-15) A.W.S. Field Instruction. The first qtr of registration in this course must be for 4 cr hrs. A weekly average of 4 hrs of selected clinical experience per cr hr and 2 cl a week are reqd. Each field placement must be in consultation with the student’s adviser. Miss Chambers, Miss Lewis, Mrs. Pease, and Staff.

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.

750 (5) W. Fundamentals of Nursing Administration. 5 cl. Prereq or concur: 740, 802, 741, and Bus Org 676, 682. Open only to students enrolled in the graduate curriculum of nursing service administration. Miss Dorsch

Study of the fundamentals of planning, organizing, and controlling nursing service departments.

751 (5) S. Supervision of Nursing Services. 4 cl and 3 hr planned observations. Prereq and concur: 750 and Bus Org 686. Open only to students enrolled in the graduate curriculum of nursing service administration.

Exploration of major problems of nursing administration at the supervisory level. Includes observations of clinical situations, conferences, field trips, and written reports.

752 (5) Su. Administration of Nursing Services. 4 cl and 3 hr planned observations. Prereq or concur: 751. Open only to students enrolled in the graduate curriculum of nursing service administration. Miss Dorsch

Exploration of major problems of nursing administration at the top administrative levels. Includes observations of administrative situations, conferences, field trips, and written reports.

796 (4) S. Methods of Teaching Nursing. 4 cl. Req'd of graduate students in Nursing. Prereq or concur: Ed 607 and Nurs 810 is recommended. Mrs. Pease, Mr. Anderson

Instructional planning for courses in clinical nursing with opportunities to develop teaching-learning units and tools to assess learning outcomes.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

802 (3) A.S. Research Development in Nursing. 3 cl. Miss Newton, Mrs. Shirk

A seminar on the status and scope of research in nursing. Written reports and comparison of various types of research studies will be required.

810 (5) W. Curriculum Development. 5 cl. Prereq: 846 or equiv and 4 cr hrs of 746. Mrs. Pease

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.

950 (arr) Su. A.W.S. Research in Nursing. Miss Newton, Mrs. Shirk, Miss McDowell

Research for thesis purposes only.

OBSTETRICS AND GYNECOLOGY

Office, N-635 University Hospital

PROFESSORS ULLERY, HOLLENBECK, MEILING, AND REEL. ASSOCIATE PROFESSORS COPELAND, HOLLAND, WILLIAMS, COX, DALY, HUGENBICHEL, AND PAVVEY. ASSISTANT PROFESSORS BARRY, BESHE, BOUTRELIS, de NEEF, VORYS, DAVIS, ECKEL, HAFKE, JACOBY, KEYS, PATTSON, RUPPERSBERG, SCOTT, SILVERJAG, ZARTMAN

OPEN ONLY TO STUDENTS REGISTERED IN THE COLLEGE OF MEDICINE

671 (2) S. Introduction to Clinical Obstetrics and Gynecology. 2 cl. Med, 2nd yr. Staff

A series of lectures and demonstrations will illustrate the methods of pelvic examination and the application of the principles of physical diagnosis to the female pelvis. The mechanism and management of normal labor are also included.
OBSTETRICS AND GYNECOLOGY 231

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 in the patients assigned. During this time, the students are also assigned in rotation
to the nursery 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 demonstra-
tions will be 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, sterility, gyneco-
lologic 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 admittance, obtain and record the histories, perform the physical and pelvic examinations, and
make routine laboratory examinations. The 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 (4) Su.A.W.S. Obstetric and Gynecologic Specialties. Med, 4th yr. The Staff
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.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

780 (2-5) Su.A.W.S. Minor Problems. Prereq: adequate preclinical training
and permission of instructor. The Staff
Clinical, laboratory, conference, and library work in Obstetrics and/or Gynecology.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the 800 or 900 group
except by permission of the Graduate Council.

900 (2-5) Su.A.W.S. Obstetric and Gynecologic Pathology. Prereq: permission of instructor. Mr. Meiling, Mr. Holzaepfel, Mr. Williams, Mr. Boutsels
Laboratory, conference, and library work. Study of current pathological specimens with emphasis
upon special investigation.

950 (arr) Su.A.W.S. Research in Obstetrics and Gynecology.
Research for thesis purposes only.

OCCUPATIONAL THERAPY
Office, 187-188 University Hospital
ASSOCIATE PROFESSOR LOCHER, ASSISTANT PROFESSOR MATHIOTT

FOR UNDERGRADUATES

401 (1) A. 402 (1) W. 403 (1) S. Occupational Therapy Orientation.
2 cl, A, 2 hr lab W.S. Miss Locher, Mrs. Mathiott
The scope of occupational therapy is presented and observed together with its relationship
to broad fields of education and medicine and to other auxiliary health professions.

500 (1) Su.A.W. Survey of Occupational Therapy. 1 cl, 2 lab or equiv.
Open to students in Soc Serv, Ed, Nurs, and Phys Ther. Miss Locher
The development of occupational therapy and survey of its relationship, history, standards,
trends, applications, personnel, opportunities, and problems.

THE FOLLOWING COURSES ARE OPEN ONLY TO STUDENTS REGISTERED
IN THE DEPARTMENT OF OCCUPATIONAL THERAPY

501 (2) S. Departmental Organization. 2 cl, Mrs. Mathiott
Occupational therapy relationships within the institution and community. A study in pro-
gram planning based on treatment methods including budgets, equipment, supplies, records, and
staffing implications.
602 (5) A. Occupational Therapy. 5 cl. Prereq: Anat 505, concur Physiol 506. Not open for graduate credit. Miss Locher, Visiting Physicians
Medical information correlated with theory of treatment through activity for general medical and surgical conditions, including tuberculosis, cardiac, geriatric, pediatric, visual, and auditory disabilities.

603 (5) W. Occupational Therapy. 5 cl. Prereq: Anat 505, Physiol 506, concur Phys Ther 503. Not open for graduate credit. Mrs. Mathiott, Visiting Neurologist, and Orthopedists
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.

604 (5) S. Occupational Therapy. 5 cl. Prereq: Psychol 541. Not open for graduate credit. Miss Locher and Psychiatrist
Information, discussion, and demonstration of medical problems, and use of activities in the total treatment program of neuropsychiatric and mentally deficient patients.

605 (2) A. Occupational Therapy. 2 cl. Prereq: Anat 505, Physiol 506, and Phys Ther 503 and 600. Not open for graduate credit. Mrs. Mathiott
Principles and methods of treatment in cases of lack of coordination; adaptation of equipment to meet activity needs of the individuals so involved.

615 (1) W. 616 (1) S. 617 (1) A. Occupational Therapy Seminar. 1 cl. Miss Locher, Mrs. Mathiott
Discussion and demonstration of current methods and problems in Occupational Therapy.

620 (6) Su,A,W,S. Clinical Practice in Occupational Therapy. Repeatable to a total of 18 cr hrs. Prereq: 2.25 pr hr for all professional courses and permission of chairman. Initial registration in this course should come in the summer following completion of the ninth Qtr of the professional program and may be for one term or the Qtr.
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

PROFESSORS MAKEY, HAVENER, PERRY, AND BLACKWELL, ASSOCIATE PROFESORS ANDREW, SUE, QUINN, AND BATTLES, ASSISTANT PROFESSORS BITONCE, MAGNUSON, MOSES, SAGE, JR., COOK, BREDENMEYER, AND STINE, AND INSTRUCTORS

OPEN ONLY TO STUDENTS REGISTERED IN THE COLLEGE OF MEDICINE

Staff
Students are assigned to clinical work in the Out-Patient Department of University Hospital.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

780 (1-5) Su,A,W,S. Minor Problems in Ophthalmology. Prereq: adequate preclinical training and permission of instructor. Mr. Havener and Staff
Library, conference, clinic, and laboratory work.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

800 (3-5) A,W,S. Seminar in Ophthalmology. Prereq: permission of instructor. Each student is responsible for presenting material at least twice a year. Attendance at weekly Grand Round on the Ophthalmic service is included.

Research for thesis and dissertation purposes only.
OPTOMETRY

Office, 107 Optometry Building

PROFESSORS FRY AND ELLERBROCK, ASSOCIATE PROFESSOR HEBBARD,
ASSISTANT PROFESSORS WILD, ESKERIDGE, AND MOTRE

OPEN ONLY TO STUDENTS REGISTERED IN THE SCHOOL OF OPTOMETRY
FOR UNDERGRADUATES

514 (4) A. Practical Optometry. 3 cl, 1 3 hr lab. Prereq: Physics 412 and
Math 438. Mr. Hebbard
Theory and techniques of keratometry, skiasmetry, objective and subjective tests of refrac-
tion, accommodation, and functions of the extra-ocular muscles.

515 (4) W. Practical Optometry. 3 cl, 1 3 hr lab. Prereq: 514. Mr. Hebbard
Correlation and analysis of data. Systematic determination of the etiology of anomalous and
sources of visual discomfort and inefficiency. Corrective procedures and prescription writing.

516 (4) S. Practical Optometry. 3 cl, 1 3 hr lab. Prereq: 515. Mr. Hebbard
Ophthalmoscopy and examination of the external parts and the media of the eye. Case his-

531 (4) A. Mechanical Optics. 3 cl, 1 2 hr lab. Prereq: Physics 412 and
Math 438. Mr. Wild
Classification of ophthalmic lenses; physical characteristics, manufacture, and testing of
optical glass and lenses; system of distribution and stocking; grinding and polishing; measuring
refracting power.

532 (4) W. Mechanical Optics. 3 cl, 1 2 hr lab. Prereq: 531. Mr. Wild
Classification, description, manufacture, and distribution of frames and mountings. Labora-
tory practice in grinding, polishing, and mounting lenses, and repairing and reconstructing
frames and mountings.

533 (4) S. Mechanical Optics. 3 cl, 1 2 hr lab. Prereq: 532. Mr. Wild
History and basic theory of ophthalmic lenses, facial measurements; writing specifications
for lenses and frames to be assembled.

in Optometry. 2 cl, 3 3 hr lab. Prereq: 516. Mr. Hebbard, Mr. Wild, and Staff
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.

545 (3-5) Su,A,W,S. Special Clinical Practice. 1 cl, 2-4 3 hr lab. Prereq:
516, concur 541 and permission of instructor. Repeatable to a maximum of 15 cr
hrs. Mr. Hebbard, Mr. Wild, and Staff
The course is designed to permit clinical experience in specialized phases of optometric prac-
tice, (a) subnormal vision, (b) amblyopia, (c) vision in schools and industries, (d) orthoptics,
(e) contact lenses.

555 (4) A. Applied Pathology of the Eye. 3 cl, 1 2 hr lab. Prereq: 516 and
Anat 608. Mr. Ellerbrock
Advanced ophthalmoscopy, slit lamp microscopy, tonometry, and other methods of detecting
pathological conditions. Systematic study of ocular diseases; artificial eyes and other prosthetic
device.

556 (4) W. Applied Pathology of the Eye. 3 cl, 1 2 hr lab. Prereq: 555.
Mr. Ellerbrock
Motor disturbances of eyes, paralytic strabismus, peripheral fixation anomalies, nystag-
num, ptosis, ptosis clefts, anomalous accommodative and pupillary responses.

557 (4) S. Applied Pathology of the Eye. 3 cl, 1 2 hr lab. Prereq: 556.
Mr. Ellerbrock
Visual fields; strabismus; subnormal central vision involving pathology; telescopic lenses
and aids of subnormal vision; theory and practice in the use of contact lenses.

561 (2) W. Optometric Economics and Jurisprudence. 2 cl. Prereq: 516.
Mr. Mote
Historical background; legal status; practice building techniques; office accounting and gen-
eral practice management; representative organization in optometry; professional ethics.
562 (2) A. Visual Problems in Schools, Industries, etc. 2 cl. Prereq: 516.
Mr. Wild
Visual screening tests and survey methods for motorists, school children, industrial workers, etc.; vision and vocational efficiency; visual aspects of job analyses and design.

563 (2) S. Civic and National Problems in Eye Care. 2 cl. Prereq: 562.
Mr. Mote
Number, distribution, supply interrelation, interaction, and roles of the various ophthalmic groups; prevalence of visual anomalies; problems and care of the blind and near blind.

NOTE: See also courses in Physiological Optics.

OTOLARYNGOLOGY
Office, N-820 University Hospital
PROFESSORS SAUNDERS, ASSOCIATE PROFESSORS LOWERY, MILLER, ASSISTANT PROFESSORS DEISHLEY, KRECH, ROTH, SMITH, WEHR, TAYLOR, BIRCK, GERSTEN

OPEN ONLY TO STUDENTS REGISTERED IN THE COLLEGE OF MEDICINE

670 (1) S. Introduction to Otolaryngology. 1 cl. Med, 2nd yr. Mr. Saunders
A basic course in otolaryngology emphasizing diagnosis and treatment. Visual aids (motion pictures and color slides) are used during each lecture.

736 (2) Su, A, W, S. Dispensary Clinics in Otolaryngology. Med, 4th yr. The Staff
Students are assigned to clinical work in the Out-Patient Department of University Hospital.

PATHOLOGY
Office, M-112 Starling Loving Hall
PROFESSORS VON HAAM, COLE, DAVIDSON, FRAJOLA, AND MACPHERSON, ASSOCIATE PROFESSORS KOLAS, LIKE, NEWTON, OLD, RIDDLE, AND SCARPPELLI, ASSISTANT PROFESSORS CEILEN, DAVIS, HURD, JOHANSMANN, LOWY, McMILLAN, MILLER, MURPHY, PRATT, REINER, SARMINA, SMITH, STEVENSON AND VAN DER HOVEN, AND INSTRUCTORS BUEGGER, CHRISTIANSEN, KAEP, SVANS, KORSTNER, MOSLENER, SUTTON, TAYLOR, ThABET, TORBET, AND WATKINS

FOR UNDERGRADUATES

630 (3) Su. Medical Technology. 3 cl. Reqd of 4th yr students in Med Tech. Mr. Stevenson
Lectures, discussions and demonstrations in hematology, urine analysis, clinical microscopy; blood bank, blood groups, blood types and blood transfusions.

631 (3) A. Medical Technology. 3 cl. Reqd of 4th yr students in Med Tech. Mr. Macpherson and Staff
Lectures, discussions and demonstrations in clinical microbiology, serology, parasitology, and mycology.

632 (3) S. Medical Technology. 3 cl. Reqd of 4th yr students in Med Tech. Mr. Frajola and Staff
Lectures, discussions in clinical blood and tissue chemistry, and modes of investigating diseases by biochemical methods.

633 (3) W. Medical Technology. 3 cl. Reqd of 4th yr students in Med Tech. Mr. Macpherson
Lectures and demonstrations in preparation of tissue for histologic examination by frozen and permanent sections; special stain techniques.

636 (2) W. 637 (2) S. Medical Technology. 2 cl. Reqd of 4th yr students in Med Tech. Mr. Macpherson and Staff
Lectures and demonstrations in use and interpretation of laboratory tests in medicine.

640 (4) Su. Medical Technology Laboratory. 12 lab hrs. Reqd of 4th yr students in Med Tech. Mr. Stevenson, Mrs. Watkins
Laboratory demonstrations and practice in hematologic techniques and clinical microscopy.
641 (9) A. Medical Technology Laboratory. 27 lab hrs. Req'd of 4th yr students in Med Tech. Mr. Macpherson, Miss Sutton
Applied techniques and demonstrations in microbiology, immunology, mycology and parasitology.

642 (9) S. Medical Technology Laboratory. 27 lab hrs. Req'd of 4th yr students in Med Tech. Mr. Frajola, Miss Earp
Demonstrations and applied techniques in the quantitative chemistry of blood and other body fluids.

643 (9) W. Medical Technology Laboratory. 27 lab hrs. Req'd of 4th yr students in Med Tech. Mr. Macpherson, Miss Sutton
Tissue technique; mycology and parasitology.

644 (5) Su. Medical Technology Laboratory. 15 lab hrs. Req'd of 4th yr students in Med Tech. Mr. Macpherson, Miss Christiansen
Laboratory demonstrations and practice in blood bank and immuno-hematologic techniques.

645 (3) A. Fundamentals of Disease. 3 cl. Req'd of 4th yr students in Med Tech. Mr. Macpherson and Staff
Lectures and demonstrations concerning the nature of disease, mechanisms involved in the disease process and use of the laboratory in defining the mechanisms of disease.

650 (5) A. Pathology. 3 cl, 6 lab hrs. Prereq: Chem 551-552; Physiol 601-602; Anat 607-608. Req'd 4th yr Opt students.
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.

651 (5) W. Ophthalmic Pathology. 3 cl, 6 lab hrs. Prereq: 650. Req'd of 4th yr Opt students.
Gross and microscopic pathology of the eye, including diseases of the conjunctiva, orbital cavity and pertinent pathology of the central nervous system.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

OPEN ONLY TO STUDENTS REGISTERED IN THE COLLEGE OF DENTISTRY

655 (5) S. General Pathology. 3 cl, 6 lab hrs. Dent, 2nd yr. Prereq: Anat 640 or 634-635. Mr. Buerger and Staff
General pathology, including the etiology of diseases, disturbances of nutrition, inflammation, regeneration, and tumors.

OPEN ONLY TO STUDENTS REGISTERED IN THE COLLEGE OF MEDICINE

603 (3) W. 604 (3) S. Clinical Pathology. 2 cl, 3 lab hrs. Req'd of 2nd yr Med students. Mr. Macpherson, Mr. Frajola
A study of the changes in the blood, urine, feces, sputum, spinal fluid and gastric contents brought about by disease.

624 (5) A. 625 (5) W. 626 (5) S. General and Special Pathology. 3 cl, 3 2 hr lab. Req'd of 2nd yr Med students. Mr. von Haam, Mr. Scarpelli, and Staff
A general study of degenerative, circulatory, inflammatory and neoplastic lesions; reactions to injury; pathology of infectious diseases; followed by a special study of these changes as they apply to the human organ system.

700 (1) Su,A,W,S. Autopsy Technique. 1 cl or 3 lab hrs. Req'd in 1 qtr of 3rd yr Med. Mr. Buerger and Staff
This course is conducted in the form of clinico-pathological conferences held in conjunction with an autopsy or fresh tissue demonstration.

730 (1) Su,A,W,S. Clinico-pathological Conferences. 1 cl. Req'd 3 qtrs of 4th yr Med students. Mr. von Haam and Staff
A clinico-pathological conference correlating the symptomatology of the most important internal and surgical diseases with organ pathology.

731 (1) A,W. Oncology Seminar. 1 cl. Req'd 1 qtr of 4th yr Med students.
Mr. Old and Clinical Staff
A clinico-pathological conference correlating the important symptomatology, diagnosis, management, and pathology of the various forms of human cancer.
PATHOLOGY

730 (3-5) Su, A.W.S. Minor Problems. Elective for sophomore, junior, and senior Med student. Prereq: permission of instructor. The Staff
Minor problems in clinical or special pathology.

OPEN TO THIRD AND FOURTH YEAR MEDICAL STUDENTS AND GRADUATE STUDENTS WITH M.D. DEGREE

740 (1) Su, A.W.S. Clinico-pathological Conference. 1 cl. Prereq: M.D. degree. Repeatable to 8 cr hrs. Mr. von Haam and Staff
A clinico-pathological conference correlating the symptomatology of the most important internal and surgical diseases with organ pathology.

741 (1) A.W. Oncology Seminar. 1 cl. Prereq: M.D. degree. Repeatable to 2 cr hrs. Mr. Old and Clinical Staff
A clinico-pathological conference correlating the important symptomatology, diagnosis, management, and pathology of the various forms of human cancer.

751 (1) Su, A.W.S. Medico-legal Pathology. 1 cl. Elective, Med 3rd and 4th yrs. Mr. ScarpeIli
A course discussing the pathology of trauma, homicide, sex offenses, and intoxications with special reference to the medico-legal aspects.

756 (1) A.W.S. Biopsy Diagnosis. 1 cl. Elective, Med 3rd and 4th yrs. Mr. Old
A study of the methods of rapid tissue diagnosis including frozen tissue section, punch biopsy, and aspiration biopsy. Limited to eight students.

758 (1) A.W.S. Pathology of Tropical Diseases. 1 cl. Elective, Med 3rd and 4th yrs. Mr. MacPherson
A discussion of the pathology of diseases encountered in tropical and sub-tropical countries.

759 (1) A.W.S. Geriatrics. 1 cl. Elective, Med 3rd and 4th yrs. Mr. von Haam
A study of the pathologic conditions found commonly in old age.

761 (1) A.W.S. Pediatric Pathology. 1 cl. Elective, Med 3rd and 4th yrs. Mr. Newton
Study of the lesions most commonly found in early childhood.

FOR GRADUATE STUDENTS

653 (2) W. 654 (3) S. Clinical Pathology. 2 cl, 1 3 hr lab. Prereq: Microbiol 654 or 659, Chem 552 and permission of instructor. Mr. MacPherson, Mr. Frajola, and Staff
A study of the changes in the blood, urine, feces, sputum, spinal fluid and gastric contents brought about by disease.

661 (5) A. General Pathology. 3 cl, 3 2 hr lab. Prereq: Anat 625 and permission of instructor. Mr. von Haam and Staff
A detailed study of degenerative, circulatory, inflammatory and neoplastic lesions; reaction to injury; pathology of infectious diseases.

662 (5) W. 663 (5) S. Special Pathology. 3 cl, 3 2 hr lab. Prereq: 661.
Mr. von Haam and Staff
Pathology of the circulatory, respiratory, hemopoietic, gastro-intestinal, urinary, reproductive, endocrine, skeletal and nervous systems.

750 (2-5) Su, A.W.S. Minor Problems. Prereq: permission of instructor. Repeatable to a maximum of 20 cr hrs. Mr. von Haam and Graduate Teaching Staff
Minor problems in clinical, forensic, surgical, pediatric, or neurological pathology.

800 (2) Su, A.W.S. Seminar in Pathology and Clinical Pathology. 1 2 hr cl.
Reqd all qtrs of graduate students majoring in Path. The Staff
Discussion of pertinent literature, presentation and discussion of research work, and demonstration of fresh specimens and slides.

950 (arr) Su, A.W.S. Research in Pathology.
Research for thesis or dissertation purposes only.
PEDIATRICS
Office, Children's Hospital

PROFESSORS BAXTER, SHAFFER, WHEELER, AND KNOBLOCk, ASSOCIATE PROFESSORS AMBUEL, EDELMAN (EMERITUS), HONTZERMAN, HOWARD, OLIVER, SEYMOUR, McCLARE, GREEN, HOSIER, MISSILDINE, TURNER, NEWTON AND ROBERTSON, ASSISTANT PROFESSORS AINSWORTH, BALDICK, GOVE, KASHERSKY, MCCALL, RIEFPENHOFF, SYLVESTER, ANDERSON, FALKENSTEIN, AND INSTRUCTORS

OPEN ONLY TO STUDENTS REGISTERED IN THE COLLEGE OF MEDICINE

670 (2) S. Pediatrics, Didactic. Med. 2nd yr. Mr. Baxter and Staff

There will be presented the anatomical and physiological characteristics of the normal infant and child, of the newborn and the premature. Emphasis will be given the normal growth and development patterns of infancy and childhood. The fundamentals of infant nutrition and feeding will be discussed.

713 (1) Su,A,W,S. Basic Science Conferences. Med, 3rd yr. Mr. Baxter and Staff

A series of two-hour meetings designed to emphasize the correlation of the basic disciplines of anatomy, biochemistry, physiology, pathology, etc., to the problems of clinical pediatrics. To be offered in cooperation with the basic science departments.


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.

ELECTIVE UNDERGRADUATE AND GRADUATE

A limited number of students acceptable to the professor may take advanced work in pediatrics including infant feeding, communicable diseases or special problems.

780 (1-5) Su,A,W,S. Minor Problems. Prereq: adequate preclinical training and permission of instructor. Mr. Baxter and Staff

Library, conference, clinic and laboratory work.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

900 (3-5) Su,A,W,S. Seminar in Pediatrics. Prereq: permission of instructor. Students are responsible for the material presented at these seminars at least twice a year. Attendance at weekly Grand Rounds on the ped service, as well as weekly attendance of X-rays and surgical pathological conferences is required.


Research for thesis purposes only.

PETROLEUM ENGINEERING
Department of Chemical Engineering
Office, 335 Chemical Engineering Building

PROFESSOR O'ROURKE (EMERITUS), ASSOCIATE PROFESSOR SLIDER

FOR UNDERGRADUATES

602 (3) A. Petroleum Geophysical and Drilling Methods. 3 cl. Prereq: Physics 533 or 413 and Math 557 or equiv. Mr. Slider

A study of the engineering aspects of the geophysical exploration and drilling for gas and oil. Emphasis is placed on rotary drilling.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

713 (3) W. Drilling Fluids. 1 cl, 2 3 hr lab. Prereq: 502. Mr. Slider

A study of the significance and control of drilling fluid qualities. Commercial drilling fluids are analyzed in the laboratory and the control of their properties is demonstrated.
PETROLEUM ENGINEERING

723 (2) W. Physical Analysis of Petroleum Reservoirs. 1 cl, 1 4 hr lab. Prereq: 602 or permission of instructor. Mr. Slider
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.

735 (3) S. Reservoir Engineering—Hydrocarbon Phase Behavior. 2 cl, 1 2 hr lab. Prereq: Chem E 754. Mr. Slider
Quantitative study of the physical nature and phase behavior of subsurface reservoir fluids.

736 (3) A. Reservoir Engineering—Fluid Flow. 2 cl, 1 2 hr lab. Prereq: 735. Mr. Slider
Quantitative study of reservoir fluid flow, including analysis of material balance, producing mechanisms, and well performance.

737 (3) S. Oil and Gas Well Completions. 3 cl. Prereq: 713, 736. Mr. Slider
Design of well completion methods emphasizing reservoir damage and evaluation of reservoir conditions, casing design, cementing, logging, acidizing, and hydraulic fracturing.

750 (3-10) A,W,S. Petroleum Investigations. Library, conf, and lab work. Prereq: 736. Mr. Slider

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

760 C Engineering problems of petroleum and natural gas exploration, production and transportation
765 D Design or planning of petroleum field development.

765 (2) S. Advanced Petroleum Engineering Technology. 2 cl. Prereq: 736 and 723. Mr. Slider
Library research and seminar type discussions of the most recent technical developments in petroleum engineering.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

802 (3-10) A,W,S. Petroleum Production and Oil Field Development and Operational Problems. Prereq: permission of the instructor. Graduate Staff
Examination and testing of petroleum and petroleum bearing rocks; economic interpretation and application to problems of primary and secondary recovery.

Research for thesis or dissertation purposes only.

PHARMACOLOGY

Department of Physiological Chemistry and Pharmacology
Office, 214 Hamilton Hall

PROFESSORS BROWN, FRAJOLA, JOHNSON, LEAKE (EMERITUS), MARKS, AND SMITH (EMERITUS). ASSOCIATE PROFESSORS COWWELL, DEVOR, KROGER, AND WIKOFF. ASSISTANT PROFESSORS ALBEN, DANELIS, EYDAH, ENGELMAN, FISCHER, GOLDMAN, ITO, LEVEQUE, MAYNARD, McCLURE, NUEKOE, AND RICHARDSON, INSTRUCTORS CARSON AND SAMBASIVARAO, AND ASSISTANTS

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

618 (2 or 4) A. Toxicology and Legal Medicine. 2 cl, 2 3 hr lab. Prereq: Chem 521, 522, 647, 648, 649, 650 or equiv. Mr. Engelman, Miss Carson, and Assistant
The effects and detection of poisons and their applications to legal medicine.

670 (3) A. Pharmacology. 3 cl. Med, 2nd yr. Open only to students in the College of Medicine. Mr. Marks, Mr. Leveque, Mrs. Danellis, Mr. Engelman
General principles of pharmacology. Drugs used for diagnosis, prevention or correction of the cause of disease, including endocrine products and chemotherapeutic agents.
671 (4) S. Pharmacology. 3 cl, 1 3 hr lab. Med, 2nd yr. Prereq: 672. Open only to students in the College of Medicine. Mr. Marks, Mr. Engelman, Mr. Leveque, Mrs. Danellis
Pharmacology of drugs which affect special tissues, organs, or systems: cardiovascular, renal, gastroenteric, and hematopoetic.

672 (2) W. Pharmacology. 2 cl, Med, 2nd yr. Prereq: 670. Open only to students in the College of Medicine. Mr. Marks, Mr. Engelman, Mr. Leveque, Mr. Goldman
Pharmacology of drugs which affect special tissues, organs, or systems with emphasis on neuropharmacology.

675 (3) W. Biologic Drug Assay. 2 cl, 1 3 hr lab. Prereq: Chem 647, 658 or equiv or permission of instructor. Mr. Marks, Mr. Engelman
An introduction to pharmacology including discussion of the major classes of drugs, their effects on cells and methods of biological standardization.

676 (2-15) Su.A.W.S. Minor Problems in Pharmacology. Permission of instructor. Mr. Marks, Mr. Leveque, Mrs. Danellis
Qualified students may avail themselves of the facilities of the laboratory for conducting a minor investigation under the direction of a senior staff member.

750 (2) Su.A.W.S. Seminar in Pharmacology. 1 cl. Permission of instructor. May be repeated for a maximum of 16 hrs credit. Mr. Marks
Conferences on selected topics in pharmacology.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

830 (3) W. Chemistry of Medicinal Substances. 3 cl. Prereq: 602 or 612 or equiv or Chem 841 or equiv.

850 (5) A. Experimental Pharmacodynamics. 3 cl, 2 3 hr lab. Prereq: 671. Mr. Marks
The action of drugs on the normal physiological processes, apart from therapeutics, and the theories which seek to explain these actions.

950 Su.A.W.S. Research in Pharmacology. To be conducted under the guidance of Mr. Marks, Mr. Leveque

PHARMACY
Office, 104 Pharmacy and Bacteriology Building
PROFESSORS PARKS, ROPE, GUTH, HARRIS, NELSON, AND TYE, ASSOCIATE PROFESSORS BEAL AND GUTTMAN, ASSISTANT PROFESSORS LAPIDUS, LATIOLEIS, LYTLE, WILLIAMS, AND WOLF, MR. ANDERSON, MR. VOTTERO, SISTER FLORENTINE, MR. KLEINMANN, AND ASSISTANTS

OPEN ONLY TO STUDENTS REGISTERED IN THE COLLEGE OF PHARMACY
FOR UNDERGRADUATES

502 (4) A.W. Pharmaceutical Technique. 3 cl, 2 2 hr lab. Prereq: Chem 551 or equiv. Mr. Guth, Mr. Guttmann, Mr. Vottero
A course dealing with the mathematics of pharmacy and with the principles and techniques related to the compounding of solid dosage forms.

503 (3) Su.W. Pharmaceutical Technique. 2 cl, 2 2 hr lab. Prereq: 502. Mr. Guth, Mr. Guttmann, Mr. Vottero
A continuation of 502 with emphasis on the liquid dosage forms.

504 (3) S. Pharmaceutical Technique. 2 cl, 2 2 hr lab. Prereq: 502. Mr. Guth, Mr. Guttmann, Mr. Vottero
A continuation of 502 with emphasis on the semi-solid dosage forms.

505 (4) S. Pharmacology for Nurses. 4 cl. Prereq: Chem 408 or 411. Open only to students registered in School of Nursing. Mr. Nelson, Mr. Tye, Mr. Wolf
A survey of the important drugs used in medicine and a consideration of their therapeutic applications. Some time is also devoted to reading prescriptions.
509 (3) A. Drug Marketing. 3 cl. Prereq: Econ 406. Mr. Lytle
A study of the activities involved in the distribution of drug products from the producer to the consumer.

512 (3) W. Pharmacy Management. 2 cl, 1 2 hr lab. Prereq: 509. Mr. Lytle
A study of fundamental problems associated with planning, organizing, and controlling a retail pharmacy emphasizing case problems to illustrate the practical application of management principles.

513 (4) S. Pharmacy Management. 3 cl, 1 2 hr lab. Prereq: 512. Mr. Lytle
A continuation of 512.

514 (2) A. History of Pharmacy. 2 cl. Prereq: 551. Mr. Tye
A course designed to give the pharmacy student a deeper appreciation of the background of pharmacy and its development through the years.

521 (5) Su. A. Pharmacognosy. 4 cl, 1 3 hr lab. Prereq: Chem 551 or equiv. Mr. Beal, Mr. Tye
A study of the history, source, identification, constituents, and medicinal preparations of some of the more important drugs of biological origin.

522 (4) W. Pharmacognosy. 4 cl. Prereq: Chem 551 or equiv. Mr. Beal. Mr. Tye
A continuation of 521.

530 (3) W. Inorganic Pharmaceutical Chemistry. 2 cl, 1 3 hr lab. Prereq: Chem 413 or equiv. Mr. Harris, Mr. Bope
A systematic study of the elements, their compounds, and preparations containing these substances that have pharmaceutical application.

531 (3) S. Inorganic Pharmaceutical Chemistry. 3 cl. Prereq: 530. Mr. Harris, Mr. Bope
A continuation of 530.

550 (1) A. 551 (1) S. Pharmacy Survey. 1 cl. Mr. Parks
Lectures and discussions to acquaint the student with the profession of pharmacy and the many fields of interest and specialization within the profession.

551 (3) S. The Pharmacist and Public Health. 2 cl, 1 3 hr lab. Prereq: senior standing.
The pharmacist's role in the maintenance of health, and the principles and practices of first aid as approved by the American Red Cross.

604 (4) Su (1st term) A. Organic Pharmaceutical Chemistry. 4 cl. Prereq: Chem 552 or equiv. Mr. LaPides, Mr. Bope
A study of the chemistry of organic pharmaceutical and medicinal agents.

607 (5) A. Pharmacology. 5 cl. Prereq: Physiol 422 or equiv or permission of instructor. Mr. Nelson, Mr. Tye, Mr. Wolf
Fundamental material including a discussion of the more commonly used drugs and preparations, their pharmacology and therapeutic applications.

610 (4) A. Drug Asssay. 2 cl, 2 3 hr lab. Prereq: 605 or equiv. Mr. Harris, Mr. Bope, Mr. Williams
The qualitative and quantitative examination of drugs and drug formulations.

613 (3) S. New and Non-Official Drugs. 3 cl. Prereq: senior standing. Mr. Williams, Mr. Guth
The pharmacy of the more commonly used new and non-official medicinals.

614 (5) Su. S. Bio-Pharmacy. 4 cl, 1 3 hr lab. Prereq: Chem 552 or equiv. Mr. Bope, Mr. Type
A study of pharmaceutical agents important to biochemical processes.

615 (1) S. Professional Orientation. 1 cl. Prereq: senior standing. Mr. Parks
Discussions to focus attention on contemporary problems in pharmacy and to stimulate development of professional awareness and responsibilities.
619 (3) A. Toxicology. 3 cl. Prereq: 709 or permission of instructor. Mr. Tye, Mr. Nelson, Mr. Wolf
Fundamentals of toxicology, including a discussion of the general classes of poisons, their physiological action, methods of treatment, and detection with special emphasis on dose.

620 (3) A.W. Cosmetic and Toilet Preparations. 2 cl, 1 3 hr lab. Prereq: 504. Mr. Williams
A fundamental study of various types of preparations, such as creams, lotions, dentifrices, powders, perfumes, and related substances.

621 (3) A. 622 (3) W. 623 (3) S. Manufacturing Pharmacy. 1 cl, 2 3 hr lab. Prereq: 504. Mr. Anderson, Mr. Guth
Courses dealing with the formulation and mechanical fabrication of a wide variety of pharmaceutical dosage forms.

624 (3) A. Physical Pharmacy. 2 cl, 1 3 hr lab. Prereq: 504. Mr. Guttman
The application of physical chemical principles and laws to the preparation and study of pharmaceutical dosage forms.

632 (1-3) Su.A.W.S. Special Problems. Cl, lab (arr). Prereq: junior standing, cumulative point hour ratio of 2.5, and permission of instructor. Repeatable to a maximum of 9 cr hrs. Staff
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 (4) A. 641 (4) W. Dispensing. 3 cl, 2 2 hr lab. Prereq: senior standing. Mr. Guth
A course dealing with the fundamentals of prescriptions including the techniques, physical-chemical phenomena, and incompatibilities.

642 (3) S. Dispensing. 2 cl, 2 2 hr lab. Prereq: 641. Mr. Guth, Mr. Huber
A continuation of 641.

643 (3) A.W.S. Hospital Pharmacy. 1 cl, 2 3 hr lab. Prereq: 504. Repeatable to a maximum of 9 cr hrs. Mr. Latiolais, Sister Florentine, Mr. Kleinmann
Introduction to and clinical experience in hospital pharmacy under the supervision of a registered pharmacist in University Hospital, Mt. Carmel Hospital, or Grant Hospital.

645 (2) A.W.S. Pharmacy Seminar. 2 cl. Prereq: senior standing or permission of instructor. Repeatable to a maximum of 6 cr hrs. Staff
A course dealing with the problems arising out of professional relations of the pharmacist with the physician, medical interns, nurses, laboratory technicians, and the laity.

647 (3) S. The Pharmacy of Metabolic Agents. 3 cl. Prereq: senior standing. Mr. Guth
A study of the pharmacy of medicinal products used in the treatment of deficiency diseases, malnutrition, and convalescence.

650 (3) S. Pharmaceutical Jurisprudence. 3 cl. Prereq: 513 or concur. Mr. Lytle
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.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

601 (3) Su.A. Glandular Products. 3 cl. Prereq: 709 or permission of instructor. Mr. Tye, Mr. Nelson, Mr. Wolf
Preparations, properties, standardisation, and uses of medicinal products obtained from glands and other organs of animals, and their related compounds.

602 (3) W. Biological Products. 3 cl. Prereq: Microbiol 607. Mr. Tye, Mr. Nelson, Mr. Wolf
U.S.P. standards and legal requirements governing manufacture, standardisation, storage and distribution of toxins, antidotes, sera, and vaccines.

605 (4) Su (2nd term), W. Organic Pharmaceutical Chemistry. 4 cl. Prereq: 604 or equiv. Mr. LaFidus, Mr. Hope
A continuation of 604.
PHARMACY

606 (3) S. Organic Pharmaceutical Chemistry. 3 cl. Prereq: 605 or equiv.
Mr. LaFidus, Mr. Bope
A continuation of 506.

625 (3) W. 626 (3) S. Physical Pharmacy. 2 cl, 1 3 hr lab. Prereq: 624 or equiv. Mr. Gutman
A continuation of 606.

708 (3) W. 709 (5) S. Pharmacology. 4 cl, 1 3 hr lab. Prereq: 607 or equiv. Mr. Nelson, Mr. Tye, Mr. Wolf
Fundamental Materia Medica including a discussion of the more commonly used drugs and preparations along with their pharmacological and therapeutic applications.

711 (3) W. Drug Assay. 2 cl, 1 3 hr lab. Prereq: 610 or equiv. Mr. Harris, Mr. Bope
A continuation of 610.

712 (5) S. Pharmaceutical Analysis. 3 cl, 2 3 hr lab. Prereq: 711 or equiv.
Mr. Harris, Mr. Bope
The use of specialised instruments in the assay and control methods of drugs and drug preparations.

714 (3) W. Pharmacology of Newer Products. 3 cl. Prereq: 709. Mr. Nelson, Mr. Tye, Mr. Wolf
A course covering the pharmacology of the more recent drugs and preparations and their therapeutic application.

#715 (3) W. Sterile Products. 2 cl, 1 3 hr lab. Prereq: 626 or equiv. Mr. Latiolais, Mr. Guth, Mr. Anderson
A course dealing with the formulation, preparation, and testing of sterile products including injections, bulk solutions, and nasal and ophthalmic preparations.

717 (3) S. Microscopical Pharmacognosy. 3 2 hr lab. Prereq: 522 or equiv.
Mr. Beal, Mr. Tye
A course embodying the principles of the microscope and the application of microchemical and specialized techniques in the detection, separation, and identification of drugs.

718 (3) Su.W. Microscopical Pharmacognosy. 1 cl, 2 2 hr lab. Prereq:
717 or equiv. Mr. Beal
Pharmaceutical applications of specialized microscopic instruments.

725 (3) A. Hospital Pharmacy and the Hospital Organization. 3 cl. Prereq: senior standing, permission of instructor, 1 course in Acc or concur, and 1 course in Bus Org or concur. Mr. Latiolais
A course dealing with the hospital organization and the relationship of its departmental components to the pharmacy.

730 (3) A. Research Techniques and Instruments. 1 cl, 2 3 hr lab. Prereq:
605 and permission of instructor. Mr. Harris
Study and application of selected techniques and instruments useful in research in the pharmaceutical sciences.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

805 (3) W. Technology. 1 cl, 2 3 hr lab. Prereq: 626 or equiv. Mr. Guth
Principles and practice in processing pharmaceutical dosage forms by the use of machines. Emphasis is on fundamentals of unit processes in pharmaceutical manufacture.

#(806) (2-3) S. Advanced Technology. 6-9 hrs lab. Prereq: 805. Repeatable to a maximum of 9 cr hrs. Mr. Guth
A laboratory course designed to permit study of a variety of problems in pharmaceutical production, with the ultimate aim of pilot plant scale production.

807 (3) W. 808 (3) S. Principles of Hospital Pharmacy. 3 cl. Prereq 725.
Mr. Latiolais
A course dealing with the administrative and professional principles and concepts of, and trends affecting, hospital pharmacy.
809 (3) Su. Product Development. 1 cl, 2 3 hr lab. Prereq: 626 or equiv. Mr. Guth
Study of problems involved in formulation of suitable dosage forms and the relationship of physical, chemical, therapeutic, and organoleptic properties of medications to principles of formulation.

811 (3) S. Advanced Pharmacy. 3 cl. Prereq: Chem 682 or Chem 670. Mr. Gutman
A study of the application of physical chemical principles to the design and development of fluid pharmaceutical dosage forms.

812 (3) Su. Advanced Pharmacy. 3 cl. Prereq: Chem 682 or Chem 670. Mr. Gutman
A study of the methods used to predict, determine, and improve the stability characteristics of medicinal agents in dosage form.

#825 (3) W. Advanced Drug Marketing. 3 cl. Prereq: 509, Bus Org 700 or equiv. Mr. Lytle
Theoretical aspects of drug marketing with emphasis on policies and practices of the pharmaceutical manufacturer.

826 (3) Su. Seminar in Pharmacy Administration. 3 cl. Prereq: 825, Bus Org 676 or equiv. Repeatable to a maximum of 6 cr hrs. Mr. Lytle
Investigation and analysis of selected areas of pharmacy administration for group discussion and written report. Case problems, review of current literature, and research.

#(838) (3) Su. Plant Drug Constituents. 2 cl, 1 3 hr lab. Prereq: permission of instructor. Mr. Harris
A study of the more important classes of constituents obtained from plants, including methods of isolation, purification, and identification.

835 (3) A. 836 (3) W. Advanced Pharmaceutical Chemistry. 3 cl. Prereq: 605 or equiv. Mr. Boppe, Mr. Harris, Mr. Lapidus
A study of the chemistry of synthetic organic medicinal agents with emphasis on the relationship of structure to biologic action.

#845 (3) W. Advanced Pharmaceutical Chemistry. 3 cl. Prereq: Chem 843, Mr. Lapidus
A study of the methods used in structure determination and synthesis of alkaloids.

#(846) (3) S. Advanced Pharmaceutical Chemistry. 3 cl. Prereq: 845. Repeatable to a maximum of 6 cr hrs. Mr. Lapidus
A continuation of 846, dealing primarily with steroidal hormones, glycosides, and antibiotics.

850 (1) A.W.S. Seminar. 1 cl. Staff
Round table discussion, oral and written reports dealing with recent advances in pharmacy.

#(851) (3) A. Advanced Pharmacognosy. 3 cl. Prereq: Agr Bio 707 or Bot 606 or permission or instructor. Mr. Beal
A study of research involving biosynthesis of plant constituents of pharmaceutical interest.

#852 (3) S. Medicinal Plant Propagation and Cultivation. 3 cl. Prereq: Bot 606 or permission of instructor. Mr. Beal
A study of the methods employed and problems involved in the propagation, cultivation, harvesting, and evaluation of medicinal plants.

853 (2-3) Su. Medicinal Plant Laboratory. 6-9 hrs lab. Prereq: 852 or permission of instructor. Repeatable to a maximum of 12 cr hrs. Mr. Beal
A laboratory course dealing with fundamental principles and special problems involved in the plantings and development of a medicinal plant garden.

870 (3) A. Theories in Pharmacology. 3 cl. Prereq: 709 or equiv. Mr. Nelson, Mr. Tye
Orientation to graduate pharmacology. An introduction into theories of pharmacology and the research approach in pharmacology.

871 (3) W. Screening Methods in Pharmacology. 1 cl, 2 3 hr lab. Prereq: 870 or equiv. Mr. Nelson, Mr. Tye, Mr. Wolf
Qualitative pharmacology covering the standard laboratory procedures and methods used in routine screening and laboratory evaluation of new drugs.
PHARMACY

#872 (3) S. Advanced Research Methods. 1 cl, 2 3 hr lab. Prereq: 871 and permission of instructor. Mr. Tye, Mr. Nelson
The theory and practice of specialized pharmacological instruments.

#880 (3) Su. Biological Standardization. 1 cl, 2 3 hr lab. Prereq: 871 and permission of instructor. Mr. Nelson, Mr. Tye
Quantitative pharmacology covering principles of bioassay design and interpretation. Laboratory consists of the performance of standard bioassays.

#881 (3) W. Advanced Topics in Pharmacology. 3 cl. Prereq: 871 and permission of instructor, Mr. Nelson, Mr. Tye
A study of current advanced theories of pharmacodynamics.

890 (1-5) Su,A,W,S. Special Problems. Cl, lab arr. Repeatable to a maximum of 15 cr hrs. Staff
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 (1-15) Su,A,W,S. Research in Pharmacy. Staff
Research for thesis or dissertation purposes only.

PHILOSOPHY
Office, 10 University Hall

PROFESSORS NELSON, AVEY (EMERITUS), BARKER, EVANS, FOX, HINSHAW, TAYLOR, AND WETZ, ASSOCIATE PROFESSORS NEMETZ, AND RITTER (EMERITUS), ASSISTANT PROFESSOR SEVERNE, MR. ANDERSON, MR. BROWN, MR. CORNHAN, MR. HARRBERT, MR. O'LENEQUIOT, MR. O'LENCAMP, MR. ROSENBERG AND ASSISTANTS

FOR UNDERGRADUATES

400 (3) A,W,S. Types of Philosophy. Not open to students who have credit for Philos 401. Staff
Essentials of the various types of philosophy; naturalism, pragmatism, dualism, idealism, mysticism.

401 (5) Su,A,W,S. Introduction to Philosophy. Not open to students who have credit for Philos 400. Staff
The meaning and scope of philosophy, its typical problems and theories, its relations to the sciences, morality, and religion.

402 (5) Su,A,W,S. Introduction to Logic. Staff
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 (5) Su,A,W,S. Introduction to Ethics. Staff
Examination of the ground for moral judgments; the nature of right and wrong, good and evil; adequate criteria for moral values.

406 (3) A. Religious Questions. Mr. Evans
Nature and significance of religion; an examination of the individual and social bases of religious experience.

510 (5) S. Introduction to Social Ethics. Not open to students who have credit for Philos 515. Mr. Frankfort
Issues in ethical theory and their bearing on the problems of the nature of a good social order and of right social action.

515 (3) W,S. Esthetics. Prereq: 1 course in Philos or 15 hrs in Fine Arts or Mus. Mr. Weitz, Mr. Brown
Principle systems of aesthetic interpretation of the creative activity of the artist; the work of art; and the contemplation and criticism of art objects.
PHILOSOPHY 245

551 (3) Su,A,W,S. Points of View in Ancient Philosophy. Prereq: junior standing. Not open to majors in Philos. Staff
A study of the central points of view of Plato and Aristotle.

552 (3) Su,A,W,S. Points of View in Modern Philosophy. Prereq: junior standing. Not open to majors in Philos. Staff
A study of two major philosophies, such as Locke and Kant.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to the University regulations, courses in this group are not open to freshmen. Sophomores with a cumulative point hour of 3.0 or higher with permission of the dean, may take these courses.

NOTE: Unless otherwise specified the prerequisite to philosophy courses in the 600 group is either (a) ten hours in philosophy and ten hours in natural or social sciences, or (b) fifteen hours in natural science and fifteen hours in social science.

601 (5) A. History of Ancient Philosophy. Not open to students who have credit for Philos 501. Not open for graduate credit to graduate students majoring in Philos. Mr. Taylor
Special attention is given to the Pre-Socratics, Plato, Aristotle, Stoicism, Epicureanism, Neo-Platonism.

602 (5) W. History of Philosophy from Augustine to Hume. Not open to students who have credit for Philos 502. Not open for graduate credit to graduate students majoring in Philos. Mr. Taylor
The medieval period is dealt with briefly. Special attention is given to Descartes, Spinoza, Leibniz, Locke, Berkeley and Hume.

603 (5) S. History of Philosophy from Kant through the Nineteenth Century. Not open to students who have credit for Philos 503. Not open for graduate credit to graduate students majoring in Philos.
Special attention is given to Kant, Fichte, Hegel, Schopenhauer, Nietzsche, and the Utilitarians.

#604 (3) A. Philosophy Since 1900 I. Prereq: 10 hrs of Philos. Mr. Weitz
Special attention is given to idealism, realism, and analytic philosophy.

#605 (3) Su,A. Philosophy Since 1900 II. Prereq: 10 hrs of Philos.
Special attention is given to pragmatism, phenomenology, and existentialism.

607 (3) S. American Philosophy. Prereq: 401 or 602, and any other 5 cr hrs in Philos. Mr. Anderson
The development of American philosophy. Background of puritanism, deism, and transcendentalism. Pragmatism, realism, naturalism, recent positivist and analytical philosophy.

#609 (5) S. Medieval Philosophy. Prereq: 10 hrs of Philos including 601, or 638 and 639. Mr. Nemetz
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 (5) A. Philosophy in Literature. Not open to students who have credit for Engl 618. Mr. Weitz
Philosophical problems as reflected in classics of literature, such as the Greek dramatists, Shakespeare, Voltaire, T. S. Eliot, Proust and Tolstoy.

[630] (3) A. Philosophy of Augustine. Prereq: 10 hrs of Philos including 601. Mr. Nemetz

[631] (3) S. Philosophy of Aquinas. Prereq: 10 hrs of Philos including 601. Mr. Nemetz
Analysis of the treatises on the existence of God, the nature of man, and law; consideration of Aristotelian influences in medieval controversies.

633 (3) A. Philosophy of Locke and Berkeley. Prereq: 10 hrs of Philos including 602.
PHILOSOPHY

#634 (3) A. Philosophy of Hume. Prereq: 10 hrs of Philos including 602.

#635 (3) W. Philosophy of Descartes. Prereq: 10 hrs of Philos including 602. Mr. Frankfurt

#636 (3) A. Philosophy of Spinoza. Prereq: 10 hrs of Philos including 602. Mr. Taylor

#637 (3) S. Philosophy of Leibniz. Prereq: 10 hrs of Philos including 602.

#638 (5) A. Philosophy of Plato. Prereq: 10 hrs of Philos including 601. Mr. Fox

#639 (5) W. Philosophy of Aristotle. Prereq: 10 hrs of Philos including 601. Mr. Nemetz

#640 (3) S. Post-Kantian German Idealism. Prereq: 10 hrs of Philos including 603.

#642 (3) Su. Philosophy of James and Dewey. Prereq: 10 hrs of Philos.

#646 (5) W. Kant: Critique of Pure Reason. Prereq: 603. Not open to students who have credit for Philos 702. Mr. Fox

#647 (5) S. Kant: Critique of Practical Reason and Critique of Judgment. Prereq: 646. Not open to students who have credit for Philos 703. Mr. Fox

#649 (4) A. Symbolic Logic I. Prereq: 402 or permission of instructor. Mr. Barker

Development of the classical propositional calculus from both the matrix and the axiomatic points of view. Modal, multi-valued, weak, intuitionistic, propositional calculi.

#650 (4) W. Symbolic Logic II. Prereq: 649 or permission of instructor. Mr. Barker

Axiomatic development of the predicate calculus of first-order through proofs of consistency and completeness. Equality, restricted quantification, and descriptions.

#652 (3) Su,W. Philosophy of Science. Prereq: 5 hrs of Philos and 10 hrs of science, or 20 hrs of science. Mr. Hinshaw

A study of the concepts and methods of science. The role of formal systems in the construction of theories.

#653 (5) Su,W. Philosophy of Religion. Prereq: 5 hrs of Philos. Mr. Evans

A study of religious concepts and problems; the idea and nature of God, of man, their relation to the world and human destiny.

#657 (3) W. Philosophy of Mind. 3 cl. Mr. Cornman

Classical and contemporary approaches to problems such as nature of mind, mind-body, other minds, intentionality, mental acts, reductionism.

#661 (3) S. Theory of Knowledge. Prereq: 10 hrs of Philos. Mr. Hinshaw

A study of major epistemological problems; the possibility, origin, foundation, structure, methods, limits, and validity of knowledge.

#663 (3) A. Problems in Metaphysics I. Prereq: 402 and 601, 602, or permission of instructor. Mr. Nelson

Philosophic methods and nature of metaphysics; categories; substance and process; causality and law.

#664 (3) W. Problems of Metaphysics II. Prereq: 663 or permission of instructor. Mr. Nelson

Metaphysical presuppositions of knowledge; problems of universals; monism and pluralism; space and time.

#665 (3) S. Philosophy of History. Prereq: 10 hrs of Philos and 10 hrs in the social sciences. Mr. Hinshaw

The place of history in knowledge; theories of the nature of historical process. Plato, St. Augustine, Hegel, Marx, Spengler, and Toynbee will be considered.
666 (3) S. Philosophy of Language. Prereq: 10 hrs of Philos including 649 or 650, Mr. Severens.
Semantics and language analysis; functions of language; modes of meaning; relation of linguistic structure to metaphysics.

671 (3) S. Advanced Ethical Theory. Prereq: 10 hrs of Philos including 405, Mr. Oldenquist

701 (2-10) Su, A, W, S. Minor Problems. Staff
Students ordinarily receive from 2 to 5 cr hrs, but honor students may receive up to 10 cr hrs.

Topic for Autumn, 1963: Philosophy of G. E. Moore. Mr. Weiss
Topic for Winter, 1964: Causation and Time. Mr. Taylor
Topic for Spring, 1964: Philosophy of Mathematics. Mr. Barker

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.
The general prerequisites include acceptable foundation courses either in psychology, logic and ethics, or in the history of philosophy, and in some cases in all these subjects.

[807] (3) A. Seminar in the Philosophy of Religion.

[821] (3) A. Seminar in Logic.

822 (3) Su, S. Seminar in Metaphysics. Mr. Taylor, Mr. Nelson

[823] (3) W. Seminar in Theory of Knowledge.

824 (3) W. Seminar in Ethics and Theory of Value. Mr. Weitz

825 (3) S. Seminar in the History of Philosophy. Mr. Fox

[827] (3) S. Seminar in Aesthetics. Prereq: a course in aesthetics or permission of instructor.

950 (arr) Su A, W, S. Research in Philosophy. Staff
Research for thesis or dissertation purposes only.

PHOTOGRAPHY
Office, 12 Brown Hall

PROFESSORS DAVIS AND WAGNER, ASSOCIATE PROFESSOR BINAU,
ASSISTANT PROFESSIONAL BALL AND DRAKE

FOR UNDERGRADUATES

511 (3) A, S. Photography. 2 cl, 2 2 hr lab. Mr. Binau
Fundamentals of photography, including cameras, emulsion characteristics, processing, filters, chemistry, and optics.

603 (3) S. Photography in Education and Communication. 2 2 hr cl. Pre-
req: graduate or senior standing and permission of instructor. Mr. Wagner
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.

605 (3) A. Theory of Photography and the Moving Image. 2 2 hr cl. Pre-
req: graduate or senior standing and permission of instructor. Mr. Wagner
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.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

610 (3) W. Application of Photographic Processes to Television. 2 cl, 2
lab hrs. Mr. Wagner
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.
PHOTOGRAPHY

615 (3) S. Motion Picture Photography. 2 cl, 2 lab hrs. Prereq: 510 or 511 or 625 or permission of instructor. Mr. Wagner, Mr. Drake
Motion picture production in the 16 mm field. Principles of motion picture cameras, photography, processing, scripting, editing, sound recording, and production planning.

625 (3) A.W. Scientific Photography. 2 cl, 2 hr lab. Prereq: 1 yr elementary or general Chem, 20 qtr hrs in a science major. Not open to students having credit for Photography 511.
For students in physical and biological science who need a knowledge of photography as an aid to their scientific work. Applications of photography to science.

650 (3) W. Advanced Photography. 2 cl, 2 hr lab. Prereq: 511 or 625.
Mr. Binau
A continuation of Photog 511 or 625.

699 (3-5) A.W.S. Minor Problems in Photography. 4 to 8 lab hrs. Prereq: 6 cr hrs in Photog, graduate standing and permission of instructor. Repeatable to a maximum of 15 cr hrs. Mr. Davis, Mr. Wagner, Mr. Binau
Use of departmental facilities for adding to the student's knowledge of a specially selected photographic problem pertaining to his major field.

PHYSICAL EDUCATION
Office, 124 Physical Education Building
MEN'S DIVISION
PROFESSORS LARKINS, HESS, ASHBEROOG, BENNETT, CUSHMAN, HIXSON, MATHEWS, MOONEY, OBERTRUPPER, PERFE, ASSOCIATE PROFESSORS HENDRICK, BROWELL, MAND, MONTARO, C. WRIGHT, T. WRIGHT, ASSISTANT PROFESSORS BARTLE, FREDERICK, KAPLAN, KLEINMAN, INSTRUCTORS BEDDEK, ERSING, EVERS, GOSIN, HARPER, HARTMAN, OLSON, WILGUS, AND ASSISTANTS

Office, 201 Pomeron Hall
WOMEN'S DIVISION
PROFESSORS MORDY, ALLENBAUGH, AUKER, GILMAN (EMERITUS), SLIEFECWICHE, STEIN, WATSON, ASSOCIATE PROFESSORS BEYER, POOLE, RUPERT, SCOTT, YOST, ASSISTANT PROFESSORS BAILEY, CRAFTS, DENDY, HASKINS, HAYES, HULL, LOGSDON, SCHROEDER, SOLLER, WHEELER, WOERNER, INSTRUCTORS BLAINE, GAZELLE, LILLY, NOLTE, OWEN, SMITH, TANDY, WHITE, WYLY, AND ASSISTANTS

Students in the College of Education may major in physical education. This course prepares students for all types of positions of leadership in the field of physical education, athletic coaching, dance, recreation, and school health education.

Students in the College of Education may take courses in physical education for minimum certification of credits not to exceed thirty quarter-credit hours in addition to the required courses Health Education 400, Physical Education 401, 402, 406, 411-412-413, 414-415-416 (Men's Division) and Health Education 400, Physical Education 421, 422, 423, 425, 426, 427 (Women's Division), on the approval of the Chairman of the Department of Physical Education and the Dean of the College of Education.

Juniors and seniors not specializing in physical education may elect one or more courses in addition to the courses required of all students. In each case the approval of the Chairman of the Department and of the Dean of the College of Education is necessary. Students in the College of Agriculture and Home Economics, Arts and Sciences, Commerce and Administration, and Engineering wishing to take these courses must secure permission of the Deans of their respective Colleges and the Chairman of the Department of Physical Education.

NOTE: All men taking Physical Education as a teaching field or for a minimum certification credit must secure the approval of the department adviser upon each quarter's schedule before presenting the schedule card at the Registrar's Office. The adviser's approval must be indicated by his signature on the Secretary's and Registrar's sections of the schedule card.

FOR UNDERGRADUATES

Instruction in the techniques of play, rules, strategies, and the social behavior involved in sports and dance activities.

404 (0) A.W.S. Physical Education (Men). 2 cl. Repeatable; not to exceed three times.
A continuation of Phys Ed 401-402-403.
411 (2) A. 412 (2) W. 413 (2) S. Physical Education Activities. 5 2 hr lab. Prereq: 412 or equiv for 413. Req'd 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, by permission of chairman. Dance Majors should schedule D sections. Repeatable without credit. Staff These courses aim to develop knowledge, understandings, and skills in the basic activities appropriate to the teacher of physical education and dance education.

414 (2) A. 415 (2) W. 416 (2) S. Physical Education Activities. 5 2 hr lab. Req'd of majors in Phys Ed. Open to women in place of 425, 426, or 427 by permission of chairman. Dance Majors should schedule D sections. Repeatable without credit. Staff Continuation of Phys Ed 411, 412, 413.

421 (1) Su.A. 422 (1) Su.W. 423 (1) Su.S. Physical Education (Women). 2 cl. Not open to majors in Phys Ed. Req'd for every freshman. Staff 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.


482 (2) S. Supervision of Playground and Community Recreation Activities. 2 2 hr lab. Miss Allenbaugh Programming of recreational activities relative to community conditions. Overview of activities desirable for a broad, comprehensive program.

519 (3) A.S. The Teaching of Basketball (Men). 3 cl, 2 1 hr lab. Prereq: 412 or satisfactory evidence of skill in playing basketball. Not open to students who have credit for 448. Mr. Taylor Study in the theory, strategy, and mechanics of directing basketball.

520 (2) A. Sports Officiating—Football (Men). 2 cl, 2 lab hrs. Prereq: 416 or satisfactory evidence of playing experience in football. Students completing the course are eligible for certification to officiate football in the schools of Ohio. Mr. Hixon. This course will include lectures, readings, class discussions and field experience in the officiating of school and college football games.

521 (2) W. Sports Officiating—Basketball. 2 cl, 2 lab hrs. Elective. Prereq: 412 or satisfactory evidence of playing in football. Students completing the course are eligible for certification to officiate basketball in the schools of Ohio. Lectures, readings, class discussions, and field experience in the officiating of school and college basketball games.

538 (2) A. Dance Notation I. 2 cl, 2 1 hr lab. Prereq: 411D or permission of instructor. Miss Alkire Fundamentals and principles of Labanotation.

539 (2) W. Dance Notation II. 2 cl, 2 1 hr lab. Prereq: 538 or permission of instructor. Continuation of 538 with emphasis on reading and writing scores.

541 (3) A. Theory and Practice of Elementary Physical Education (Women). 2 2 hr lab, 1 3 hr school observation. Miss Allenbaugh, Miss Watson Contribution of rhythmic, individual and group activities to the development of children. Stimulation of the creative process and adoption of methods and materials.

542 (4) W. Physical Education for the Elementary School Child. 4 1 hr lec, 1 3 hr lab. Prereq: 541 for Women, Psychol 407 for all students. Section for Men, Mr. Ashbrook, Mr. Hewlett; Section for Women, Miss Allenbaugh, Miss Watson Study of characteristics of the elementary school child with implications for physical education experiences. The selection, adaptation and teaching of appropriate activities are emphasized.
543 (3) S. The Theory and Practice of Physical Education for Junior High School Youth (Women). 5 lab hrs. Prereq: 541. Miss Hull
A study of the developmental needs of nearly adolescent youth. Emphasis is placed upon the adaptation of physical activities to meet these needs.

544 (2) W. The Teaching of Track and Field (Men). 2 2 hr cl. Prereq: 412 or satisfactory evidence of skill in track and field events. Not open to students who have credit for 443. Mr. Snyder
Study in the theory, methods and mechanics of coaching track and field.

546 (3) W. The Teaching of Football (Men). 2 cl, 3 lab hrs. Prereq: 416 or satisfactory evidence of skill in playing football. Not open to students who have credit for 446. Mr. Hayes
Study in the theory, methods, and mechanics of coaching football including fundamentals of play, offensive and defensive formations, organizations, practice periods, and educational values.

547 (2) W. The Teaching of Baseball (Men). 2 2 hr cl. Prereq: 412 or satisfactory evidence of playing experience in baseball. Not open to students who have credit for 447. Mr. Karow
Study in the theory, strategy, and mechanics of coaching baseball, including batting, base-running and the playing of all positions.

548 (2) S. Theory and Practice of Dance Education. 1 cl, 3 lab hrs. Prereq: 2 qtrs of Modern Dance or equiv. Miss Alkire
Foundations for teaching and organizing courses of study in modern dance in high school programs of physical education. Laboratory problems, lectures, and readings.

549 (2) Section for Men, S. Section for Women, W. The Teaching of Swimming. 2 cl, 2 lab hrs. Prereq: satisfactory evidence of skill in swimming.
Mr. Peppe, Mr. C. Wirthwein, Miss Lilly
Organisation of water front activities in schools, camps and recreation centers. Methods of teaching swimming, life saving and rescuing.

550 (2) A.S. Theory and Practice of Dance Education. 1 cl, 4 lab hrs. Prereq: 542 or equiv. Staff
A continuation of 548 with emphasis on folk and ballroom forms of dances. Laboratory problems, lectures, and readings.

551 (2) Su, A, W, S. Directed Teaching Experience in Physical Education. 4 hr lab. Prereq: permission of departmental adviser. Repeatable to a total of 6 cr hrs. Staff
Opportunity is provided for assisting in the teaching of sport and dance activity classes.

560 (3) A.S. Camp Counselling. A, 2 cl, 7 day September workshop; S, 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 (3) Su, A, W, S. Creative Physical Education for Elementary Teachers. (Men and Women) 2 2 hr lab. Req'd for elementary teachers. Not open to students who have credit for Phys Ed 476, 541, 542. Miss Allenbaugh and Staff
Theory of physical activities as a medium for creative self-expression. Exploration of rhythmic, individual and group activities and their relation to development of children.

616 (2) A.S. The Administration of Interschool Athletics. 2 cl. Not open to students who have credit for 540. Mr. Hixson
An introductory course in athletic administration, including scheduling contests, records, eligibility, contest management, facilities and equipment, budgets and finance, public relations and awards.

633 (5) W. Dance Production. 1 2 hr cl, 10 lab hrs. Prereq: permission of instructor. Miss Alkire
A study of the production problems in staging dance for the theatre. Lectures, readings, and discussions.
PHYSICAL EDUCATION

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

General Prerequisites for Courses Numbered from 600 to 799. For all courses in this group, the prerequisite is at least junior standing and twenty quarter-hours in Physical Education and allied subjects of which a minimum of at least ten quarter-hours must be in Physical Education; or thirty quarter-hours in not more than two allied subjects.


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.

615 (2) Su,S. Problems in Intramural Sports. 2 cl hr. Mr. Staley
A critical analysis of intramural sports programs. Problems of policy and administration of programs on the elementary, secondary and college levels will be studied.

621 (5) A.S. Principles of Physical Education. 5 cl. Prereq: major or minor in Phys Ed or permission of instructor. Mr. Osterhuffer
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.

625 (3) Su,W. Evaluation in Physical Education. 2 cl, 1 2 hr lab. Mr. Mathews
A critical study of methods in evaluating biological, social, and psychological outcomes for physical education.

630 (3-5) A.S. Men; S. Women. Adapted Physical Education. 3 cl, 2 lab hrs, Men; 4 cl, 2 lab hrs, Women. Prereq: Phys Ed 651 or equiv. Section for men, Mr. Ashbrook; Section for Women, Miss Gilman
Organization and administration of individual physical education for typical and atypical students. Laboratory experience in sports, swimming or exercise therapy for prevalent types of disabilities.

631 (3) S. Theory and Practice of Modern Dance. 2 cl, 3 lab hrs. Prereq: permission of instructor. Miss Alkire
Foundations for teaching and organizing instructional and extra curricular programs of modern dance in schools and colleges. Laboratory problems, lectures, readings, and discussions.

632 (3) A. Dance Composition. 1 3 hr cl. Lab (arr). Prereq: permission of instructor. Miss Alkire
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.

640 (3) Su,W. History of Physical and Health Education. 3 cl. Not open to students who have credit for Ed 642. Mr. Bennett
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.

Emphasis on the study of needs, interests and abilities of secondary school youth and methods and materials for the conduct of appropriate sports activities.

648 (3) S. Physical Education for Senior High School Youth. Women, 3 2 hr cl. Men, 2 cl, 3 lab. Prereq: 560 or equiv. Miss Crafts, Mr. Hixson
Continuation of 647 with emphasis on the characteristics of the middle adolescent as they affect the selection and conduct of physical education activities.

649 (3) S. Outdoor Education and Camp Administration. 3 cl. Prereq: 560 or permission of instructor. Mr. Mand
This course is an introduction to the principles, status and administration of outdoor education and camping.
PHYSICAL EDUCATION

655 (3) S. Public Recreation: Its Organization and Administration. 3 cl. Prereq: Soc 645 or equiv. Not open to students with credit for Soc Work 655. Mr. Mand
Consideration of common patterns of organization of community recreation found in American cities, large and small, under municipal, school and other auspices.

682 (5) Su,W. Organization and Administration of Physical Education. 5 cl. Prereq: 621 or equiv. Miss Mordy, Mr. Hess
Study of policies and procedures in the organization and administration of the physical education program.

685 (4) Su,A.S. Safety, First Aid and Care of Injuries (Men). 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. Mr. Biggs
A consideration of the methods of prevention and care of injuries, conditioning of athletes and safety provisions for the conduct of physical education.

691 (3) Su,A,W. Men; W. Women. Kinesiology. 4 cl. Prereq: Anat 504 or equiv. Miss Stein, Mr. Mand, Mr. Bartels
The science of bodily movement.

701 (1-4) Su,A,W,S. Minor Problems in Physical Education and Dance Education. Prereq: permission of adviser. Not open to students who have credit for 651. Staff
a. Physical Education
b. Dance Education
This course is designed primarily for seniors and graduate students to provide them with an opportunity to investigate selected professional problems.

799 (4) Su. Physical Education Workshop (3 week Workshop). Prereq: teaching experience or senior standing in Phys Ed and permission of instructor. Miss Crafts
A team approach to activity teaching in Physical Education with emphasis on instruction, methods, materials, resources, evaluation, inter-relationships, and others.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

802 (2) Su,W. Seminar in Physical Education. 2 cl. Staff

803 (2) S. Seminar in Recreation. 2 cl. Mr. Mand

805 (3) Su,W. Physical Education in School and College. 3 cl. Mr. Ober-teuffer

810 (3) W. Survey of Research in Physical Education. 3 cl. Prereq: 825 or equiv. Mr. Mathews

814 (3) Su,S. Seminar in the Role of Sports in Society. 3 cl. Prereq: Soc 645 or equiv. Miss Mordy
Study of the significance of sports in society; and examination of the extent to which sports contribute to human welfare.

816 (3) Su,W. Problems in Interscholastic and Intercollegiate Athletics. 3 cl. Mr. Hixson
The relation of athletics to education; problems of athletic organization; eligibility; finance, current trends, and developments in management and purpose; public relations.

820 (3) Su,A,W,S. Problems in Physical Education. Staff

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

Advanced problems in physical education, individual or group participation.
820A Su. Recreation
820B W. Adapted Physical Education
820C W. Curriculum in Physical Education
820D A. Physical Education in Higher Education.
820E S. Physical Education in Secondary Education.
820F Physical Education in Elementary Education.
820G S. Dance Education.
820H W. School Recreation.
820I Su. Administration.
823 (5) Su.S. Organic Science as Applied to Physical Education and Health Education. Prereq: 10 hrs of Physiol, 10 hrs of Chem and 10 hrs of Biol or equiv. Mr. Ashbrook
A systematic study of the integration of chemistry, biology, anatomy, physiology to the fields of physical education and health education.

825 (3) Su.A. Methods of Research in Health Education and Physical Education. 3 cl. Req'd of all graduate students in Health Education and Physical Education. Mr. Mathews
To develop some competency in professional writing and in the use of various research methods applied to health education and physical education.

826 (3) A. Supervision of Physical and School Health Education. 3 cl. Mr. Hixson
A study of the responsibilities and functions of the supervisor in city, county, and state school systems.

846 (3) S. Professional Preparation of Teachers in Physical and Health Education. 3 cl. Not open to students who have credit for Phys Ed 646. Mr. Hess
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.

950 Su.A,W,S. Research in Physical Education. Staff
Research for thesis or dissertation purposes only.

PHYSICAL MEDICINE
Office, 209 Ohio Rehabilitation Center
ASSOCIATE PROFESSORS BURK, JOHNSON, STOW, ASSISTANT PROFESSOR WOODS,
INSTRUCTORS MITCHELL, MARTIN, AND DAUGHERTY
FOR UNDERGRADUATES

500 (2) A. Introduction to Physical Therapy. 2 cl. Miss Woods
A general orientation of physical therapy and its relation to medical services. Medical ethics, medical terminology, personal relationships, institutional contracts, and patient management.

OPEN ONLY TO STUDENTS REGISTERED IN THE CURRICULUM OF PHYSICAL MEDICINE

501 (2) A. Physical Therapy Arts. 2 cl, 1 1 hr lab. Miss Woods
Orientation to hospital organization, department administration, and medical-legal problems. Techniques: massage, bandaging, body mechanics. Introduction to the application of physical therapy in medical problems.

502 (2) A. Massage. 1 cl, 1 3 hr lab. Prereq: Physiol 506 or concur. Mr. Martin
History, application, physiological effects, indications, contra-indications, of massage in medicine. Surface anatomy.

503 (2) W. Muscle Function Measurements and Tests. 1 cl, 2 2 hr lab. Prereq: Physiol 506 or concur. Mr. Martin
Principles of body mechanics, and analysis of muscle and joint actions in co-ordinated movement. Theory and practice of muscle testing and joint measurements.

510 (4) W. Functional Anatomy. 2 cl, 2 2 hr lab. Mr. Mitchell
The application of physical therapy techniques to osteology, arthrology, and myology.

600 (2) S. Kinesiology in Physical Therapy. 1 cl, 3 1 hr lab. Mr. Mitchell
Advanced physical therapy techniques with special emphasis on tests, measurements, and analysis of human motion.

602 (3) A. Physical Therapy Procedures. 2 cl, 2 2 hr lab. Staff
Theory, technique, demonstration, and practice in the use of physical agents in physical therapy including: thermotherapy, hydrotherapy, electrotherapy, ultrasonic therapy.
PHYSICAL MEDICINE

603 (2) W. Neuromuscular Disease. 2 cl. Prereq: 601. Mr. Burk
Anatomy and physiology applied to the physical therapy techniques of treating neuromuscular diseases. Clinical presentation of neurological patients.

604 (4) W. Medical Science. 3 cl, 3 1 hr lab. Prereq: 601, 602. Mr. Johnson
Lectures and clinical presentation of patients in the medical science fields related to physical medicine, to include medicine, surgery, orthopedics, geriatrics, neurology, psychiatry, gynecology, obstetrics, dermatology, and ophthalmology.

605 (4) S. Therapeutic Exercises. 2 cl, 3 2 hr lab. Mr. Mitchell
Theory and technique of muscle re-education and application of exercise to medical, orthopedic, post-surgical, and neurological disorders, including patient teaching methods. Laboratory demonstrations and supervised clinical practice.

607 (3) S. Physical Rehabilitation. 2 cl, 2 2 hr lab. Mr. Daughterty
Theory, technique, and equipment used in the physical restoration of the disabled, including the relation of medical aspects to total patient concept of rehabilitation. Laboratory demonstrations and field trips.

608 (3) S. Physical Medicine Clinic. 2 cl, 2 2 hr lab. Mr. Martin
Coordination and summary practice of all physical therapy procedures, being determined by the physical disability and medical prescription.

609 (1-2) A. 610 (1-2) W. 611 (1-2) S. Seminar. Permission of instructor. Mr. Burk, Mr. Johnson
Student participation in department medical seminars at which papers of current interest are presented by physicians and invited guests from related fields.

612 (1-3) S. Problems in Physical Therapy. 2 cl, 1 hr lab. Miss Woods
Survey and analysis of selected problems and research with the opportunity for students to extend their knowledge in some specialized subject in physical therapy.

613 (2) Su.A.W.S. Clinical Conference and Observation. 2 cl. Permission of instructor. Staff
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 (18) Su.A.W.S. Clinical Practice in Physical Therapy. 5 2 hr lab. Permission of instructor. Staff
Clinical application of physical therapy techniques under supervision in physical medicine and rehabilitation departments of affiliated hospitals. Practice with assigned patients.

615 (3) W. Agents Used in Physical Therapy. 3 cl. Not open to students with credit for Phys Med 601. Mr. Stow
Heat, cold, light, water, electricity, sound, and exercise as used in the diagnosis and treatment of disease.

616 (3) A. Effects of Agents Used in Physical Therapy. 2 cl. Not open to students with credit for Phys Med 601. Mr. Burk
Physiological effects of heat, cold, light, water, electricity, sound, and exercise, as used in the diagnosis and treatment of disease.

PHYSICS
Office, 121 Physics Building

PROFESSORS H. H. NIELSEN, BELL, DAUNT, DUCKEY, HEER, KORRINGA, LAUDE (emeritus), MILLS, OETJEN, POOL, PRIBUS, SHAFER, C. SHAW, ALPHEUS SMITH (emeritus), AND WILLIAMS. ASSOCIATE PROFESSORS BROWN, EDWARDS, ERIKSON, HARRIS, HAUSMAN, HESTHAL, JASTRAM, JONES, JOSSEM, KURBATOV (emeritus), NELSON, C. NIELSEN, RAO, J. SHAW, AND ZUMSTEIN. ASSISTANT PROFESSORS GAINES, PLOUGHE, REIBEL, RILEY, AND YANG

FOR UNDERGRADUATES

401 (5) A.W.S. Nature of the Physical World. Formerly Gen S 431. 4 cl, 1 2 hr lab. Not open to students having credit for Gen S 431. Mr. Hesthal
A unified elementary non-mathematical description of the physical universe for cultural value, emphasizing scientific method and current topics. Laboratory demonstration and telescopic observation.

402 (5) W.S. Nature of the Physical World. Formerly Gen S 432. 4 cl, 1 2 hr lab. Prereq: Physics 401. A continuation of Physics 401. Not open to students having credit for Gen S 432. Mr. Hesthal
PHYSICS  255

411 (5)  Su,A,W. General Physics: Mechanics and Sound. 4 cr, 1 2 hr lab. Prereq: Math 400 or 401, or passing of O.S.U. Math Entrance Test. Reqd: pre-medical and pre-dental curricula, second year. Mr. Dickey

412 (5)  Su,A,W,S. General Physics: Heat, Electricity Magnetism, Light. 4 cr, 1 2 hr lab. Prereq: 411. Reqd: pre-medical and pre-dental curricula, second year. Mr. Dickey

413 (5)  A,W,S. General Physics: Modern Physics. 4 cr, 1 2 hr lab. Prereq: 412. Reqd: pre-medical curricula, second year. Mr. Dickey

420 (5)  A. Descriptive Meteorology. 4 cr, 1 2 hr lab. Mr. J. Shaw
Descriptive treatment of local weather phenomena and commonly observed weather changes; laboratory includes instrumental observations, use of meteorological data, study of weather maps.

505 (3)  W. Intermediate Geometrical Optics. 3 cr. Prereq: 411-412-413 and Math 440. Reqd: all Optom majors. Not open to students having credit for 605. Mr. H. Nielsen
Ray optics of thick lenses, mirrors, prisms and their combination; apertures and aberrations.

Wave theory of optical phenomena; applications.

531 (5)  A,W,S. General Physics for Engineers and Physical Scientists: Mechanics. Formerly Physics 431. 4 cr, 1 2 hr lab. Prereq: 1 entrance unit of Physics or 411, concure Math 536 or 441. Not open to students who have credit for 431. Mr. Williams

532 (5)  A,W,S. General Physics for Engineers and Physical Scientists: Heat, Sound, Light. Formerly Physics 432, 4 cr, 1 2 hr lab. Prereq: 531 and Math 536 or 441. Not open to students having credit for 432. Mr. Williams

533 (5)  Su,A,W,S. General Physics for Engineers and Physical Scientists: Electricity, Magnetism. Formerly Physics 433, 4 cr, 1 2 hr lab. Prereq: 531 and Math 536 or 441. Not open to students having credit for 433. Mr. Williams

535 (2)  W. Geometrical Optics Laboratory. 1 4 hr lab. Prereq or concure: 505 or 606. Reqd: Optom majors. Not open to students having credit for 635. Mr. Zumstein
Selected experiments in geometrical optics.

536 (2)  S. Physical Optics Laboratory. 1 4 hr lab. Prereq or concure: 506 or 606. Reqd: Optom majors. Not open to students having credit for 636. Mr. Zumstein
Selected experiments in physical optics.

Introductory analytical treatment of concepts and methods of modern Physics including topics from nuclear, atomic, molecular or solid state Physics; quantum-mechanical concepts.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

Unless otherwise indicated, the prerequisites for 600 and 700 courses in physics are Math 549 or 538 and Physics 411-412-413 or 551-552-553.

601 (3)  Su,A,W,S. Intermediate Physical Mechanics. 3 cr. Not open for graduate credit for Physics majors. Reqd: all undergraduate Physics majors. Mr. Shaffer
Analytical treatment of vectors; kinematics and dynamics of particle; force fields; simple harmonic oscillator and modifications; emphasis on analytical methods used in other physics courses.
603 (3) A.S. Intermediate Heat. 3 cl. Not open for graduate credit for Physics majors. Req'd: all undergraduate Physics majors. Mr. Erickson
Introduction to theory of heat with applications.

605 (3) A. Geometrical Optics. 3 cl. Mr. Zumstein
Advanced theory of geometrical optics including thick lenses, types of mirrors, combinations of lenses and mirrors, apertures and aberrations in optical systems.

606 (3) Su,W.S. Introductory Physical Optics. 3 cl. Req'd: all undergraduate Physics majors. Mr. Zumstein
Introduction to diffraction; interference; and polarization phenomena. Applications in design and performance of optical instruments.

608 (3) Su,W.S. Intermediate Electricity and Magnetism. 3 cl. Prereq: 601. Req'd: all undergraduate Physics majors. Not open for graduate credit for Physics majors. Mr. Dickey
Intermediate mathematical treatment of electric and magnetic fields; problem solving emphasized.

610 (3) W.S. Electron Physics. 3 cl. Prereq: 601 and 614 or equiv. Req'd: all Elec E majors. Mr. Heer, Mr. Erickson
Physical phenomena and elementary theory of solids; binding and energy bands of solids; electrical, thermal and magnetic properties of metals and semi-conductors.

612 (3) S. Periodic and Transient Electric Currents. 3 cl. Prereq: 601. Req'd: undergraduate Physics majors. Mr. Dickey
Study of response of circuits with constant parameters to both constant and variable voltages; electronic circuits and instruments used in physical research.

614 (3) Su,A,W.S. Introduction to Modern Physics. 3 cl. Req'd: all undergraduate Physics majors and Elec E majors. Not open for graduate credit for Physics majors. Mr. H. Nielsen
Intermediate mathematical treatment, including: fundamental particles; qualitative concepts of quantum theory and their history; emission and absorption processes; atomic and molecular structure.

615 (3) A.W.S. Introduction to Nuclear Physics. 3 cl. Prereq: 601 and 614 or equiv. Not open for graduate credit for Physics majors. Mr. Heer
Properties of the atomic nucleus; disintegration processes; particles and photon emission; fission; fusion. Detection techniques for nuclear radiations. Energy levels and selection rules.

616 (3) Su,A,W.S. Advanced Physical Laboratory. 2 3 hr. lab. Prereq: 412, 413 or 532, 533 plus Math 538 or 548. Repeatable to total of 24 cr. hrs. Req'd: all undergraduate Physics majors. Mr. Jossem, Mr. C. Shaw
Experiments selected from: acoustics, atomic physics; electricity, magnetism; electron physics; electronics; heat, thermodynamics; nuclear physics; optics; solid state; spectroscopy; x-rays. Independent work emphasized.

634 (4) Su,A. Fundamentals of Radioactivity and Instrumentation. 3 lec and 1 3 hr. lab. Prereq: 2 qtrs of college physics or Chem and 20 hrs of biological science or permission of instructor. Not open to students majoring in Chem, engineering or Physics. Mr. Pool
Descriptive treatment of atomic and nuclear structure; physical properties of radioactive nuclei; instrumentation; radiation hazards and safety; introduction to applications of radioactivity.

637 (3) Su,A. 638 (3) Su,W. 639 (3) Su,S. Physics Seminar for In-Service Science Teachers. 1 3 hr. Prereq: 15 hrs of Physics and teaching experience, permission of instructor. Open for graduate credit to qualified students. Mr. Riley
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.

641 (3) S. Basic Principles and Recent Advances in Physics. Open only to students registered in the Academic Year Science Institute. Mr. Riley
Primarily for high school physics teachers; a unified treatment of concepts and principles of classical physics together with selected topics in contemporary physics.
#643 (3) W. General Meteorology. 3 cl. Prereq: 15 hrs of natural science including one of these: Agron 501, Bot 402, Geog 403, Geol 402, Physics 412 or 532, Zool 402. Not open to students having credit for Physics 510. Mr. J. Shaw

Study of atmospheric phenomena. Individual observation and prediction of weather events.

645 (3) Su.A. Descriptive Acoustics. 3 cl. Prereq: junior standing in Music, Speech or Science Education. This course cannot be counted toward a physics major. Mr. Shaw, Mr. Shaffer

Descriptive non-mathematical treatments of acoustics with applications to music and speech including: sources, propagation, reception, characteristics of sound; room acoustics; hearing; apparatus.

#648] (3) S. Physics of the Upper Atmosphere. 3 cl. Prereq: 601. Mr. J. Shaw

The structure of the upper atmosphere as obtained from studies of the ionosphere, aurora, meteors, and use of rockets.

701 (1-15) Su,A,W,S. Minor Problems in Physics. Repeatable. Prereq: satisfactory advanced courses in experimental and theoretical physics and permission of instructor. All instructors

A course designed to give a properly qualified student opportunity for independent reading, study or lab work in a specialized field of interest.

702 (3) Su,S. Kinetic Theory of Gases. 3 cl. Prereq: 603, and Math 601 and 611 or 608 and 609. Not open to students with credit for Physics 604. Mr. Daunt

Introduction to kinetic theory of gases with applications to physical systems.

703 (3) A. 704 (3) W. Thermodynamics. 3 cl. Prereq: 603 and Math 601 and 611. Not open to students with credit for Physics 803-804. Mr. Daunt

Modern treatment of topics in physical thermodynamics including entropy, specific heats, third law, phase, and lattice changes, surface phenomena; applications to low temperature phenomena.

#709 (3) A. Wave Motion and Sound. 3 cl. Prereq: 601 and Math 611. Mr. C. Shaw

Theory of wave motion; production; propagation and detection of sound waves; measurements and applications.

#711 (3) S. Physics of Ionized Gases. 3 cl. Prereq: 608 and 702. Mr. C. Nielsen

Ionization processes, plasma oscillations, pinch effect; hydromagnetic phenomena. Applications to particle detection, collective phenomena in solids, cosmic and auroral phenomena, the thermonuclear problems.

712 (3) A. Fundamentals of Electricity and Magnetism. 3 cl. Prereq: 601, 608, Math 661. Mr. Heer

Mathematical theory of classical electricity and magnetism.

713 (3) W. Electromagnetic Field Phenomena. 3 cl. Prereq: 601, 712 and Math 611. Mr. Dickey

An introductory course in Maxwell's theory of the electromagnetic field.

714 (3) S. Electromagnetic Theory of Light. 3 cl. Prereq: 606 and 713. Mr. Prebus

Mathematical treatment of physical optics.

716 (3) S. Introduction to Theory of Solids. 3 cl. Prereq: 610. Mr. C. Shaw

Fundamental properties of solids with emphasis on conduction in metals and semiconductors.

718 (3) Su.A. Modern Atomic Spectroscopy. 3 cl. Prereq: 601, 614. Mr. Williams, Mr. Rao

Modern theory of structure of the atom and quantum-mechanical treatment of origin of atomic spectra.
719 (3) S. Spectra and Structure of Molecules. 3 cl. Prereq: 601, 614. Mr. Bell, Mr. Rao
Experimental methods and theory of molecular spectra; relation of spectra to molecular structure.

720 (3) Su.W. X-ray Physics. 3 cl. Prereq: 718. Mr. C. Shaw, Mr. Jossem
Modern theory and experiment in X-ray emission, absorption, scattering, dispersion; application to solid state and nuclear physics.

721 (3) W. Fundamentals of Nuclear Physics. 3 cl. Prereq: 718. Mr. Jastram
Topics in nuclear research; beta decay, shell structure, internal conversion, resonance, scattering, elementary particles, angular correlation, collision dynamics. Concurrent course in quantum mechanics recommended.

723 (3) S. Nuclear Reactors and Neutron Physics. 3 cl. Prereq: 615 and 702. Mr. Pool
Neutron sources; scattering and capture of neutrons; nuclear fission; resonances phenomena; material damage; diffusion; power production.

726 (3) Su.A. Methods of Theoretical Physics. 3 cl. Req'd: undergraduate Physics majors. Mr. Bell
Analytical course coordinating methods of dynamics of particles and systems of particles, electrical circuits, wave motion, etc.; preparation for quantum mechanics.

727 (3) Su.W. Methods of Quantum Mechanics I. 3 cl. Prereq: 601, 614 and 726 or equiv. Mr. Bell
Introduction to Schrodinger and matrix techniques of quantum mechanics; perturbation methods; resonance; application to simple problems.

728 (3) S. Methods of Quantum Mechanics II. 3 cl. Prereq: 727. Mr. Bell
Continuation of 727 with applications to more complicated problems; quantum mechanics of atoms and molecules; approximate methods.

730 (3) S. Analysis of Physical Measurements. 3 cl. Prereq: 601, 614 and 5 hrs of advanced lab. Mr. C. Nielsen
Nature of physical measurements; types of data and their analytical treatment; curve fitting; errors; applications of analytical methods to typical physical problems.

733 (3) A.S. Nucleonic Measurements and Instrumentation. 2 3 hr lab. Prereq: 615 and permission of instructor. Repeatable to a maximum of 6 cr hrs. Not open to students having credit for Physics 633. Mr. Pool
Nuclear measurements from the latest types of nuclear instruments; characteristic radiations of numerous radioactive sources. The neutron experiments center around a subcritical reactor.

734 (3) W. Nuclear Reactor Laboratory. 2 3 hr labs. Prereq: 733, 723 and permission of instructor. Repeatable to a maximum of 6 cr hrs. Mr. Pool
Neutron diffusion, neutron shielding, radioactivity production, pile oscillation, reactor control, buckling and other pile parameters; critical reactor will be operated by student.

740 (3) A. 741 (3) W. 742 (3) S. Introduction to Theoretical Physics. 2 cl. Prereq: 601 and Math 601. Mr. Shaffer
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.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.
A reading knowledge of German and French is highly desirable.

805 (3) W. 806 (3) S. Electromagnetic Field Theory. 3 cl. Prereq: 713 and Math 721. Mr. Prebus
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.
813 (3) A. Line Spectra and Atomic Structure. 3 cl. Prereq: 718, 727 or 818. Mr. Heer
Advanced treatment of theory and interpretation of atomic spectra including contemporary problems.

817 (3) A. 818 (3) W. 819 (3) S. Quantum Mechanics. 3 cl. Prereq: 718, Math 601 and 611, Physics 727 and 740 recommended. Mr. Korringa
Advanced fundamental course including: physical bases; Schrodinger, matrix and operational formulations; approximate methods; transformation theory; relativistic modifications; hole theory, etc.

# [820] (3) A. # [821] (3) W. # [822] (3) S. Theoretical Nuclear Physics. 3 cl. Prereq: 721 and 728 or 818. Mr. Jastram
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.

823 (3) A. Nuclear Spectroscopy. 3 cl. Prereq: 718, 727, 728 or 818. Mr. Jastram
Advanced treatment of theory and interpretation of various aspects of nuclear spectroscopy including current topics.

824 (3) W. 825 (3) S. Statistical Mechanics. 3 cl. Prereq: 702, 727 or 818, and 740. Mr. Korringa
Advanced treatment of fundamentals of classical and quantum statistical mechanics with application to contemporary problems.

# [833] (3) W. # [834] (3) S. Theory of the Solid State. 3 cl. Prereq: 716, 728 or 818 and Math 721. Mr. Daunt
Modern theory of solid state including: classification of solids and theory of such physical properties as cohesion, specific heat, conductivity, and magnetism.

840 (3) A. 841 (3) S. Advanced Dynamics. 3 cl. Prereq: 742 and Math 661. Mr. Mills
840 starts with Lagrange's equation and includes variational theorems, Hamilton's canonical equations, general transformation theory. 841 treats selected topics in advanced dynamics.

# [843] (3) A. # [844] (3) W. Theory of Quantized Fields. 3 cl Prereq:
819, 840. Mr. Mills
The concepts and methods of quantum field theory, both as a fundamental description of physical interactions and as a method for use in certain relativistic problems.

# [846] (3) A. # [847] (3) W. Physics of Elementary Particles. 3 cl. Prereq:
721, 817. Mr. Mills
Properties of elementary particles; theory of strong and weak interactions.

# [851] (3) A. # [852] (3) W. Advanced Molecular Spectra. 3 cl. Prereq:
718, 719, 728. Mr. H. Nielsen
Advanced treatment of topics in theory and interpretation of electronic, vibration, rotational aspects of molecular spectra; emphasis on details of rotation-vibration spectra of polyatomic molecules.

860 (3) Su.A. 861 (3) Su.W. 882 (3) S. Advanced Topics in Physics. 3 cl. Prereq: permission of instructor. Repeatable. All Instructors
An advanced treatment of some field of physics of current interest not presently covered in other courses. Topic to be announced for each quarter.

881 (1) Su.A. 882 (1) W. 883 (1) S. Seminar in Physics. 1-2 hr cl. Repeatable. Prereq: acceptable specialized courses and permission of instructor. All Instructors
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.

950 (arr) Su.A.W.S. Research in Physics.
Research for thesis or dissertation purposes only.
PHYSIOLOGICAL CHEMISTRY

Department of Physiological Chemistry and Pharmacology
Office, 214 Hamilton Hall

PROFESSORS BROWN, FRANOLA, JOHNSON, LEAR (EMERITUS), MARKS, AND SMITH (EMERITUS), ASSOCIATE PROFESSORS CORNWELL, DEVOR, KRUGER, AND WIKOFF, ASSISTANT PROFESSORS ALBERG, DANELLIS, ENDHAU, ENGELMANN, FINGER, GOLDMAN, ITU, LEVEQUE, MAYNARD, McCLURE, NUNBE, AND RICHARDSON, INSTRUCTORS CARSON AND SAMBAHARAO, AND ASSISTANTS

511 (3) A. 512 (3) W. Physiological Chemistry. 2 cl. 1 2 hr lecture-demonstration. Prereq: Chem 551. Req'd in Medical Dietetics Curriculum. Mr. Devor, Mr. Nuenke
Biochemistry of carbohydrates, lipids, proteins, enzymes; digestion, absorption, intermediary metabolism; biochemistry of blood and urine.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. Prerequisites include fundamental courses in general chemistry, qualitative and quantitative analysis and organic chemistry, including laboratory work in all subjects. Courses 601, 602, 610, 611, and 612 are not available for graduate credit for students majoring in Physiological Chemistry.

601 (4) A. 602 (4) W. Physiological Chemistry. 4 cl. Med 1st yr. Prereq: Chem 521, 522, 647, 648, 649, 650 or equiv. Req'd 602-610 concur. Open only to students in the College of Medicine. Mr. Alber, Mr. Brown, Mr. Devor, Mr. Kruger, Mr. Cornell, Mr. McClure, Mr. Nuenke, Mr. Richardson, and Mr. Endahl
Chemistry of carbohydrates, lipids, proteins, and biochemistry of digestion, metabolism, and excretion.

609 (2) A. 610 (2) W. Physiological Chemistry. 2 3 hr lab. Med, 1st yr. Req'd 601-602 concur. Open only to students in the College of Medicine. Mr. Alber, Mr. Devor, Mr. Cornell, Mr. Ito, Mr. Maynard, Mr. Nuenke, Mr. Richardson, and Assistants
The properties of fats, carbohydrates, and proteins. Biochemistry of digestion, metabolism, and excretion. Composition of the tissues.

611 (5) A. Physiological Chemistry. 3 cl. 2 3 hr lab. Prereq: Chem 521, 522, 647, 648, 649, 650, or 655, 656, 657, 658, 659, 660 or equiv. Miss Wikoff, Mr. Devor, and Staff
Chemistry of carbohydrates, lipids, and proteins.

612 (5) W. Physiological Chemistry. 3 cl. 2 3 hr lab. Prereq: 611. Miss Wikoff, Mr. Devor, and Staff
Biochemistry of digestion, metabolism, and excretion.

613 (3) S. Quantitative Methods of Blood Analysis. 1 cl. 2 3 hr lab. Prereq: 602 or 612. Miss Wikoff and Assistants
Determination of important constituents of the blood.

614 (5) W. Biochemical Methods of Analysis (Food Analysis). 2 cl, 3 3 hr lab. Prereq: 611 or equiv. Mr. Devor, Mr. Alber, and Assistants
The quantitative analysis of the proteins, fats, and carbohydrates. Special methods for the analysis of biological materials.

619 (2-15) Su, A.W.S. Minor Problems in Physiological Chemistry. Prereq: 602, 612 or equiv. Department Staff
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 (6) S. Physiological Chemistry. 4 cl. 2 3 hr lab. Prereq: Chem 551, 552. Open only to students in the College of Dentistry. Mr. Alber, Mr. Devor, Mr. Cornell, Mr. McClure, Mr. Nuenke, Mr. Richardson, and Assistants
Chemistry of the carbohydrates, lipids, and proteins. Biochemistry of digestion, absorption, metabolism, and excretion. The tissues.
623 (2) A. Physiological Chemistry (Human Nutrition). 2 cl. Prereq: 632. Open only to students in the College of Dentistry. Mr. Brown
The elements of human nutrition with a special emphasis on the relation of diet to dentistry.

715 (1) S. Biochemical Biogaphy. 1 cl. Prereq: 612. Reqd of all students majoring in the department. Miss Wikoff

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

812 (2) W. Seminar in Physiological Chemistry. 2 cl. Prereq: 602 or 612 or equiv.
Topic to be announced.

813 (2) S. Seminar in Physiological Chemistry. 2 cl. Prereq: 602 or 612 or equiv.
Topic to be announced.

815 (1) A.W.S. Seminar. 1 cl. Prereq or concur: 601 or 611 or equiv. Reqd of all graduate students majoring in Physiol Chem. Can be repeated for a maximum of 9 cr hrs.

821 (3) A. Advanced Physiological Chemistry. 3 cl. Prereq: 602 or 612 or equiv, and Chem 841, 842, 843 or permission of instructor. Mr. Kruger and Staff
An advanced treatment of the chemistry of the carbohydrates, proteins, and steroids.

822 (3) W. Advanced Physiological Chemistry. 3 cl. Prereq: 602 or 612 or equiv, and Chem 841, 842, 843 or permission of instructor. Mr. Cornwell and Staff
An advanced treatment of the chemistry of the lipids, and intermediary metabolism.

823 (3) S. Advanced Physiological Chemistry. 3 cl. Prereq: 602 or 612 or equiv and Chem 841, 842, 843 or permission of instructor. Mr. Richardson and Staff
Continuation of the biochemistry of intermediary metabolism.

825 (3) A. 826 (3) W. Biochemical Preparations and Techniques. 9 hrs conf and lab. Prereq: 821 and 822 or concur. Staff
Advanced courses in biological preparations and laboratory techniques. Isolation of carbohydrates, lipids, proteins, enzymes, and hormones.

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

950 Su,A,W,S. Research in Physiological Chemistry. To be conducted under the guidance of Mr. Brown, Miss Wikoff, Mr. Frajola, Mr. Devor, Mr. Marks, Mr. Cornwell, Mr. Johnson, Mr. Kruger, Mr. McChew, Mr. Fischer, Mr. Richardson, Mr. Alben, Mr. Nuenke, and Mr. Endahl
Research for thesis or dissertation purposes only.

PHYSIOLOGICAL OPTICS
Office, 107 Optometry Building

PROFESSORS FRY, BLACKWELL, AND ELLERBROCK. ASSOCIATE PROFESSORS HEBBARD, McCONNELL, ASSISTANT PROFESSOR WILD

FOR ADVANCED UNDERGRADUATES AND GRADUATES

611 (5) S. Introduction to Physiological Optics. 4 cl, 1 2 hr lab. Prereq: Physics 605 and Anat 608. Not available for graduate credit for students majoring in Physiol Opt. Mr. Wild
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.

612 (5) A. Introduction to Physiological Optics. 4 cl, 1 2 hr lab. Prereq: 511. Not available for graduate credit for students majoring in Physiol Opt. Mr. Wild
The motility of the eye; the structure and innervation of the extracocular muscles; the center of rotation and analysis and description of eye movements.
613 (5) W. Intermediate Physiological Optics. 4 cl, 1 2 hr lab. Prereq: 612. Mr. Wild
Molecular sensory mechanisms of vision; analysis and specification of visual stimuli; photoreception and retino-cortical transmission; adaptation of photoreceptors; flickers; brightness discrimination; and color-vision.

614 (3) S. Intermediate Physiological Optics. 3 cl. Prereq: 612. Mr. Ellerbrock
Circulation and metabolism of the eye; intra-ocular pressure; lacrimal system; movements and functions of the eyelids.

615 (5) S. Intermediate Physiological Optics. 4 cl, 1 2 hr lab. Prereq: 613. Mr. Fry
Binaural integration of hue and brightness; retinal correspondence; visual perception of figure-ground relations, light, color, illumination, size, shape, direction, distance, and motion.

701 (1-15) Su,A,W,S. Minor Problems in Physiological Optics. Prereq: permission of department chairman. Repeatable. Mr. Fry, Mr. Blackwell, Mr. Ellerbrock, Mr. Hebhard, Mr. McConnell
This course is designed to permit any properly qualified students to carry on a minor investigation or add to his knowledge and technique.

FOR GRADUATES

801 (5) A. Advanced Physiological Optics. 3 cl, 2 2 hr lab. Prereq: 613.
Mr. Fry
The ocular image-forming mechanism; accommodation and pupil contraction, aberrations, stray light; enopic phenomena; shape, size, distortion; retinal illuminance and blur.

802 (5) W. Advanced Physiological Optics. 3 cl, 2 2 hr lab. Prereq: 801.
Mr. Fry
Fixation, disparity, photochemistry and electrophysiology of photoreceptors; luminosity; color-mixture; retinal-cortical transmission; simultaneous contrast; visibility; adaptation; after images.

803 (5) S. Advanced Physiological Optics. 3 cl, 2 2 hr lab. Prereq: 802.
Mr. Fry
Binaural integration of hue and brilliance, fusional movements, fixation, retinal correspondence, visual perception of figure-ground relations, light, color, illumination, size, shape, direction, distance, and motion.

950 Su,A,W,S. Research in Physiological Optics.
Research for thesis or dissertation purposes only.

Note: See also courses in Optometry.

PHYSIOLOGY
Office, 312 Hamilton Hall

PROFESSORS GRUBBS, ANGERER, BOZLER, HIATT, SAPIRSTEIN, HARTMAN (EMERITUS), HITCHCOCK (EMERITUS), AND MYERS (RESEARCH), ASSOCIATE PROFESSORS BEMAN, BROWNELL, LESSLER, COULTER, LIPETZ, PIEFER, ASSISTANT PROFESSORS ALLISON, LIPSEY, LUKIN, NISHIKAWARA, RETZLAFF, STOW, AND TOMASHEFSKI, INSTRUCTORS KUNZ, BLAIR, AND YAPEL

FOR UNDERGRADUATES OR IN PROFESSIONAL CURRICULA

421 (5) A.S. Introduction to Physiology. 4 cl, 1 lab. (Spring Quarter seniors graduating in Summer Quarter must have permission of Department Chairman.) Not open to students with credit for Physiol 506 and 507. Staff
A brief survey of the structural organization of the body from the cell to organism and of the properties of living matter is followed by a description of the structure and a study of the function of the muscular, nervous (including sense organs), and digestive systems (including energy and food metabolism).

422 (5) Su,W. Introduction to Physiology. 4 cl, 1 lab. Prereq: 421. (Summer Qtr—graduating seniors must obtain permission of the department chairman.) Not open to students with credit for Physiol 506 and 507. Staff
A continuation of Physiology 421. The structures and functions involved in a study of blood and other body fluids, renal systems, respiration, control of body temperature, and the integrative action of the endocrine organs.
506 (5) A. Intermediate Physiology. 4 cl, 1 lab. Prereq: 2 qtrs Chem, Zool 400 or 1 qtr Anat. Not open to students who have credit for Physiol 421 and 422. Staff
The concepts and principles involved in the activities of muscles and nerves; central and peripheral nervous system, including sense organs; secretion, digestion and motility of digestive trace; and energy and food metabolism.

507 (5) W. Intermediate Physiology. 4 cl, 1 lab. Prereq: 506 or equiv. Not open to students who have credit for Physiol 421 and 422. Staff
A continuation of Physiol 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.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

601 (5) A. Advanced Mammalian Physiology. 4 cl, 1 lab. Prereq: Inorganic and Organic Chem, 1 yr college Physics and 1 yr Biol Sc, or permission of departmental chairman. Staff
Advanced physiology of muscle, nerve, central nervous system, special senses, digestion, and metabolism.

602 (5) W. Advanced Mammalian Physiology. 4 cl, 1 lab. Prereq: Inorganic and Organic Chem, 1 yr college Physics and 1 yr Biol Sc, or permission of departmental chairman. Not open for graduate credit for students majoring in Physiol. Staff
Advanced physiology of body fluids and excretion, circulation, respiration, body temperature regulation, and endocrinology.

604 (6) A. Advanced Physiology. 4 cl, 2 lab. Open only to students in the College of Dentistry and students doubly registered in the College of Dentistry and Graduate School. Mr. Lessler and Staff
This course covers the cardiovascular system including blood, neuromuscular system, body fluids, and excretion.

605 (6) W. Advanced Physiology. 5 cl, 1 lab. Prereq: 604 or equiv. Open only to students registered in College of Dentistry and students doubly registered in College of Dentistry and Graduate School. Mr. Lessler, Mr. Lipsky, and Staff
This course covers the central nervous system and special senses, respiration, digestion, metabolism, the endocrinology, and reproduction.

#623 (5) S. Cellular and Comparative Physiology. 4 cl, 1 lab. Prereq: elementary Physiol or equiv, general Zool, general Physics, Organic Chem or equiv and permission of instructor. Mr. Lessler, Mr. Angerer, and Staff
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.

624 (3) S. Human Physiology. 2 cl, 1 lab. Med, 1st yr. Open only to students in College of Medicine and students doubly registered in College of Medicine and Graduate School. Mr. Bozler and Staff
Neuromuscular system and heart.

#628 (5) S. General Physiology (Physico-Chemical Biology). 4 cl, 1 lab. Prereq: elementary Physiol or equiv, general Zool, general Physics, Organic Chem or equiv, and permission of instructor. Mr. Angerer, Mr. Lessler, and Staff
Analyses of similarity among protoplasmic systems interpreted on known physical and chemical concepts and principles; where pertinent, the comparative viewpoint is considered.

630 (5) S. Endocrinology. 4 cl, 1 lab. Prereq: 601 and 602, or permission of instructor. Miss Brownell, Miss Nishikawara, and Staff
A study of the functions of the thyroid, parathyroid, pituitary, adrenal, pancreas, gonads, and other organs with possible endocrine function.

635 (6) A. Human Physiology. 4 cl, 2 lab. Med 2nd yr. Open only to students in College of Medicine and students doubly registered in College of Medicine and Graduate School. Mr. Grubbs, Mr. Coulter, and Staff
Cardiovascular system, body fluids, excretion, respiration, and metabolism.
PHYSIOLOGY

635 (6) W. Human Physiology. 4 cl, 2 lab. Med 2nd yr. Open only to students in College of Medicine and students doubly registered in College of Medicine and Graduate School. Mr. Grubbs, Mr. Coulter, and Staff
Digestion, endocrine system, sense organs, and central nervous system.

646 (5) W. Radiation Biophysics. 5 cl. Prereq: 1 yr each of college Biol, Math, Physics, and Physiol. Chem 601-602 or 611-612 or equiv. Mr. Myers, Staff
Studies and radioactive isotopes; biological effects of ionizing radiation.

652 (5) W. Principles of Physiology. 3 cl, 2 hr lab. Prereq: 16 hrs Biol Sc, 15 hrs Chem or Physics or both, or permission of instructor. Not open for graduate students seeking degrees in Physiol. Open only to students registered in the Academic Year Science Institute. Staff
The nature and behavior of living organisms and their relationship to their environment with special consideration of the functions of vertebrate organ systems.

701 (1-15) Su,A,W,S. Minor Problems. Prereq: permission of instructor. Staff
Reading, conferences, laboratory work by individual arrangement with qualified students who desire more intensive and specialized study than is available in other courses.

FOR GRADUATES

715 (1 or 2) Su. Seminar in Physiology. Prereq: permission of department chairman or graduate adviser. Staff
A seminar course in physiology involving joint participation by students and staff.

724 (3) S. Advanced Human Physiology. 2 cl, 1 lab. Prereq: permission of departmental chairman. Mr. Bozler and Staff
An advanced study of the muscular, peripheral nervous system and heart.

725 (6) A. Advanced Human Physiology. 4 cl, 2 lab. Prereq: permission of departmental chairman. Req'd for graduate students majoring in Physiol. Mr. Grubbs and Staff
Continuation of 724. An advanced study of the cardiovascular system, body fluids, excretion, respiration, and metabolism.

726 (6) W. Advanced Human Physiology. 4 cl, 2 lab. Prereq: permission of departmental chairman. Req'd for graduate students majoring in Physiol. Mr. Grubbs and Staff
Continuation of 725. An advanced study of digestion, endocrine system, sense organs, and central nervous system.

807 (3 to 5) Su,A,W,S. Advanced Studies in Physiology. Prereq: 601 and 602 or equiv. Inquire of departmental office or professor in charge as to which qtr any particular topic will be offered.
(a) Neuromuscular System. Mr. Bozler, Mr. Coulter
(b) Cardiovascular and Renal Physiology. Mr. Sapien
(c) Aviation Physiology and Respiration. Mr. Hiltz
(d) Digestion and Metabolism. Mr. Grubbs, Mr. Beman
(e) Physico-Chemical (General) Physiology. Mr. Angerer, Mr. Lessler
(f) Biophysics. Mr. Coulter
(g) Endocrinology. Miss Nishikawa, Miss Brownell
(i) A. Sensory Electrophysiology. Mr. Lipton
(j) A. Physiological Control Systems. Mr. Coulter

815 (2) A. 816 (2) W. 817 (2) S. Seminar in Physiology. Prereq: permission of departmental chairman. Staff
950 Su,A,W,S. Research in Physiology.
Research for thesis or dissertation purposes only.

BIOPHYSICS

FOR ADVANCED UNDERGRADUATES AND GRADUATES

645 (3) S. Principles of Biophysics. 3 cl. Prereq: elementary Physiol or equiv, and 1 yr of college Physics or permission of instructor. Mr. Coulter and Staff
A study of physical systems in relation to biological phenomena, with specific illustrations in the application of mechanics, heat, light, sound, electricity, hydraulics, etc.
PHYSIOLOGY 265

648 (3) S. Physical Instrumentation for Biologists. 1 cr, 2 lab. Prereq: Elementary Physiology and 1 yr college Physics or permission of instructor. Mr. Coulter and Staff
The theory and practical application of physical instruments used in biological studies, including elementary electronics.

POLISH
Department of Slavic Languages and Literature
317 University Hall

#(601) (3) A. Polish. 3 cr. Prereq: Russian 408 or 415 or permission of instructor.

#(602) (3) W. Polish. 3 cr. Prereq: 601.

#(603) (3) S. Polish. 3 cr. Prereq: 602.

#64 (3) A. Intermediate Polish. 3 cr. Prereq: 603 or equiv.

#605 (3) W. Intermediate Polish. 3 cr. Prereq: 604 or permission of instructor.
Reading texts of moderate difficulty, conversation, simple compositions.

#606 (3) S. Intermediate Polish. 3 cr. Prereq: 605 or permission of instructor.
Reading from modern Polish literature, practice in writing and speaking.

POLITICAL SCIENCE
Office, 100 University Hall

PROFESSORS HERSON, SPENCER (EMERITUS), HELMS, WALKER, AUMANN, MANSFIELD, SPITZ, KAUFMAN, JAFFA, FURNESS (MERSHON PROFESSOR) AND HEIMBERGER, (VICE-PRESIDENT), ASSOCIATE PROFESSORS NEMER, AND CHRISTOPH, ASSISTANT PROFESSORS LOTT, KETTLER, AND HALE, MR. MARSHALL, MR. WILHELM, LECTURER MR. VORTY, AND ASSISTANTS

FOR UNDERGRADUATES

401 (5) Su,A,W,S. American National Government. 5 cr. Not open to students who have credit for 507. Mr. Hale and Staff
An 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.

Not open to students who have credit for 401. Mr. Spitz and Staff
A study of political ideas, institutions, processes and problems, presenting comparatively the leading types of government in the modern world.

508 (5) W. Government of the United States. 5 cr. Prereq: 1 course in Pol Sc. Not open to students who have credit for 401. Mr. Helms
An intermediate study of American national government, primarily for prospective majors in the social sciences, and for pre-law students.

509 (5) A,W,S. Foreign Governments and Politics. 5 cr. Prereq: 1 course in Pol Sc or Hist 423, or Hist 401-402. Mr. Christoph, Mr. Lott, and Staff
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.

510 (5) Su,A,W,S. American State Government. 5 cr. Prereq: 1 course in Pol Sc. Mr. Walker, Mr. Aumann, and Staff
A study of the organization and functions of the states and their municipal subdivisions in the United States.

530 (3) A,W,S. International Tensions. 3 cr. Prereq: sophomore standing or above. Open to all students; req'd of senior APROTC cadets. Mr. Kawal, Mr. Lott, Mr. Marshall.
Causes of international tensions and conflicts: international security organizations; basic issues in world politics.
598 (3) S. Local Government in the United States. 3 cl. Mr. Herson and Staff
County, municipal and special governmental districts comparatively treated; their legal status, political significance, governmental structures and functions; their relations with state and national governments.

599 (5) A.W.S. Introduction to Political Science. 5 cl. Not open to students who have previous credit in Pol Sc. Mr. Lott and Staff
An introductory study of some important political ideas, institutions, problems and practices, including constitutionalism, democracy, authoritarianism, representation, political parties, and the legislative process.

705 (3-5) A. 706 (3-5) W. 707 (3-5) S. Honors Courses. Prereq: senior standing and 40 cr hrs in social sciences, including 15 cr hrs in Pol Sc, with a record of A in at least half of the Pol Sc courses and an average of B in the remainder. At least 2 qtrs 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. Department Staff
A special topic is assigned to each student each quarter, and results are tested by the requirement of papers and special examinations.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

Unless otherwise specified in the course description below, and except for Arts College students with junior standing, prerequisites for 600 level courses are two courses in political science, or a declared major in another social science, or the consent of the instructor. In the case of Arts College juniors and seniors, the history and social science requirements of the B.A. curriculum take the place of these prerequisites.

601 (3) A.S. Introduction to Political Theory. 5 cl. Mr. Spitz, Mr. Kettler
An inquiry into the major problems of political philosophy; the legitimacy of governments, forms and institutions, stability and change, freedom and control of power.

605 (5) A. Principles of Public Administration I. 5 cl. Mr. Mansfield, Mr. Walker
Basic problems of public administration; ends and means; the formulation of policy; organization and management; working methods of control; coordination and responsibility.

606 (5) W. Principles of Public Administration II. 4 cl, 1 lab. Prereq: 3 courses in Pol Sc. Mr. Walker, Mr. Mansfield
An examination of the principles of public administration as applied to the rendering of services to the public by national, state, and local government.

607 (5) Su.A. American Municipal Government. 5 cl. Mr. Walker
A study of municipalities in the United States, their social significance, governmental structure, and experience with government by council, mayor, commission, and manager.

609 (3) Su.W. Government of Ohio. 3 cl. Mr. Walker, Mr. Aumann
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.

611 (5) A. Introduction to Jurisprudence. 5 cl. Mr. Aumann
A study of the concepts which legal systems develop and of the interests which law protects. Ideas of various schools of juristic thought examined.

612 (5) A. International Law. 5 cl. Mr. Marshall
A study of the principles of international law.

613 (5) A.S. Contemporary Politics. 5 cl. Mr. Furniss and Staff
Political relations among states; methods and goals of diplomacy; current problems in major areas of tension; tendencies toward administrative, judicial, and legislative world-organization.

[614] (3) S. Public Personnel Administration. 3 cl. Prereq: 605. Mr. Walker
The organization, purposes and activities of civil service agencies; and the conduct of public personnel policies and procedures.
615 (5) A. Administration of Justice. 5 cl. Mr. Aumann
A study of the nature, purposes, and limitations of law as administered through courts.
The development, organization, and procedure of our judicial system. Recent trends in legal
thinking.

616 (5) Su,W. American Constitutional Law. 5 cl. Mr. Aumann
A study of leading constitutional principles in the United States as interpreted by the
courts.

618 (3) S. The National Government and the National Economy. 3 cl.
Prereq: 401 or 507 and 10 hrs Econ. Mr. Mansfield, Mr. Hale
A study of the interaction of economic and political powers illustrated in major contem-
porary issues of national affairs.

621 (3) A. History of Political Theory: I, The Socratic Method. 3 cl. Mr.
Jaffa
The Socratic revolution in western political philosophy. Its consequences for human thought
about man, the state, law, justice, property, power, happiness.

622 (3) W. History of Political Theory: II, From Machiavelli to Hegel.
3 cl. Mr. Kettler
A study of representative works by major modern thinkers—including Hobbes, Montesquieu,
Rousseau, Kant and Hegel—seen in historical context.

623 (3) S. History of Political Theory: III, Contemporary Political
Thought. 3 cl. Mr. Spitz, Mr. Kettler
An examination of the more important contemporary ideas on the nature of the state;
anarchism, syndicalism, communism, fascism, socialism, and democracy.

624 (3) W. American Political Ideas. 3 cl. Mr. Spitz, Mr. Hale
An analysis of American ideas on law and government, authority and liberty, oligarchy and
democracy, from the Puritans to the present day.

625 (5) A. Great Britain and the Commonwealth. 5 cl. Mr. Christoph
A general study of the government of Great Britain and of the Commonwealth of Nations
as an association of self-governing states.

627 (5) Su,S. Latin American Government and Politics. 5 cl. Mr. Lott, Mr.
Walker
A study of political processes, institutions, and groups in Latin America, with emphasis on
constitutional, geographical, social, and economic environment in which they operate.

628 (5) W. Government of Western Europe. 5 cl. Mr. Christoph
A study of the political institutions of West Germany and France, as time permits, one
or more of the small states of Western Europe.

633 (3) Su,A. Legislation. 3 cl. Mr. Walker
The processes of law-making in the United States, constitutions, statutes, executive ordi-
nances, popular law-making, legislative drafting.

634 (5) W. Public Opinion and Political Processes. 5 cl. Mr. Christoph
The formation, organization, and effects of public opinion and propaganda in the modern
state. Emphasis on the role of groups in political behavior.

635 (5) A.S. American Political Parties and Pressure Groups. 5 cl. Mr.
Heims
The organization, programs, and campaign methods of political parties and pressure groups.
Methods of nomination, suffrage, qualifications, campaign finance, and the conduct of elections.

636 (5) A. The Soviet Union. 5 cl. Mr. Nemzer
A general study of the Soviet Union; governmental and party institutions; ideology and
methods; problems of communist dictatorship.

637 (5) W. Soviet Foreign Policy. 5 cl. Mr. Nemzer
Basic concepts about, and choices in, Soviet foreign policy: development and present pat-
terns of Soviet relations with key nations; major problems in future relationships.

640 (5) S. The United States in World Affairs. 5 cl. Mr. Mansfield, Mr.
Nemzer
Domestic factors and agencies influencing American foreign policy; basic patterns of recent
American relations, especially with the Soviet bloc, Western Europe, and the Middle East.
649  (3)  S. International Relations of the Far East. 5 cl. Mr. Kawai
   The Far East in contemporary world politics; factors underlying the foreign policies of the
   nations concerned with this region.

650  (5)  W. The Government and Politics of the Far East. 5 cl. Mr. Kawai
   Government institutions of China, imperial, republican, and communist. Constitutionalism
   vs. militarism, occupation reforms, and contemporary politics in Japan. The governments of
   nearby east Asian countries.

651  (5)  A. Southeast Asia. 5 cl. Mr. Kawai
   Governments and politics of the Philippines, Indonesia, Indo-China, Malaya, Thailand, and
   Burma; contemporary problems of this region in relation to world politics.

652  (3)  S. Regional Patterns in International Politics. 3 cl. Repeatable to
   a total of 15 cr hrs. Mr. Marshall
   Basic power concepts, political institutions, and international relations of the following
   major areas, in turn:

   INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

   [652A]  The Far East
   [652B]  The Middle East
   [652C]  Central Europe
   [652D]  Latin America
   [652E]  Africa
   [652F]  The Soviet Union

655  (3)  S. Presidential Leadership and the Presidency. 3 cl. Mr. Hale
   A study of presidential power and responsibility; the roles of the president; the policies of
   leadership; the presidency as an institution.

701  (1-5)  Su.A.W.S. Minor Problems. Prereq: senior standing and 40 cr
   hrs in social sciences, including 15 hrs in Pol Sc. Department Staff
   A special topic is assigned to each student and results are tested by papers and special
   examinations.

714  (3)  Su.W. International Organization and Administration. 1 2 hr cl, 1
   hr arr. Mr. Lott
   An examination of the current system of international organization and its administrative
   aspects, with emphasis on the operations of the United Nations agencies.

730  (3)  W. Administrative Law. 1 2 hr cl. Prereq: 605, 606, 616 or equiv.
   Mr. Mansfield, Mr. Walker, Mr. Hale
   Processes and powers of administrative agencies; limits on administrative discretion; procedure
   before administrative tribunals; methods and scope of judicial review of administrative
   action.

731  (3)  A. Methods of Governmental Research. 1 2 hr cl, 1 hr arr. Pre-
   req: 15 cr hrs in Pol Sc and senior standing. Mr. Herson
   The materials of political science; history of procedure in political science research; re-
   search techniques; presentation of results of research.

734  (3)  S. Comparative Political Parties. 3 cl. Prereq: 635 and two
   courses in foreign governments or equiv. Mr. Christoph
   An examination of the nature and role of political parties in modern societies by the use
   of the comparative method.

735  (3-5)  A.W.S. Contemporary Political Problems. 1 2 hr cl. Prereq:
   15 cr hrs in Pol Sc and senior standing. Staff
   Topics for 1963-64: Autumn Quarter, The Formulation and Administration of U.S. Foreign
   Policy, Mr. Hale; Winter Quarter, Current U.S.-Latin American Relations: Problems and
   Prospects, Mr. Lott; Spring Quarter, Approaches to the Study of Politics, Mr. Herson.

737  (3)  S. Problems in Soviet Politics. 3 cl. Prereq: 636 or 637. Mr.
   Nemzer
   An intensive examination of selected problems such as crises of succession, conflicts of
   pressure groups, Soviet policies in the United States, Sino-Soviet relations.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the 500 or 600 group
except by permission of the Graduate Council.

Specific course prerequisites are stated in the listings below. A general foundation in under-
graduate courses in history and the social sciences is assumed. Any of the 600 level courses listed
below may be repeated for credit provided that no student shall earn more than ten hours of
credit in any single course.
805 (3-5) A.W.S. Political Thought. 1 2 hr cl. Prereq: previous course work in political thought; for advanced students in related departments, permission of instructor. Autumn Quarter, Mr. Spitz; Winter Quarter, Mr. Jaffa; Spring Quarter, Mr. Kettler
Seminar in the history of political ideas and in the theoretical problems of contemporary politics.

806 (3-5) A. Comparative Government. 1 2 hr cl. Prereq: 628 and one of the following, or equiv: 625, 627, 636, 650. Mr. Nemzer, Mr. Kawai, Mr. Christoph
Seminar in the governments of foreign countries.

807 (3-5) W. Political Parties and Pressure Groups. 1 2 hr cl. Prereq: two upperclass courses in Pol Se, including 635. Mr. Herson
Seminar in American political parties and pressure groups.

808 (3-5) Su. W. Public Administration. 1 2 hr cl. Prereq: at least 2 of the following, or equiv: 605, 606, 614, 618, 720. Mr. Mansfield, Mr. Walker, Mr. Hale
Seminar in staff and line activities of national, state, and local governments.

809 (3-5) W. Municipal Government. 1 2 hr cl. Prereq: 605, 606, 607 or equiv. Mr. Walker, Mr. Herson
Seminar in the municipal governments of the United States and Europe.

810 (3-5) W. International Relations. 1 2 hr cl. Prereq: 714 or 640 or 649. Mr. Nemzer, Mr. Kawai, Mr. Furniss
Seminar in international relations.

811 (1-5) Su. Public Law. 1 2 hr cl. Prereq: 615 and 616. Mr. Aumann
Seminar in the field of public law, including special problems in the fields of constitutional law or judicial administration.

(See under Interdepartmental Seminars)

950 Su.A,W,S. Research in Political Science. Staff
Research for thesis or dissertation purposes only.

PORTUGUESE
Department of Romance Languages and Literature
Office, 15 Derby Hall
PROFESSOR SCHUZ, ASSOCIATE PROFESSOR GRIFFIN
FOR ADVANCED UNDERGRADUATES AND GRADUATES

701 (1-5) A,W.S. Minor Problems in Portuguese. Prereq: permission of instructor. Mr. Schutz, Mr. Griffin

POULTRY SCIENCE
Office, Poultry Administration Building
PROFESSORS WINTER, BAKER, CRAY, DAKAN (EMERITUS), JAAP, AND MCGARTNEY.
ASSOCIATE PROFESSORS BROWN, CLAYTON, MARSH, MOUNTNEY, AND NADER
FOR UNDERGRADUATES

401 (5) A,W,S. Poultry Production. 3 cl, 2 2 hr lab. Staff
An introductory course covering all phases of poultry production and marketing. A one-day field trip is required.

#501 (3) W. Poultry Meat Production. 3 cl. Prereq: 401 or Zool 401 or equiv.
Broiler, turkey and waterfowl meat production. Stock, rearing, feeding, management and marketing.

# [503] (3) W. Market and Hatching Egg Production. 3 cl. Prereq: 401 or Zool 401 or equiv.
Production, feeding, management and marketing of pullets and laying hens. Egg care, packaging, pricing and marketing.
Dairy Sc 520 (5) A,W,S. Principles of Animal Improvement. Mr. Fechheimer, Mr. Jaap, Mr. Parker (Offered in cooperation with the Departments of Animal Sc and Poul Sc)  
(See under Dairy Science)

521 (5) Su,A,W,S. Poultry Plant Experience. Staff  
Ten weeks practical experience including written report and completion of special problem in an approved poultry plant.

Animal Sc 530 (5) A,W,S. Principles of Animal Nutrition. Mr. Cline Mr. Naber, Mr. Tynick. (Offered in cooperation with the Departments of Dairy Sc and Poul Sc)  
(See under Animal Science.)

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

613 (5) W. Prevention and Control of Diseases of Poultry. 3 cl, 2 2 hr lab. Prereq: 401 or Zool 401 and Microbiol 607 or equiv. Not open to students who have credit for 513. Mr. Marsh  
Recognition of diseases of poultry and game birds, prevention and control measures.

618 (3) A. Poultry Products Technology. 1 cl, 2 2 hr lab. Prereq: 15 hr Chem, Zool 402 or equiv, Microbiol 607 or equiv. Mr. Mountney  
Preparation of egg and poultry meat products. Utilization of inedible poultry by-products.

Agr Ee 621 (5) S. Poultry Marketing. Mr. Baker (Offered in cooperation with the Department of Poul Sc)  
(See under Agricultural Economics)

Animal Sc 630 (5) W. Nutrition and Feeding of Monogastric Animals. Mr. Cline, Mr. Naber. (Offered in cooperation with the Department of Poul Sc)  
(See under Animal Science)

701 (2-5) Su,A,W,S. Special Problems in Poultry Science. Prereq: permission of instructor. Staff  
The work must comprise some original research. A written report is required.

Dairy Sc 720 (5) W. Genetics of Animal Populations, Mr. Fechheimer, Mr. Jaap. (Offered in cooperation with the Departments of Animal Sc and Poul Sc)  
(See under Dairy Science)


FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

Dairy Sc 820 (3) W,S. Current Topics in Animal Breeding. Mr. Fechheimer, Mr. Jaap, Mr. Parker, Mr. Gilmore, Mr. McCartney. (Offered in cooperation with the Departments of Animal Sc and Poul Sc)  
(See under Dairy Science)

Animal Sc 830 (3) A,W,S. Advanced Studies in Nutrition. Mr. Conrad, Mr. Cline, Mr. Naber. (Offered in cooperation with the Departments of Dairy Sc and Poul Sc)  
(See under Animal Science)

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

Research for thesis or dissertation purposes only.
PREVENTIVE MEDICINE
Public Health, Nutrition, Occupational Medicine, Aviation Medicine
Office, B-Wing, Starling Loving Hall

PROFESSORS ASEE, WILCE (EMERITUS), FANCHER, MELLING, PALCHANS, LEWIS, SHILLITO, SHAFFER, ASSOCIATE PROFESSORS DINMAN, FRANZOLA, KELLER, RIDDLE, ASSISTANT PROFESSORS DAVIS, FRANKS, GODDARD, GOODELOE, FREEDMAN, HARDING, LENTZ, LEUCHTER, LOVELACE, SCHREUDER, SCHWITZENBERG, SMITH, TOMASHEFSKI, SHARP, SCOBIE, DINES, ROBERTS, BILLINGS, THOMAS, KAUFMAN, QUASHNOCK, von GIERKE, HYDE, AND WENBERG, AND INSTRUCTORS BURK, HAROLD, KAPLAN, GRAWEY, ROWE, McCONKEY, MียERS

OPEN ONLY TO STUDENTS REGISTERED IN THE CURRICULUM
IN MEDICAL DIETETICS

FOR UNDERGRADUATES

501 (1) A.S. Introduction to Medical Dietetics. 2 cl. Required of majors in the Medical Dietetic curriculum as a prerequisite to other dietetic courses. Mrs. Lewis and Staff

Basic knowledge and experience in functional and sociological aspects of responsibilities of the Medical Dietitian.

510 (6) Su. Introduction to Patient Food Service. 3 cl. 12 hr clinical study. Required in Medical Dietetic curriculum. Prereq: 501, Home Ec 440. Miss Sharp

Principles and practice in food service and dietary care of the hospital patient.

515 (6) A. Quantity Food Preparation and Service. 2 cl, 3 4 hr lab. Required in Medical Dietetic curriculum-open to others by permission of instructor. Prereq: Home Ec 441, 615. Mrs. Hubbard

Application of basic principles of food preparation and service in selected types of quantity food service operations.

516 (6) W. Menu Planning and Food Procurement. 3 cl, 3 3 hr lab. Prereq: 515.

Basic principles of menu planning and food procurement applied to selected types of quantity food operations.

517 (4) Su. Organization and Management in Quantity Food Service. 2 cl, 8 hr clinical study. Prereq: 516, Bus Org 686 or concur.

Principles and theories of personal, production and financial management related to quantity food service.

601 (6) S. 602 (6) Su. Nutrition in Disease. 5 cl, 4 hr clinical study. Prereq: 510, Home Ec 610. Miss Sharp and Medical Lecturers

Causes, results and dietary management of alterations in nutritional processes.

620 (12) A.W.S. Dietetics Administration. 4 cl, 32 hr clinical study. Prereq: 517. Open only to students enrolled in Medical Dietetics.

Application of management principles to the administration of hospital food service.

622 (12) A.W.S. Therapeutic Dietetics. 4 cl, 32 hr clinical study. Prereq: 602. Open only to students enrolled in Medical Dietetics.

Identification, evaluation and solution of problems involved in performing functions of the dietitian in patient care.

625 (5) A.W.S. Teaching of Dietetics. 5 cl, 4 hr clinical study, concur 627. Open only to senior students enrolled in Medical Dietetics.

Educational principles and practices as applied to the teaching responsibilities of the dietitian.

627 (3) A.W.S. Community Nutrition. 2 cl, 4 hr clinical study. Prereq: 602 or by permission of the instructor, concur 626. Miss Scobie and Mr. Keller

Public health nutrition programs and their services to the community, with particular reference to nutrition problems of special groups of the population.
PREVENTIVE MEDICINE

650 (1) S. Senior Seminar in Medical Dietetics. 2 cl. Open only to seniors in Medical Dietetics. Mrs. Lewis
Study of the development of dietetics as a profession, and of the responsibilities of the dietician.

OPEN ONLY TO STUDENTS ENROLLED IN THE SCHOOL OF NURSING

595 (3) A.W.S. Epidemiology. 2 cl. Prereq: Microbiol 510. Req'd of students enrolled in Gen Nurs curriculum. Mr. Keller
The principles of epidemiology and application of these to all disease processes.

618 (3) W.S. Public Health Administration in Relation to Nursing. 5 cl.
Prereq or concur: Soc Work 661 and completion of 1st yr of Gen Nurs curriculum. Req'd of students enrolled in Basic and Gen Nurs curriculum. Not open for graduate credit. Mr. Keller
Basic principles of public health administration and organization in relation to nursing including some of the special fields in public health.

OPEN ONLY TO STUDENTS REGISTERED IN THE COLLEGE OF MEDICINE

624 (2) S. Quantitative Methods in Medicine. 1 2 hr lec period each week.
Med, 1st yr. Mr. Keller and Staff
Topics discussed include the principles of medical statistics, problems of sampling in the field of medicine, tests of significance, rates and ratios, relationships between variables.

625 (3) S. Environmental Medicine. 3 lec, discussions or lab demonstrations each week. Med, 2nd yr. Not open for graduate credit. Mr. Price and Staff
A basic study of man in his environment and the effects of the physical, chemical, biological, psychological and sociological hazards of the environment upon health and disease.

718 (1) Su.A.W.S. Applied Nutrition. Med, 4th yr. Mrs. Lewis and Staff
A conference and demonstration course.

739 (2) A.W. Social and Economic Aspects of Medical Practice. Med, 4th yr. Mr. Keller and Staff
This course will cover the organization and function of federal, state and community public health services, and orient the student in his own relationship to these services. Community resources for health, welfare, and rehabilitation will be studied. The economic factors in health and disease will be considered at length.

750 (2) A. Epidemiology and Public Health. Prereq: Pre-Med 624 and permission of the Instructor. Mr. Keller and Staff
Problems in epidemiology. The application of specific health techniques in the control of disease.

753 (2-5) Su.A.W.S. Principles of Public Health Administration. Mr.
Goodloe and Staff
Administration, organization, and function of Public Health agencies. Principles of sanitation, food inspection, immunization, and school health will be studied.

(a) Selected topics in Occupational and Aviation Medicine. Mr. Ashe and Staff
(b) Selected topics in advanced nutrition. Mrs. Lewis and Medical Staff

760 (3) W. Nutrition in Systemic Disease. Prereq: senior standing in Med or graduate standing in Nutrition. Elective Med Senior and qualified graduate students in hospital dietetics or nutrition. Mrs. Lewis and Medical Staff
The physiopathological background of systemic disease and the rationale of specific diets in their preventive and treatment.

761 (3) A.W.S. Community Nutrition. Prereq: senior standing in Med or graduate standing in Nutrition. Miss Scobie
Methods of discovering problems in public health nutrition and practical application of nutrition information for improvement of nutritional status at various age levels.

780 (3-5) Su.A.W.S. Minor Problems. Prereq: adequate preclinical training and satisfactory scholarship in regular required work, and permission of chairman of department. Staff
FOR RESIDENTS IN AVIATION AND OCCUPATIONAL MEDICINE

The following 500 courses (810-813) (820-822) (850-852) in Occupational and Aviation Medicine are open to persons holding M.D. degrees from an approved medical school and who have had at least one year as intern or resident. Graduate students otherwise qualified may be admitted to any specific course with the approval of the chairman of the department.

810 (1) Su. 811 (1) A. 812 (1) W. 813 (1) S. Occupational Health Principles. 1 hr conf each week. Mr. Dinman and Staff

Functions of medicine in industry; its role, administrative design, intramural relationships, physical facilities, personal equipment, costs and benefits, placement and periodic examination of employees, health maintenance, and environmental control. Intramural and extramural relationships of the physician in industry.

820 (3) A. 821 (3) W. 822 (3) S. Applied Toxicology in Aviation and Occupational Medicine. 2 hr conf and hospital ward observations. Mr. Ashe and Staff

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.

850 (3) A. Advanced Preventive Medicine: Public Health. 2 2 hr conf each week. Also open to graduate students with a proper interest in the health sciences. Mr. Keller and Staff

Principles of public health; biostatistics, epidemiology, environmental sanitation, communicable disease control on a global basis, public health administration.

851 (3) W. Advanced Preventive Medicine: Industrial Hygiene. 3 conf each week and lab. Prereq: Pre Med 850. Mr. Dinman, Mr. Roberts and Staff

Engineering appraisal of environmental health hazards, sampling techniques, instrumentation and analytical methods; the industrial hygiene survey.

852 (3) S. Advanced Preventive Medicine: Environmental Control. 2 conf each week and field exercises. Prereq: Pre Med 850 and 851. Mr. Roberts and Staff

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.

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


Research for thesis purposes only.

PSYCHIATRY

Office, 059 Psychiatric Institute and Hospital

PROFESSOR PATTERSON AND STAFF

OPEN ONLY TO STUDENTS REGISTERED IN THE COLLEGE OF MEDICINE

624 (3) A. Psychiatry. Med, 1st yr. Mr. Patterson and Staff

The development, structure, and dynamics of personality. Adaptation patterns characteristic of man's adjustment to the world in which he lives.

651 (2) A,W. Psychiatry. Prereq: 624. Med, 2nd yr. Mr. Patterson and Staff

Abnormal psychological responses to stress; pathological dynamisms; psychosomatic reactions. Case study methods and interview techniques; organic brain disorders and major psychiatry syndromes.

756 (2) Su,A,W,S. Dispensary Clinics in Psychiatry. Med, 4th yr. Mr. Patterson and Staff

Students are assigned clinical work in the Mental Hygiene Clinic. Conferences and seminars held weekly. Correlation of psychiatric, psychological and social work.

780 (1-4) Su,A,W,S. Minor Problems. 1-4 cl. Prereq: adequate pre-clinical training and permission of chairman. Mr. Patterson

Library and clinical work.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.
274 PSYCHIATRY

704 (2) A. 705 (2) W. Electroencephalography. 2 cl. Prereq: basic training in Psychol or in Psychiatry, and permission of instructor. Mr. Parker Interpretation and technique of obtaining recordings.

800 (1-2) Su,A,W,S. Seminars in Psychiatry. 1 cl. Prereq: M.D. and 1st yr training in Psychiatry and permission of chairman. Req'd for M.Sc. degree in Department of Psychiatry.
   (a) Clinical Psychiatry, Mr. Patterson and Staff
   (b) Research Methodology. Mr. Pasamanick and Staff
   (c) Psychotherapy. Mr. Patterson and Staff
   (d) Psychiatric Literature. Mr. Patterson and Staff

807 (2) A. 808 (2) W. 809 (2) S. Clinical Psychiatry. 2 cl. Prereq: concurrent department of Psychiatry. Mr. Patterson and Staff
   Current diagnostic and treatment methods of dealing with major psychiatric disorders.

810 (2) Su,A,W,S. Seminar in Child Psychiatry. 2 cl. Prereq: concurrent department of Psychiatry. Mr. Grove, Mr. Missildine Theory and technique experience in the clinic with emphasis on the collaborative team approach represented by the discipline of psychiatry, social work and psychology.

830 (1-2) Su,A,W,S. Special Problems in Biological Psychiatry. 1 cl. Prereq. M.D. degree and first yr training in Psychiatry or permission of chairman. Registration limited to 2 sections per qtr.
   (a) Electroencephalography in Psychiatry. Mr. Parker
   (b) Neurochemistry, and Neuropharmacology. Mr. McClure and Mr. Fischer
   (c) Neuroendocrinology. Mr. Goldman
   (d) Neuropathology. Mr. Liss
   (e) Neurophysiology, Mr. Betzstaff
   (f) Psychosomatic Medicine. Mr. Patterson and Staff
   (g) Physiological Psychiatry. Mr. Pasamanick and Staff

840 (1-2) Su,A,W,S. Special Problems in Clinical Psychiatry. 1 cl. Prereq: M.D. degree and first yr training in Psychiatry or permission of chairman. Registration limited to 2 sections per qtr.
   (a) Advanced Psychotherapy. Mr. Pariser
   (b) Applied Psychanalytic Theory. Mr. Pariser
   (c) Developmental Defects of Childhood. Hilda Knobloch
   (d) Epidemiology of Mental Illness. Mr. Pasamanick
   (e) Hospital Group Psychotherapy. Mr. Gardiner
   (f) Mental Health Administration. Mr. Ristine
   (g) Psychiatric Test Procedures. Mr. Gardiner
   (h) Social Psychiatry. Mr. Dinsit

950 (5-15) Su,A,W,S. Psychiatric Research. Prereq: M.D. and one yr residency in Psychiatry. Staff
   Student will pursue one or more research problems under the guidance and counseling of senior staff.

PSYCHOLOGY

Office, 321 Arps Hall

PROFESSORS WHERRY, BURRT (EMERITUS), PRESSEY (EMERITUS), ROSEBROOK (EMERITUS), BRIGGS, BURNETT, CASSIDY, FLETCHER, HORROCKS, HUEFSMAN, KELLY, MEYER, MILES, PEPINSKY, REESHAU (EMERITUS), ROBINSON, ROTTER, SCHINDLER, SHERMAN, STEWART, STODDILL, THOMPSON, TOOTS, WICKENS, ASSOCIATE PROFESSORS CORRELL, FURST, HOWELL, HUNT, LAWSON, LIVERANT, PETERS, SMITH, ASSISTANT PROFESSORS BARKER, GAVIN, CRAWFORD, CROWNE, ERICKSON, JOHNSON, NAYLOR, SCHMIDT, WOLF, INSTRUCTOR DUNAWAY, LECTURERS ALBRECHT, CONAWAY, GRETHE, AND ASSISTANTS

PSYCHO-EDUCATIONAL SERVICE. The Department offers a consultation service to University students. Direct contact may be made with the following members of the staff: Academic orientation, study problems, reading difficulties—Mr. Fletcher, 357A Arps Hall; Vocational orientation or choice—Mr. Correll, Student Services Building; Social and personal orientation—Mr. Kelly, 402B Arps Hall; Mr. Rotter, 401 Arps Hall; Mr. Seidel, 402A Arps Hall.

FOR UNDERGRADUATES

401 (5) Su,A,W,S. General Psychology, 5 cl. Staff
   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 (5) A.W.S. General Psychology. 5 cl. Prereq: 401. Staff
A continuation of Psychology 401. Further emphasis on the development of a scientific attitude toward personal psychological problems in the fields of learning, thinking, intelligence, and personality.

403 (5) A.W.S. Introductory Psychology. 5 cl. Prereq: Zool 401-402 or Bot 401-402 or 20 hrs Natural Sc. Not open to students who have credit for Psychol 401 or 402. Staff
An introduction to psychology for students with science background; topics covered similar to Psychology 401.

404 (5) Su,A,W,S. Educational Psychology for Medical Personnel. 5 cl. Prereq: 401 and Zool 401. Not open to students who have credit for Psychol 407. Staff
Human capacities, abilities, interests, individual differences and total development through the life span. Aspects of learning and personality of interest to medical personnel.

407 (5) Su,A,W,S. Educational Psychology. 5 cl. Prereq: 401. Reqd in College of Education. Not open to students who have credit for Psychol 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 (3) A.W.S. Mental Hygiene. 3 cl. Not open to seniors. Prereq: 401. Staff
Mrs. Stoddard
Survey of the principles of mental hygiene. Social and emotional adjustment, and personality in light of the principles of mental hygiene. Adjustment problems of the college student.

411 (3) Su,A,W,S. Psychology of Effective Student Adjustment. 5 lab hrs. Credit does not count toward graduation. Mr. Kinzer, Mr. Robinson
The psychological principles of effective learning and performance in college. The psychological problems involved in the transition from control by adults to self-management.

504 (3 or 4) A.S. General Psychology; Sensation and Perception. 3 cl. 1 optional 2 hr lab. Prereq: junior standing, 508 (may be concur.) Reqd of Psychol majors in College of Arts. Mr. Howell
Subject matter and methods of psychology as a life science, with special reference to problems of sensory intensities, sensory discrimination functions, and perceptual functions.

505 (3 or 4) A.W. General Psychology: Motivation and Action. 3 cl. 1 optional 2 hr lab. Prereq: junior standing, 508 (may be concur.) Reqd of Psychol majors in College of Arts. Mr. Erickson
A behavioristic presentation of experimental work on learning and motivation. Laboratory deals exclusively with free operant behavior of the rat.

506 (3 or 4) W.S. General Psychology: Learning and Thinking. 3 cl. 1 optional 2 hr lab. Prereq: junior standing and 505. Reqd of Psychol majors in College of Arts. Mr. Lawson
The principles developed in 505 are extended to complex human behavior, especially verbal. Laboratory concentrates on human verbal learning.

507 (3) A.W.S. Genetic Psychology. 3 cl. Prereq: 401 or 403. Reqd of Psychol majors in College of Arts. Mr. Horrocks, Mr. Thompson, Mrs. Wolf
The facts of human development with some phylogenetic perspective. Topics cover physical and mental development, innate tendencies, mental states, and personality development.

508 (5) A.S. Quantitative Methods in Psychology. 5 cl. Prereq: 401 or 403. Reqd of Psychol majors in College of Arts. Mr. Erickson
Methods of measurement in psychology, procedures used in expressing behavior in terms of quantity, the significance of quantity in the study of human traits.

521 (3) A.W.S. Social Psychology. 3 cl. Prereq: 401 or 403. Reqd of Psychol majors in College of Arts.
The influence of group processes, organizational variables, and culture upon the social modification of basic drives, attitudes and language.

541 (3) Su,A,W,S. Psychology of Abnormal Behavior. 3 cl. Observation clinics at State Hospital. Prereq: 10 qtr hrs Psychol. Reqd of Psychol majors in College of Arts. Mr. Scodel, Mr. Crowne, Mr. Kelly
A consideration of the symptomatologies, etiologies and therapies of the major neuroses and psychoses with special emphasis on psychoanalytic theories and methods.
581 (1-4) A. Advising Freshman Students. Repeatable to a total of 4 cr. hrs. Prereq: permission of instructor. Miss Dunaway, Miss Adams
Mature student assistants of freshmen will have actual experience in advising younger students concerning their scholastic and social orientation and personal development. This course will be accepted as a professional elective in the College of Education.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

601 (3) A.W. Experimental Psychology. 1 cl, 4 lab hrs arr. Prereq: 402, 403, or 407. Repeatable to a total of 6 qtr hrs. Mr. Miles
The experiments are selected both for general and cultural values and for preparation for technical research in experimental psychology.

605 (3) W. Physiological Psychology. 3 cl. Prereq: 402 or 403. Mr. Meyer
Some physiological correlates of psychological phenomena. The properties of integrated organ systems, with emphasis upon the characteristics of their elements. Psychophysiological abnormalities will be considered.

606 (3) S. Advanced Physiological Psychology. 3 cl. Prereq: 605. Mr. Meyer
Further physiological correlates of psychological phenomena. Sensory and motor processes will be special topics.

608 (4) Su.A,W,S. Elementary Statistical Methods. 2 cl, 2 2 hr labs. Prereq: college algebra or permission of instructor. Mr. Toops, Mr. Wherry, Mr. Lawson, Mr. Naylor, Mr. Erickson
Introduction to statistics and application to psychological and educational research. Rationale, computation, and interpretation.

609 (3) Su.A,W,S. Exceptional Children: General Survey. 3 cl. Prereq: 10 hrs Psychol. Miss Cassidy, and Staff
Exceptional children and their problems including intellectual deviant, the partially sighted and of hearing children with speech problems, other physically handicapped and emotionally disturbed.

610 (3) Su.A,W,S. Adolescence. 3 cl. Prereq: 407 or 402. Mr. Horrocks
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.

611 (3) Su.W. The Intellectual Deviate. 3 cl. Prereq: 609 or permission of instructor. Miss Cassidy, Mr. Huelman
Theory and concepts of mental retardation, slow learner, intellectually gifted. Causation, diagnosis, and treatment of social, personal, and educational problems of children so labeled.

613 (3) Su.A,S. Mental and Educational Tests. 2 cl, 1 lab hr. Prereq: 402 or 407. Mr. Horrocks, Mr. Furst
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.

615 (3) Psycho-Educational Diagnosis and Treatment. 1 cl plus 4 lab hrs. Prereq: permission of instructor. Sections A and B prereq to C and F. For Section E, 683. Sections E and F each repeatable to a total of 3 hrs.

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

615A A. Binet-type Tests. Theory, development and use of Binet tests. Introduction to writing of psychological reports. Staff
615B W. Wechsler Intelligence Scales for Children and Adults. Theory, development and use of the Wechsler scales. Staff
615C S. Special Tests for Exceptional Children with Sensory, Motor and Language Handicaps. Theory and use of special clinical tests and developmental scales. Mr. Smith
615D W. Performance Tests, including Wechsler Scales. Mrs. Sanderson
615E Su. A. W. S. Diagnostic Teaching. Use of test materials in the diagnosis of special disabilities in school work. Practice with remedial procedures. Mr. Huelman

Mr. Smith
622 (3) S. Delinquent Children. 3 cl. Prereq: 13 qtr hrs Psychol 606, or permission of instructor. Mr. Rotter
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.

623 (3) A. Engineering Psychology. 3 cl. Prereq: 564 and 508 or equiv, plus 15 qtr hrs in Psychol or 5 qtr hrs in Psychol plus 9 qtr hrs in engineering courses on time and motion study, quality control, or machine design. Mr. Briggs
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.

626 (4) A. Psychology of Learning. 4 cl. Prereq: 402 or equiv. Mr. Wickers
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.

627 (3) S. Performance Theory. 3 cl. Prereq: permission of the instructor. Mr. Briggs
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.

628 (3) Su.A.S. Principles and Economy of Learning. 3 cl. Prereq: 10 qtr hrs Psychol or graduate standing. Mr. Johnson
The psychological principles involved in the practical control of learning activities, especially the more complex forms as seen in school and in industrial training.

629 (3) W. Systematic Psychology. 3 cl. Prereq: 25 qtr hrs of Psychol including 504, 508, 601 and 608 or equivalent. Mr. Briggs
Scientific method in psychology. A consideration of scales of measurement, the use of models and problems of psychophysics.

631 (3) A. Differential Psychology. 3 cl. Prereq: 508 or 608, or equiv and permission of instructor. Mr. Johnson
Critical consideration of the traits wherein individuals and groups differ. Factual data as to differences between men and women, races and ethnic groups, social classes, etc.

632 (3) W. The Psychology of Speech. 3 cl. Prereq: 10 qtr hrs Psychol and 10 qtr hrs Speech. Mr. Knowler
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.

633 (2) S. The Psychology of the Audience. 2 cl. Prereq: 679, and 10 qtr hrs Speech or permission of instructor. Mr. Knowler

635 (3) W. Psychology of Advertising. 3 cl. Prereq: 10 qtr hrs Psychol. Mr. Hulsman
An overview of theory and practice including causes, diagnostic procedures, remediation, and instructional materials.

636 (3) A. Educational Disability. 3 cl. Prereq: 609, 583 and permission of instructor. Mr. Naylor
An overview of theory and practice including causes, diagnostic procedures, remediation, and instructional materials.

637 (3) A. Industrial Psychology. 3 cl. Prereq: 10 qtr hrs Psychol. Mr. Naylor
Industrial training; effective work methods; equipment design; environmental factors; fatigue, monotony and accidents; morale.

639 (3) S. Psychology and Industrial Personnel. 3 cl. Prereq: 10 qtr hrs Psychol. Mr. Wherry
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.
640 (3) Su.A. Educational and Vocational Guidance. 3 cl. Prereq: 402
or 407. Mr. Troops, Mr. Correll
Theory and techniques of guidance based on records and individual
trait-profiles. Each student constructs his own profile.

644 (3) W. Techniques of Human Motivation. 3 cl. Prereq: 10 qtr hrs
Psychol. Mr. Naylor
The techniques of optimizing human motivation. The incentive values of
environmental pertinence.

646 (3) W. Contemporary Viewpoints in Psychology. 3 cl. Prereq: 16 qtr
hrs Psychol. Mr. Meyer
A consideration of the development of modern scientific psychology from its roots in the
schools of the nineteenth century to its contemporary status.

648 (3) A. Prejudice and Personality. 3 cl. Prereq: a course in social
Psychol or race relations such as 521, Soc 622, 623, 604 or 605.
Social psychological theories of group conflict. Personality dynamics in prejudice.
Approaches to the reduction of intergroup hostility.

650 (1-15) Su.A.W.S. Minor Problems. Prereq: 16 qtr hrs Psychol and
permission of instructor. By permission of the chairman of the department
doctoral Committee 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. Staff
Investigation of minor problems in the various fields of psychology.

655 (3) A. Comparative Psychology. 1 cl, 2 2 hr lab. Prereq: 504, 505.
506, or 20 hrs Psychol or Zool, including animal behavior and permission of
instructor. Mr. Lawson
Principles of animal behavior, with emphasis upon the contributions of zoology and 3. F.
Skinner.

659 (3) Su.A.S. Counseling Psychology: An Introduction. 3 cl. Prereq:
10 qtr hrs Psychol. Mr. Schmidt
A course designed for students who are interested in counseling and personnel work. Discussion of counseling psychology, counseling, and testing.

663 (3) Su.A.W.S. Psychology of Childhood. 3 cl. Prereq: 402, 403 or 407.
Mr. Thompson, Mr. Johnson
Psychological development from birth to age 12. Influence of school, family and other
out-of-school activities. Provision for the child's psychological needs.

666 (2-3) A.W.S. Studying the Individual Child. Lab hrs arr. Prereq:
610 or 668 (prior or concur); with permission of instructor, 507 or Home Ed.
561 may be substituted for the foregoing. Mr. Thompson
The student is assigned a normal child for individual study. He observes the child's behavior at home, at school, in varied social situations (using tests where appropriate), coordinates information obtained from records and interviews and makes a report weekly. The course may be repeated in an immediately following quarter for a total of not over five hours.

667 (3) W. Psychology of Music. 3 cl. Prereq: permission of instructor.
Mr. Kinzer, Mr. Poland
Psychological factors in musical learning, memorization, rhythm, harmony, form tone color
interpretation, ear playing, dictation, and music talent.

670 (3) W. Psychological Problems of Adult Life. 3 cl. Mr. Horricks.
Mr. Johnson
A survey regarding changes in capacity for learning through adulthood and age, in inter-
est, emotions, psychological problems of work, adult education, leisure.

671 (3) Su.W. Principles of Treating the Problem Child. 3 cl. Prereq: 11
qtr hrs Psychol, 809, or permission of instructor. Mr. Rotter
Methods used in dealing with behavior and personality problems of children.

674 (3) A.W. Psychological Study of Individuals and Groups in the Resi-
dence Setting. 3 cl. Prereq: permission of instructor. Repeatable to a total of
6 cr hrs. Miss Stewart
Basic concepts and techniques of personnel work in the student living center.
676 (3) Su.A.W. Advanced Educational Psychology. 3 cl. Prereq: 402 or 407 or permission of instructor. Mr. Thompson, Mr. Furst
A course in advanced educational psychology, giving a critical appraisal of the implications for education of modern psychological findings.

677 (4) W. Experimental Social Psychology. 2 cl, 4 lab hrs. Prereq: 621 or equiv and 608. Mr. Rosenberg
A laboratory course in the methods of experimental and social psychology. Typical experiments in such social psychological areas as attitude scaling, suggestion, social perception.

678 (3) Su.A.W.S. Psychology of Personality. 3 cl. Prereq: 10 qtr hrs Psychol. Not open to graduate students in Psychol. Mr. Rotter, Mr. Barker, Mr. Crowne
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.

679 (3) S. Psychology of Public Attitudes. 3 cl. Prereq: 521 and 508 or equiv.
The psychological theory and the measurement of social attitudes. A study of the psychological determinants of attitudes. Emphasis upon problems of definition, analysis, and measurement.

680 (3) Su.W. Educational Tests and Measurements. 3 cl. Prereq: senior or graduate standing and permission of instructor. Mr. Furst
A service course for those majoring in Elementary and Secondary Education, Guidance, School Psychology, and School Administration. Stress is on use of measurements in school.

683 (3) Su.A.W.S. Psychology of Reading. 3 cl. Prereq: 402 or 407. Mr. Robinson, Mr. Hudesman
Psychological analysis of the reading process. The relationship of this to teaching and remedial methods. Discussion of remedial reading techniques.

687 (3) S. Vision and Visual Training Procedures. 3 cl. Prereq: 402. Mr. Howell
The measurement and diagnosis of the fundamental visual skills; reading and form perception problems; visual training instruments and techniques.

689 (3) Su.W. Occupational Information. 3 cl and field trips. Prereq: senior or graduate standing and permission of instructor. Mr. Fletcher, Mr. Schmidt
A survey of the development, significance, and use of occupational information in counseling and personnel work.

690 (3) Su.S. Mental Hygiene for Professional Workers. 3 cl. Prereq: 402 or 407. Mr. Barker
The determinants of maladjustment and principles used in the prevention of maladjustment for teachers, personnel workers, social workers, psychologists, occupational therapists and other professional groups.

695 (3 or 5) S. Clinical Psychology. 3 cl, 2 optional lab. Prereq: 13 qtr hrs Psychol, 5 qtr hrs at 600 level. Mr. Kelly
Discussion of the field of clinical psychology; its methods, its problems and its use in guidance, education, hospitals, industry, and other areas.

700 (3) A.W.S. Honors Course. 3 cl. Open only to major students approved by the departmental Undergraduate Program Committee. Repeatable to a total of 9 hrs. Mr. Barker and Staff
A program of readings, conferences, and reports selected to provide maximum individual development and preparation for graduate study in the field.

703 (3) W.S. Special Topics in Psychology. 3 cl. Prereq: 15 qtr hrs Psychol at 600 level or above and permission of instructor. Staff
The topics will vary from quarter to quarter and will be announced at least one month in advance.

704 (3) Su.A.S. Tests and Measurements in Speech Education. 3 cl. Prereq: 682 and 613. Mr. Fotheringham
Procedures in securing, developing and using tests and test procedures in speech.
[713] (2) Laboratory in Psychological and Educational Measurement. Lab hrs. Prereq: 612 or 680 and permission of instructor. Repeatable to a total of 6 cr hrs.
A laboratory practicum in the construction and validation of psychological measurement instruments with particular emphasis upon measures of achievement and interpersonal relations.

718 (2) W. The Psychology of Group Therapy. 2 cl. Prereq: 671 or permission of instructor. Mr. Scodel
Primarily for students who may use psychological group methods in professional work.
General principles of group therapy and specific methods with children and adults described and evaluated.

782 (1) A.W.S. Laboratory in the Psychology of Campus Groups. 1 cl, 3 lab hrs. Prereq: 674, 821, and 828A. Repeatable to a total of 3 cr hrs. Miss Stewart
Experience in the advisement of campus organizations and in services to special student groups is paralleled with continuous discussion of psychological principles and appropriate technique.

788 (3). Laboratory in Industrial Psychology. 1 cl plus 4 lab hrs. Prereq: 608 or equiv and permission of the instructor. Repeatable to a total of 12 cr hrs, but individual letters are not repeatable.

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD
788A A. Attitude and Morale Scales. Mr. Naylor
788B B. Industrial Testing.
788C C. Job Analysis and Evaluation. Mr. Shartle
788D D. Merit Rating. Mr. Wherry

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.
These prerequisites include the equivalent of at least two years of psychology; or of one year of psychology and one year of college work in one of the following subjects: philosophy, mathematics, physiology, physics, sociology, sociology.

802 (2) A.W.S. Seminar in Experimental Psychology. 2 cl. Prereq: permission of instructor. Mr. Wickens, Mr. Meyer, Mr. Lawson, Mr. Briggs, Mr. Miles

803 (2) W. Seminar in Educational Psychology. 2 cl. Prereq: permission of instructor. Mr. Horrocks, Mr. Thompson

804 (2). Seminar in Psychological Measurement. 2 cl. Prereq: permission of the instructor.
(a) W. Analysis of Psychological Integration. Mr. Furst
(b) The Measurement of Cognitive Functions.
(c) The Scaling of Interpersonal Responses
(d) Theoretical Models for Scaling and Testing.

805 (1) A.W.S. Contemporary Psychological Literature. 1 cl. Mr. Meyer Mr. Wickens, Mr. Briggs

806 (2 or 4) A.W.S. Seminar in Clinical and Abnormal Psychology. 2 cl. Two sections A and B may be offered in any one qtr. Prereq: permission of instructor. Mr. Kelly, Mr. Rotter, Mr. Scodel

807 (2). Seminar in Industrial Psychology. 2 cl. Prereq: permission of the instructor.
Topics:
(a) Consumer Behavior and Marketing Research.
(b) Criterion Development.
(c) W. Leadership and Organizational Values. Mr. Shartle
(d) A. Motivation and Morale. Mr. Naylor
(e) Selection and Placement Theory.
(f) Training Methods and Devices.
(g) S. Current Practices and Trends. Mr. Naylor
PSYCHOLOGY 281

810 (2) Su, A.S. Psychological Problems in Higher Education. 2 cl. Mr. Burnett, Mr. Johnson
A course intended to give graduate students preparing for college teaching positions contact
with current educational research regarding the psychological problems they will encounter.

811 (4) S. Advanced Theoretical Psychology. 4 cl. Mr. Wickens
A description and evaluation of the major advanced psychological behavior theories.

812 (3) A. Advanced Social Psychology. 3 cl. Prereq: 25 qtr hrs Psychol
including social Psychol and 624 or 826 or equiv. Mr. Rosenberg
Problems of learning and perception relative to the social environment, the influence of
culture in the development of individual behavior patterns, and related topics.

813 (3). Seminar in Social Psychology. 3 cl. Prereq: permission of the
instructor.
Topics:
(a) A. Contemporary Attitude Theory and Research. Mr. Rosenberg
(b) W. Social Structure and Personality. Mr. Rosenberg
(c) S. Systematic Theory in Social Psychology. Mr. Rosenberg
(d) The Psychology of Social Movements. Mr. Rosenberg
(e) Current Research Trends.

814 (4) W. Intermediate Statistical Methods. 2 cl, 2 2 hr labs. Prereq:
a course in statistics or permission of instructor. Mr. Toops
Principles and techniques for deriving statistical equations; their modification to handle
special cases. Clarifying assumptions and their application.

815 (2). Seminar in Psychological Statistics. 2 cl. Prereq: permission of
the instructor.
Topics:
(a) A. Analysis of Variance. Mr. Lawson
(b) S. Experimental Design. Mr. Naylor
(c) A. (1). Factor Analysis. Mr. Wherry
(d) Mathematical Models and Theory.
(e) S. (2). Non-Parametric Statistics. Mr. Wherry
(f) Prediction Statistics.
(g) Current Practices and Trends.

816 (4) S. Correlational Analysis. 4 cl. Prereq: 825 or permission of the
instructor. Required in graduate core curriculum. Mr. Naylor
Techniques and rationale of using quantitative and qualitative data for prediction. Test
and battery analysis and validation.

818 (3) W.S. Theories of Personality. 3 cl. Prereq: advanced work in
personality and social Psychol and permission of instructor. Mr. Liverant,
Mr. Parker, Mr. Rotter
A critical consideration of the theories of personality structure and origin.

819 (3) Su. Machine Programming for Psychological Research. 2 cl, 1 lab.
Prereq: 816 and Math 590 or equiv and permission of instructor. Mr. Wherry
An introduction to modern symbolic language and loop theory. Applications to the
more common psychological statistical problems will be stressed.

821 (3) Su, A.W. Psychology of Counseling. 3 cl. Prereq: 13 qtr hrs Psychol,
Mr. Robinson, Mr. Schmidt
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.

822 (2) A.W.S. Seminar in Counseling Psychology. 2 cl. Prereq: permission
of instructor. Mr. Pepinsky, Mr. Burnett, Mr. Correll, Miss Dunaway

823 (3) Su, S. Advanced Counseling Psychology. 3 cl. Prereq: 852. Mr.
Pepinsky, Mr. Fletcher
A survey and critical analysis of literature and research regarding effects of sequence
of work activity, vocational exploration and career development.

824 (3) Su, S. Psychological and Child Study Services in the Public Schools.
3 cl. Prereq: permission of instructor. Miss Cassidy, Mr. Smith, Mr. Hulsman
Professional problems in school psychology.

825 (5) W. Methodological Foundations of Experimental Psychology. 5
cl. Required in the graduate core curriculum. Mr. Briggs, Mr. Lawson
Problems of definition of psychological concepts, formulation and testing of hypotheses,
test construction and formulation of empirical generalization with reference to design of
psychological experiments.
Advanced graduate students have the opportunity of relating principles and concepts of student personnel administration to operating procedures on the campus.

828 (3-5). Laboratory in Counseling. 1 cl plus 4 lab hrs. Prereq: permission of instructor and completion as indicated for the separate sections. Repeatable to a maximum of 20 cr hrs.

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

828A So.A,W.S. Educational Counseling. Prereq: 821 and 855. Mr. Robinson, Mr. Schmidt
Supervised practice in assisting college students in their adjustments to college. Techniques of diagnosis and treatment. Special help is given in interviewing techniques.
Mr. Correll, Mr. Pepsinsky
An opportunity for mature students who have adequate background to obtain practical experience in counseling through the facilities of the University Counseling and Testing Center.

828B A.W.S. Laboratory in Vocational Counseling. Prereq: 823 and 828A. Mr. Fletcher
An opportunity for mature students with adequate background and training to obtain practical experience, under guidance, in the use of personality adjustment techniques at the college level.

828E A.W.S. Counseling Supervision. Prereq: 828B. Mr. Fletcher, Mr. Robinson, Mr. Pepsinsky
An opportunity for mature students to get experience in supervisory techniques through supervised observation of other counselors and discussion with them of their work.

829I (3). Intermediate Statistical Methods. 3 cl.
Principles and techniques for deriving statistical equations; their modification to basic special cases. Clarifying assumptions and their application.

830I (3). Advanced Statistical Methods. 3 cl.
Techniques and rationale of using quantitative and qualitative data for prediction. Test and battery analysis and validation.

831 (3 to 15) A.W.S. Advanced Experimental Laboratory. Prereq: permission of instructor. Repeatable to a maximum of 15 cr hrs. Mr. Wickens, Mr. Meyer, Mr. Briggs, Mr. Lawson
Advanced training in the experimental and quantitative methods in the several areas of general experimental psychology and comparative psychology.

834 (3) A. Counseling and Therapy as Social Institutions. 3 cl. Mr. Pepsinsky
A review of diverse counseling and therapeutic practices as belief and ritual, with emphasis upon their manifest and latent functions in American society.

840 (3) A. Theory of Human Development. 3 cl. Mr. Horrocks
Critical consideration of human development. The meaning of development, the methods of investigation, and the units of measurement will be emphasized.

841 (2) W. Advanced Psychology of Motivation. 3 cl. Prereq: 20 qtr hrs Psychol including 505 or 628 or equiv or permission of instructor. Mr. Lawson, Mr. Wickens
An evaluation of the experimental and theoretical material on: physiological drives; development and maintenance of secondary motives; perception and motivation; conflict.

843 (3) A. Theoretical Psychology. 3 cl. Prereq: 843. Mr. Meyer
Organization of the data of physiological psychology into a consistent system with emphasis upon the problems posed by phenomena of sensory-motor correlation.

844 (3) W. Psychophysics of the Special Senses. 3 cl. Prereq: elementary Physiol or 605 and 606, or equiv, or Physiol Opt 613 or equiv. Not open to students who have credit for Physiol 658. Mr. Howell
A survey of the basic physiology of the senses, including smell, taste, and hearing, with emphasis on the photochemical and neural basis of vision.

854 (3) S. Advanced Comparative Psychology. 3 cl. Prereq: 655. Mr. Meyer, Mr. Miles
Contemporary literature in comparative psychology.

855 (3) W. Perception. 3 cl. Prereq: 504 and 601 or permission of instructor. Mr. Miles
Basic problems and phenomena of perception and their theoretical interpretations.
PSYCHOLOGY

851 (2) Seminar in Developmental Psychology. 2 cl. Prereq: permission of the instructor.
(a) Experimental Designs and Research Strategies.
(b) A. Developmental Dimensions of Cognitive Functioning. Mr. Thompson
(c) Development of Social Attitudes and Research Values.
(d) Cultural Influences on Human Development.

852 (3-5) Su.W. Counseling Diagnostics. 3 cl, 2 opt lab per. Prereq: 608, 613, and 621, and (for laboratory) permission of the instructor. Mr. Fletcher, Mr. Correll
Theory and application of interview data, observed behavior, test results, and biographical information as a basis for diagnostics in counseling and evaluation.

853 (3) A. History and Systems of Psychology. 3 cl. Prereq: 16 qtr hrs Psychol. Required in graduate core curriculum. Mr. Howell, Mr. Meyer
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.

854 (2) S. Interaction of Developmental Learning Functions. 2 cl. Prereq: 663 and 626 or 628 or equiv. Mr. Thompson
Relation of empirical data on imprinting, sensory and motor deprivation, and environmental extensions upon theoretical constructions designed to integrate such data.

855 (3) S. Theory of Test Construction and Use. 3 cl. Prereq: 613 or 680 or equiv. Mr. Forst
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.

861 (3 to 5) A. Clinical Psychology. 3 cl, 2 optional lab per. Prereq: permission of instructor. Mr. Crowne and Staff
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.

862 (3 to 5) S. Psychopathology. 3 cl, 2 optional lab per. Prereq: permission of instructor. Mr. Kelley and Staff
Personality disturbances and their clinical manifestations.

863 (3 to 5) S. Psychodynamics. 3 cl, 1 optional lab. Prereq: permission of instructor. Mr. Rotter and Staff
Survey of personality theories, particularly those related to methods of psychological treatment. Laboratory involves cases in children's clinics, mental hospital or school system.

864 (3 to 5) A. Psychodiagnosis. 3 cl, 2 optional lab per. Prereq: permission of instructor, Mr. Rotter and Staff
Theory and use of psychodiagnostic tests. Laboratory includes administration, scoring and interpretation of projective tests.

865 (2 to 13) Lectures A.W. Practicums A.W.S. Advanced Psychological Clinic. 2 cl. Repeatable to a maximum of 4 cr hrs. Practicum 3 cr hrs repeatable to a maximum of 9 cr hrs. Student may not receive credit for more than 2 practicums of one type. Prereq: permission of instructor. Repeatable to a maximum of 13 cr hrs. Mr. Kelly, Mr. Rotter, Mr. Scodel, and Staff
Theory and practice of psychotherapy. Offered in connection with community and training centers in psychology. Clinics. Two practicums, Type A, advisory services and Type B, treatment services.

880 (1 to 15) Su.A.W.S. Supervised Field Experience in Psychology. Prereq: 1 yr graduate work in Psychol and approval of local staff of area in which student is specializing. Supervised by member of local staff and some member of the outside agency approved by the Department of Psychology.
Supervised experience, either research or operational, in any agency doing professional psychological work such as a school system, a psychological clinic, and industrial personnel department, or a counseling center.

899 (1 to 5) S. Interdepartmental Seminar.
(See under Interdepartmental Seminars)

950 (arr) Su.A.W.S. Research in Psychology. Staff
Research for thesis or dissertation purposes only.
RADIO AND TELEVISION
Office, 19 Derby Hall
COORDINATOR: PROFESSOR TYLER
SUPERVISORY COMMITTEE: PROFESSORS HULL, SUMMERS, KIENZLE, AND WAGNER, ASSOCIATE PROFESSORS COLLMAN AND EWING, ASSISTANT PROFESSOR DRENTEN
FOR ADVANCED UNDERGRADUATES AND GRADUATES
According to University regulations, courses in this group are not open to freshmen or sophomores.
655 (1-3) A.W.S. Radio Broadcasting Problems. 3-9 lab hrs. Prereq: 405, junior standing and permission of station director. Repeatable to a maximum of 3 cr hrs. Mr. Ewing and Station Staff
Supervised experience at Station WOSU (Radio and Television).

RADIOLOGY
Office, University Hospital
PROFESSORS NELSON, HUGH J. MEANS (EMERITUS), MOLNAR, POMEROY, ASSOCIATE PROFESSORS MYERS, HOWARD, FULTON, KIRKENDALL (EMERITUS), CHRISTOPHORIDIS, FREIMANIS, HARALAMBOPoulos, ASSISTANT PROFESSORS GRAVES, CARTER, FRIEDMAN, MEYER, PLAUT, CALLENDINE, SIPP, FINK, DUNBAR, EGGLESTON, FRYE, AND INSTRUCTORS
OPEN ONLY TO STUDENTS REGISTERED IN THE COLLEGE OF MEDICINE
According to University regulations, courses in this group are not open to freshmen or sophomores.
750 (1-5) Su.A.W.S. Radiology, Advanced. Prereq: acceptable courses in the basic preclinical sciences and proof of an interest in and ability to undertake the selected project and permission of chairman of department.
Students will act as clinical clerks in the department of Radiology, University Hospital, and receive instruction in film reading and technique.
780 (1-5) Su.A.W.S. Minor Problems. Prereq: adequate preclinical training and satisfactory scholarship in regular required courses and permission of chairman of department. Staff
Library, conference and laboratory work.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.
950 (arr) Su.A.W.S. Research in Radiology.
Research for thesis or dissertation purposes only.

ROMANCE LANGUAGES AND LITERATURE
115 Derby Hall
(See courses listed under French, Italian, Romance Linguistics, Portuguese, and Spanish)

ROMANCE LINGUISTICS
Department of Romance Languages and Literature
Office: 115 Derby Hall
PROFESSOR SCHUTZ, ASSOCIATE PROFESSOR GRIFFIN
(SEE ALSO COURSES UNDER FRENCH, ITALIAN, PORTUGUESE, AND SPANISH)
FOR ADVANCED UNDERGRADUATES AND GRADUATES
647 (3-5) W. Romance Linguistics. Prereq: permission of instructor. Mr. Griffin
A survey of the development of the major Romance languages and dialects and an introduction to the basic materials and techniques of linguistic investigation.
ROMANCE LINGUISTICS 285

[648] (4) S. Romance Linguistics: Phonetics. 3 cl, 2 lab. Prereq: permission of instructor. Mr. Griffin
   Theory and practice of phonetics as applied to descriptive and historical work in Romance Linguistics, with an introduction to laboratory methods in dialectology.

701 (1-5) A.W.S. Minor Problems in Romance Linguistics. Prereq: permission of instructor. Mr. Griffin, Mr. Schutz

FOR GRADUATES
   An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

822 (3-5) S. Seminar in Romance Linguistics. Prereq: permission of instructor. Mr. Griffin, Mr. Schutz

RURAL SOCIOLOGY
Department of Agricultural Economics and Rural Sociology
Office, 103 Agricultural Administration Building

PROFESSORS SMITH, MANGUS, AND OYLER, ASSOCIATE PROFESSORS CAFENER, DIMIT, J. MITCHELL, AND ROGERS, ASSISTANT PROFESSORS BIBLE AND HAVENS, AND ASSISTANTS

FOR UNDERGRADUATES

405 (5) A.W.S. Introduction to Rural Sociology. 5 cl. Not open to students with credit for Rur Soc 506 or Soc 401, 507 or 511. Mr. Mangus, Mr. Rogers, Mr. Havens, and Assistants.
   Principles of society, major social institutions and social change. Emphasizes social changes in rural life, rural organizations, population and family living.

506 (3) S. Rural Leadership. 1 2 hr cl, 1 2 hr lab. Mr. Mitchell
   Basic principles and practices in the development of effective leadership in organization programs.

FOR ADVANCED UNDERGRADUATES AND GRADUATES
   According to University regulations, courses in this group are not open to freshmen or sophomores.

606 (5) W. Advanced Rural Sociology. 5 cl. Prereq: 405 or Soc 401 or 507 or 511 or permission of instructor. Mr. Mangus
   An advanced course on rural society dealing with fundamentals in rural social institutions and organizations, rural social change and nature of rural social systems.

609 (3) Su.A. Rural Social Organization. 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.

630 (4) S. The Rural Family. 4 cl. Not open to students with credit in Rur Soc 611. Prereq: 405 or Soc 401, 507, 511 or permission of instructor. Mr. Mangus
   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.

640 (3) S. Diffusion of Information on Agricultural Technology. 3 cl. Prereq: 405 or Soc 401 or 507 or 511 or permission of instructor. Mr. Rogers, Mr. Havens
   The processes by which new ideas diffuse to the farmer and homemaker. Emphasis on the role of group influences, professional agricultural workers, and adoption leaders.

660 (3) W. Rural Sociology of Developing Societies. 3 cl. Prereq: junior standing and 10 hrs of Rur Soc, 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.

701 (2-5) Su.A.W.S. Special Problems. Prereq: minimum of 8 cr hrs in Rur Soc or Soc and permission of instructor. Staff
   Eligible students plan and conduct an analysis of a special sociological problem not included in regular courses.
901 (2-4) A.W.S. Advanced Seminars in Rural Sociology. Prereq: permission of instructor. Members of the graduate staff in Rur Soc will organize seminars from time to time on various topics. Offerings for each subject will be announced by the department prior to registration time each quarter.

The fields 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 (arr) Su,A.W.S. Research in Rural Sociology.
Research for thesis and dissertation purposes only.

RUSSIAN
Department of Slavic Languages and Literature
Office, 317 University Hall
PROFESSOR TWAROG, ASSOCIATE PROFESSOR SIBAJORIS, AND ASSISTANT PROFESSOR EFF

Courses appropriate for the Russian Area Studies Certificate Program may be found among the offerings of the following departments: Economics, Geography, History, Political Science, Russian, and Sociology. See under Russian Area Studies in the Bulletin of the Graduate School for further curricular details.

FOR UNDERGRADUATES

401 (5) A.W.S. Elementary Russian. 5 cl. Credit in Russian 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. Staff

402 (5) A.W.S. Elementary Russian. 5 cl. Prereq: 401. Staff

403 (5) A.W.S. Elementary Russian. 5 cl. Prereq: 401. Staff
Reading of prose and poetry; oral and written practice; grammar review.

404 (5) A.W.S. Intermediate Russian. 5 cl. Prereq: 403 or 415. Staff
Reading of prose and poetry; oral and written practice; vocabulary building.

407 (2) A. Scientific Russian Reading. 2 cl. Prereq: 408 or 415. Staff
Concentration on material of general interest to all sciences.

NOTE: The sequence 407, 408, 409 may be taken in lieu of 404 to satisfy language requirements for the B.A. and B.Sc.

408 (2) W. Scientific Russian Reading. 2 cl. Prereq: 407 or consent of instructor. Staff
Reading of unedited texts from current Soviet publications.

409 (2) S. Scientific Russian Reading. 2 cl. Prereq: 408 or consent of instructor. Staff
Specialized reading and translation of a major contribution in one of the sciences.

415 (15-10-5) Su. Intensive Russian. 15 cl. Limited to 15. Prereq: permission of the chairman. Students who have credit for 401 or 402 may, with the permission of the chairman, enroll in the course for only 5 or 10 credits, though the course must be taken in its entirety. For students with no prior credit in Russian no partial credit can be granted. Not open to students with credit for 403. Register before May 12.

Elementary and intermediate Russian for students desiring comprehensive knowledge of Russian in the shortest possible time. Students will devote their entire time to the course.

505 (3) W. Russian Conversation. 3 cl. Prereq: 404 or permission of instructor. Mrs. Epp
Drill in everyday patterns of conversation.
506 (2) W. Russian Composition. 2 cl. Prereq: 404 or permission of instructor. Mrs. Epp
Practice in simple writing.

507 (3) S. Intermediate Conversation. 3 cl. Prereq: 505 or permission of instructor. Mrs. Epp

508 (2) S. Review Grammar and Composition. 2 cl. Prereq: 506 or permission of instructor.
Review of Russian grammar, composition on assigned topics, practice in translation.

516 (10-3) Su. Intermediate Intensive Russian. 10 cl. Limited to 15. Prereq: 403, 415 or permission of chairman. The equiv of 404, 405, 506. Students who have credit for 404 may, with the permission of the chairman, enroll in the course for only 5 instead of the normal 10 credits. The course must be taken in its entirety. No partial credit can be granted. Register before May 12.

[517] (15) Su. Study Tour of the USSR. 15 cl, 1st session; 2nd session in USSR. Prereq: minimum of 25 to maximum of 35 quarter hrs of Russian or the equiv. Open only to undergraduates who will not receive their degrees before December following the tour. Permission of departmental chairman required. At The Ohio State University students will be given advanced work in conversation and reading in order to prepare for the tour. In the USSR only Russian will be spoken. Some formal instruction will be given daily by the tour leaders.

576 (3) S. A. 576 (3) W. 577 (3) S. Introduction to Russian Literature. 3 cl. Prereq: 404 or permission of instructor. Conducted in Russian. These courses partially fulfill the B.A. and B.S. requirements in literature.

575. The Early Classics: Romanticism, the Natural School, Early Realism. Mr. Epp
Readings from representative authors such as Pushkin, Lermontov, Gogol, Turgenev.

576. The Russian Realists. Mrs. Epp
Readings from representative authors such as Turgenev, Dostoievsky, Tolstoy, Goncharov.

577. Impressionism, Critical Realism, Symbolism, Socialist Realism. Mrs. Epp
Readings from representative authors such as Chekhov, Gorky, Bunin, Blok, and Sholokhov.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to the University regulations, courses in this group are not open to freshmen or sophomores.

#517 (3) W. #618 (3) S. Slavic Literature in English Translation. 3 cl.
Emphasis on the non-Russian Slavic literatures: Bulgarian, Czech, Polish, Serbian, Ukrainian.

#617 Slavic Literature from the Beginning Through Romanticism. Mr. Twarog
The epic tradition, renaissance, baroque literature, classicism, post-romanticism, and romanticism, the great Slavic literary awakening.

#618 Slavic Literature from Realism and Symbolism to World War II. Mr. Twarog
Emphasis on development of the novel and drama in Czech, Polish, and Ukrainian literature: Capek, Hasek, Sienkiewicz, Reymont, Franz, and Ukrańska.

620 (5) A. 621 (5) W. 622 (5) S. Russian Literature in English Translation. 4 cl.

620 Russian Literature from Pushkin to Turgenev. May not be taken for credit if the student has credit for 613. Mr. Twarog
An introduction to the Russian novel, drama, and poetry. Major contributions of Pushkin, Lermontov, Gogol, Ostrovsky, Goncharov, and Turgenev.
621 Russian Literature from Dostoevsky to Blok. May not be taken for credit if the student has credit for 614. Mr. Twarog
Reading and analysis of Crime and Punishment, War and Peace, The Golyeysy Family, as well as short stories and plays by Chekhov, Gorky, Baxin, Bely, and Andreev.

622 Soviet Literature. May not be taken for credit if the student has credit for 616. Mr. Twarog
A survey of Soviet Russian literature from 1917 to the present. Reading of representative authors such as Pasternak, Leontov, Federov, Khlebnikov, and Pavlovskii.

ADVANCED COURSES IN LITERATURE

The general prerequisite for the following literature courses is at least nine hours in literature courses on the 500 level. Courses 646 through 664 will be given in English but undergraduate majors in Slavic will do prescribed portions of the reading in the original.

#650 (3) A. Dostoevsky. 3 cl.
Critical analysis of the major novels and shorter works. The intellectual and literary development of Dostoevsky.

#651 (3) W. Tolstoy. 3 cl.
Analysis of all major works including the novels, plays, stories, and important polemical works.

#652 (3) S. Chekhov. 3 cl.
Critical analysis of the major plays and the most significant stories of the later period.

#653 (3) A. Russian Drama. 3 cl.
Emphasis on period from 1860 to present day. Ostrovsky, Chekhov, Gorky, Andreev. Plays and Soviet writers LeoJonov and Katanov.

#654 (3) W. Turgenev. 3 cl.
Reading of the major novels, plays, and short stories. A study of novelistic techniques.

#670 (3) S. Pushkin and His Time. 3 cl. Prereq: 575-577 or permission of instructor. Analysis of Eugene Onegin as poetry and an encyclopedia of the times. Social, political, cultural trends in the 1820's and 1830's. Romanic Poets.

FOR GRADUATES

609 (3) A. Advanced Reading, Conversation, and Composition. 3 cl. Prereq: 10 hrs of 500 level courses in Russian, including 505, 506, or permission of instructor. Mrs. Epp
Reading of contemporary prose and verse, presentation of oral and written reports, drill in intonation patterns, translation from English into Russian.

610 (3) W. Advanced Reading, Conversation, and Composition. 3 cl. Prereq: 500 or permission of instructor. Mrs. Epp

611 (3) S. Advanced Reading, Conversation, and Composition. 3 cl. Prereq: 610 or permission of instructor. Mrs. Epp

690 (0) W. Russian for Research. 2 cl.
Basic elements of Russian grammar.

691 (0) S. Russian for Research. 2 cl. Prereq: 403, 415, or 690.
Reading of texts in special fields.

Prerequisites for 600 Courses

700 courses are designed primarily for graduate students but linguistics courses 780-784 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.

701 (1-5) Su,A,W,S. Minor Problems in Slavic. Repeatable. Prereq: permission of the departmental chairman. Mrs. Epp, Mr. Slabjoris, Mr. Twarog

720 (3) W. History of the Russian Language. 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.

721 (3) S. The Structure of Russian. 3 cl.
A structural analysis of Modern Russian. Essential for those intending to teach Russian or become translators.

730 (3) A. An Introduction to the Slavic Languages. 3 cl.
A general survey of all the Slavic languages and their common features.

750 (3) W. Russian Literature to 1650. 3 cl.
Emphasis on literature of the Kievian period.
761 (3) S. Russian Literature 1650-1800. 3 cl.
The baroque period, classicism and sentimentality. Emphasis on the classical period of the 18th century.

770 (3) S. Russian Poetry from Tintchev to the Symbolists. 3 cl.
Tintchev, Pet. Nekrasov, and the Civic poets, Merezhkovsky, Brusov, Balmont, Bely, and Blik.

810 (5) A. Old Church Slavonic. 5 cl.
Study of the earliest recorded Slavic language. Reading and linguistic interpretation of original documents.

820 (3) S. Seminar in Slavic Linguistics. 2 cl.
Selected topics in Old Church Slavonic, Old Russian, Modern Russian, and Comparative Slavic Linguistics.

830 (5) W. Seminar in Slavic Literature. 2 c. Mr. Twarog
Selected topics from literature after 1800.

950 (arr) Su, A.W.S. Research in Slavic. Staff
Research for thesis purposes only.

SERBO-CROATIAN
Department of Slavic Languages and Literature
Office, 318 University Hall

#601 (3) A. Serbo-Croatian. 3 cl. Prereq: Russian 403 or 415 or permission of instructor.

#602 (3) W. Serbo-Croatian. 3 cl. Prereq: 601 or permission of instructor.

#603 (3) S. Serbo-Croatian. 3 cl. Prereq: 602 or permission of instructor.

(#604 (3) A. Intermediate Serbo-Croatian. 3 cl. Prereq: 603 or equiv. Reading of simple Serbo-Croatian texts from the 18th century.

(#605 (3) W. Intermediate Serbo-Croatian. 3 cl. Prereq: 604 or permission of instructor. Reading texts of moderate difficulty, conversation, simple compositions.

(#606 (3) S. Intermediate Serbo-Croatian. 3 cl. Prereq: 605 or permission of instructor. Reading from modern Serbo-Croatian literature, practice in writing and speaking.

SLAVIC LANGUAGES AND LITERATURE
(Office, 317 University Hall)
(See courses listed under Polish, Russian, and Serbo-Croatian)

SOCIAL WORK
Office, 300 Stillman Hall

PROFESSORS SHIMP, DIRECTOR, RECKLESS, LEEDY, CORNELL, LIVINGSTON, ASSOCIATE PROFESSORS HAMILTON, NICHOLS, PRINCE, MUELLER, BAKER, ASSISTANT DIRECTOR, DAYKIN, HOFFMAN, SMITH, SISSON, ASSISTANT PROFESSORS BURK, ZUPANCIC, LONGO, HAYWARD, EISENSTEIN, CRYMES, CUNNINGHAM, DEMBROSKI, FERGUSON, PANTALO, VISITING PROFESSOR GRAHAM, VISITING ASSISTANT PROFESSORS BRISSENDEN, ELKUS, EDGAR, LECTURER POSEY

NOTE: Students who have credit for Social Work 418, 430, 450, 465, 466, 468 or 495 should consult the School of Social Work before registering in any course in Social Work.

511 (5) A.W.S. Social Investigation and Social Statistics. 3 cl. 2 2 hr lab.
Prereq: Soc 401 or 407 or 507 or equiv. Not open to students who have credit for 638 or 639. Mr. Cornell, Mr. Eisenstein, Mr. Crymes

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.

599 (3) A.W.S. Health and Welfare Needs and Resources I. 3 cl. Prereq: Soc 401, 407, 507 or equiv. Mr. Livingston, Mr. Dembroski

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.
SOCIAL WORK

600 (3) A.W.S. Health and Welfare Needs and Resources II. 3 cl. Prereq: 511 and 599. Not for graduate credit. Not open to students who have credit for 668. Mr. Livingston, Mrs. Sisson, Mr. Dombroski
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.

601 (3) A.W.S. Health and Welfare Needs and Resources III. 3 cl. Prereq: 600 or equiv. Not for graduate credit. Not open to students who have credit for 668. Mr. Leedy, Mrs. Baker
Study of voluntary and governmental agencies and services involved in the orderly development, administration, financing, and coordination of health and welfare service.

661 (4) A.W.S. The Individual and the Social Agency. Prereq: 601 and 659 or Nurs 529 or Ed 505. Not open to graduate students in Soc Work. Mrs. Prince, Mrs. Sisson, Mrs. Nichols, Mr. Dombroski
The study and evaluation of social and environmental and psychological conditions as they affect the individual in his use of social welfare resources.

675 (3-8) Su.A.W.S. Social Welfare Observation and Experience. Social Agency Assignment plus 1 2 hr seminar weekly. Repealable to maximum of 15 cr hrs. Prereq: 600 and 659. Open only to majors in Social Welfare and by permission of instructor. Not for graduate credit. Staff
Individualized and supervised observation and experiences in selected social welfare agencies and institutions. (Comprehensive report by student and agency supervisor required.)

696 (3) W. Case Studies in Public Social Services. 3 cl. Prereq: 601 and 661. Not for graduate credit. Mr. Livingston, Mrs. Sisson
Critical analysis of representative public service cases and practical interpretation of agency policies. Attention given to family budgeting and standards for health and decency.

699 (1-5) Su.A.W.S. Special Problems. Prereq: 601, junior or senior standing in Social Welfare, and permission of instructor. Repeatable to a maximum of 10 cr hrs. Not for graduate credit. Staff
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

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are not open to freshmen or sophomores.

Students not registered in the School of Social Work may elect Social Work courses up to a maximum of twenty quarter hours.

621 (3) W. Principles of Probation and Parole. 3 cl. Prereq: 600, Anthropol 501, Soc 625 or their equiv. Not for graduate credit to students in Social Work. Mr. Daykin
A study of how offenders are placed and supervised on probation and parole.

627 (5) A.S. Juvenile Delinquency and Its Treatment. 5 cl. Prereq: 600, Anthropol 501, Soc 625 or their equiv. Not for graduate credit to students in Social Work. Mr. Daykin
Juvenile Delinquency as a social problem. Methods of treatment and prevention, including juvenile courts, clinics, probation, parole, correctional institutions, child placement, and recreational programs.

637 (3) A.S. Social Implications in Rehabilitation. 3 cl. Prereq: 601 and 10 hrs of Psych or equiv. Not open to students who have credit for 510. Not for graduate credit to students in Social Work. Mr. Hamilton
The significance of disability and employability in their social, medical, and industrial application; rehabilitation as a process; current concepts.

647 (3) A. Practice in Leading Group Recreation. 4 cl. 1 2 hr lab. Prereq: 600, Psychol 402 or 404 and ten hours of Soc. Not for graduate credit to students in Social Work. Mr. Longo
Practice and demonstration in leadership of recreational activities. Use of games, music, folk and square dancing, dramatics, and other program resources to achieve specific objectives.
648 (3) S. Guidance and Group Aspects of Camping. 3 cl. Prereq: 600 and Soc 648 or equiv. Not for graduate credit for students in Social Work. Mr. Longo

Objectives of youth agency camps and democratic procedures in their achievement. Interpersonal relationships, use of organizational structure and program media, staff training, supervision, and evaluation.

650 (3) A.W. Principles of Group Leadership. 3 cl. Prereq: 600, Psychol 402, or ten hours of Psychol or Soc. Not for graduate credit to students in Social Work. Mrs. Nichols, Mr. Longo

Examination of principles of group leadership. Understanding group purposes and behavior. Use of program media. Records of actual experience used as illustrative material.

659 (4) A.W. Social Work Aspects of the Individual and His Family. 4 cl. Prereq: Soc 600, Psychol 402 or equiv. Not for graduate credit to students in Soc Work. Mrs. Orbison, Mrs. Nichols, Mr. Dombrowski

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.

679 (3) A.S. Legal Aspects of Social Work. 3 cl. Prereq: 601 and 10 hrs of Soc. Not for graduate credit to students in Social Work. Mr. Livingston, Mr. Daykin

Law as a means of social control. Study of case, statute and constitutional law most frequently involved in social work practice. Legal aid.

720 (3) A.W. Research Methods in Social Work I. 2 cl, 1 2 hr lab. Prereq: 511 or equiv. Not open to students who have credit for 680. Mr. Cornell, Mr. Eisenstein, Mr. Crymes

Designed to prepare students to do social work research. Case, statistical and survey methods are discussed.

721 (3) W.S. Research Methods in Social Work II. 2 cl, 1 2 hr lab. Prereq: 720. Not open to students who have credit for 681. Mr. Cornell, Mr. Eisenstein, Mr. Crymes

Designed to give facility in the use of appropriate methods of analysis and interpretation of statistical data and their application to social work research.

FOR GRADUATES

Students entering upon professional training shall have had at least fundamental courses in sociology, psychology, political science, economics, and history in their undergraduate work. Students desiring to become candidates for the Master of Social Work degree should have at least thirty quarter hours of work in the social sciences, of which at least fifteen shall be a concentration in sociology or an allied social science.

701 (4) A. Social Policies, Problems and Welfare Services. 4 cl. Mr. Livingston

Sequential development, areas of concern and philosophical bases of social work. Current social work programs and services. Concepts and ethical standards.

705 (4) W. Dynamics of Individual Functioning I. 2 cl, 1 2 hr seminar. Prereq: 708. Not open to students who have credit for 827. Mr. Hoffman and Staff

Application of psychiatric knowledge and understanding of normal growth and development in social work practice.

706 (3) S. Dynamics of Individual Functioning II. 2 cl, 1 2 hr seminar. Prereq: 705. Not open to students who have credit for 827. Mr. Hoffman and Staff

Neuroses, psychoses, and other deviations from normal development. Psychodynamic factors and their importance to social workers. Contribution of Clinical Psychologist.

708 (3) A. Dynamics of Social Process. 3 cl. Prereq: 601 or equiv. Mrs. Nichols, Mrs. Mueller

An analysis of the dynamics of selected social factors with their impact upon social work practice.

711 (2) A. Planning Social Welfare Services I. 2 cl, Prereq: 701 and 750 and second yr standing. Not open to students who have credit for 814. Mr. Leedy

Principles and methods of planning community welfare services. Technical aspects of structure, management, and function of agencies concerned with welfare planning and financing are examined.
712 (2) S. Interpretation of Social Work. 2 cl. Prereq: 701, 708 and 730 or equiv. Not open to students who have credit for 815. Mr. Fusery
The place of education in a social work program. The message and the method of educational publicity.

713 (2) A.W. Social Casework I. 2 cl. Not open to students who have credit for 816. Prereq: 701 or concur. Mrs. Prince, Mrs. Sisson, Mrs. Mueller, Mr. Dombroski
The principles and methods of social casework and their application; case records used for study and discussion.

714 (3) W. Social Casework II. 3 cl. Prereq: 713, 708. Not open to students who have credit for 817. Mrs. Prince, Mrs. Sisson, Miss Hayward, Mr. Dombroski
The principles and methods of social casework and their application; case records used for study and discussion.

724 (2) A. Social Work Approach to Juvenile Delinquency. 2 cl. Prereq: 701 and 708. Not open to students who have credit for 822. Mr. Daykin
An examination of the philosophies, approaches, and policies operating in programs which attempt to treat and prevent delinquency.

725 (2) S. Medical Aspects of Social Work. 2 cl. Prereq: 701. Not open to students who have credit for 825. Mr. Burk
Presentation of medical knowledge about disease and disability, emphasizing symptoms, diagnosis, treatment, and convalescent care. The social implication of disease and disability is stressed.

729 (3) W. Rehabilitation I. 3 cl. Prereq: 701, 705 or equiv and permission of instructor. Not open to students who have credit for 832. Mr. Hamilton
Integration of medical and extra-medical services in rehabilitation, with emphasis on understanding the problems of vocational adjustment of the handicapped.

730 (2) W.S. Community Organization for Social Welfare I. 2 cl. Prereq: 701, 708 or equiv. Not open to students who have credit for 830. Mr. Leedy
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.

731 (3) S. Community Organization for Social Welfare II. 3 cl. Prereq: 730. Mr. Leedy, Mr. Shimp
Values, assumptions and social science propositions underlie planned and consciously effected change in the interest of social welfare.

763 (2) A.W. Social Group Work I. 2 cl. Not open to students who have credit for 863. Prereq: 701 or concur. Mrs. Nichols, Mr. Longo
Principles and concepts. Worker's role in enabling members of a group to use group experience for personal growth and development of social responsibility.

764 (3) A.S. Social Group Work II. 3 cl. Prereq: 701, 708 and 763. Not open to students who have credit for 864. Mrs. Baker, Mrs. Nichols, Mr. Longo
Discussion on advanced level of role of worker in effecting group and program processes toward meeting individual needs and group objectives.

775 (3-8) Su.A.W.S. Agency Laboratory Experience I. Open only to first year graduate students in Social Work and arranged by the student's faculty advisor. Repeatable to a maximum of 18 cr hrs. Staff
Planned visits to social agencies, group analysis of observation, followed by assignment to specific agency for beginning responsibilities with recipients of agency service.

801 (1-5) Su (1st or 2nd term or qtr). A.W.S. Special Research Problems. Prereq: graduate standing in Soc Work and permission of instructor. Repeatable to a total of 15 cr hrs. Staff
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
(b) Social Group Work
(c) Social Work Administration
(d) Social Work Research
(e) Social Casework
(f) Community Organization
(g) Rehabilitation of the Handicapped
(h) Psychiatric Social Work
(i) Other Areas
802 (1-4) A.W.S. Area Seminars in Social Work. Open only to graduate students who have completed a minimum of 1 yr in Soc Work. Staff
Organised 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 (2) S. Social Work in Multi-Professional Settings. 2 cl. Prereq: 713 and 768. Mrs. Prince, Miss Hayward
Basic factors involved in social work diagnosis and treatment. Deals with differential co-ordination of client's needs, social worker's abilities, agency's purpose and limitations.

823 (3) S. Social Casework III. 3 cl. Prereq: 714 or 764 or 724. Mrs. Sisson, Mrs. Mueller
Principles and methods of placement, determination of need for placement, preparation and participation of child, selection of subsitute care, foster home or institution, and follow-up.

837 (4) W. Planning Social Welfare Services II. 4 cl. Prereq: 711. Mr. Leedy
Financing welfare services. Planning and conducting fund raising campaigns and budgeting. Problems of planning, specialised services. Designing and adjustment of programs to meet welfare needs.

840 (2) S. Techniques in Probation and Parole Work. 2 cl. Prereq: 701 and 713. Mr. Daykin
Specific policies and skills in making probation and parole investigations, and in supervision of probationers and parolees. Differential services required for juvenile and adult offenders.

843 (3) W.S. The Administration of Social Work Agencies. 3 cl. Prereq: 701, 708, and 713 or 768 or 730. Mr. Livingston, Mrs. Nichols
An introduction to the basic factors in the administration of social agencies.

844 (3) S. Social Security Systems—United States and Foreign. 3 cl. Prereq: 701, 708, 713 or 768 or 730. Mr. Livingston
A study of social security systems with special reference to the United States. Emphasis is given to the public assistance phases of such programs.

852 (2) S. Supervision in Social Work. 2 cl. Prereq: 843 or permission of instructor. Open to 2nd yr students in Soc Work and other graduate students with permission of instructor. Mrs. Nichols
An examination of the nature and function of the supervisory process in the practice of social work. An analysis of concepts and methods of social work supervision as they apply to personnel practices and to the process of staff development and growth.

857 (1-3) A. 858 (1-3) W. 859 (1-3) S. Seminar in Social Work Research and Statistics. Prereq: 720 and 721 or equiv, and permission of instructor. Mr. Cornell, Mr. Eisenstein
Critical examination of problems in planning and administration of social work research projects. Evaluation of methods and findings of selected studies in social work field.

862 (2) S. Seminar in Psychiatric Applications in Social Work. 2 cl. Prereq: 714, 764 or equiv. Mrs. Prince
Application by the social caseworker of psychiatric understanding and treatment to more severe problems of emotional disturbances.

865 (3) S. Social Group Work III. 3 cl. Prereq: 705, 764 or equiv. Mrs. Baker, Mrs. Nichols, Mr. Longo
Advanced study of social group work theory and practice.

875 (6-15) S. A.W.S. Agency Laboratory Experience II. Prereq: 775. Open only to second year graduate students in Social Work. Repeatable to a maximum of 26 or hrs. Staff
Application of social work theory in selected social agency settings. Joint direction and evaluation by agency staff and faculty.

876 (2) W. Institutional Care and Treatment of the Social Offender. 2 cl. Prereq: 705 or equiv. Mr. Daykin
A monographic analysis of outstanding correctional institutions for juvenile and adult offenders.
881 (3) W. Community Organization for Social Welfare III. 3 cl. Prereq: 731. Mr. Leedy
Role of professional worker in setting goals. Evaluation of community effort in building balanced programs. Effects of national agencies on local programs.

883 (2) S. Seminar in Integration of Social Work. 2nd yr grad standing in Social Work. Staff
A discussion of theory and practice based upon experience in field instruction, with emphasis upon the interpretation of specific areas of social work practice.

899 (1-5) A.W.S. Interdepartmental Seminar.
(See under Interdepartmental Seminars.)

Research for thesis or dissertation purposes only.

SOCIOLOGY
Department of Sociology and Anthropology
Office, 112 Hagerty Hall

PROFESSORS SLETTED, BERRY, BULLOCK, CUBER, DENUNE (EMERITUS), JONASSEN, MANGUS, OYLER, AND RECKLESS. ASSOCIATE PROFESSORS BOURGUIGNON, CLARKE, DINTZ, DYNES, GEIGER, HAAS, HINKLE, MUNRO, AND NISSEN.
ASSISTANT PROFESSORS CLATWORTHY, CORWIN, EYNON, GLASS, HELFICH, LEFTON, NAGI, QUARANTELLI, VAN DER ZENEN, AND ZELNIK. INSTRUCTORS GLEAST AND SEBOLD

FOR UNDERGRADUATES

401 (5) Su, A.W.S. Introductory Sociology. 5 cl. Not open to students who have credit for 410, or 507, or 511 or Rur Soc 405. Mr. Cuber, Mr. Geiger
A study of the fundamental concepts of sociology and an introduction to the analysis of social problems.

402 (5) Su, A.W.S. Social Trends and Problems. 5 cl. Prereq: 5 hrs of Soc or equiv with permission of instructor. Not open to students who have credit for 410 or 511. Mr. Dintz and Staff
Analysis of recent social trends and contemporary social problems.

407 (5) Su, A.W.S. Educational Sociology. Field trips, visits to local institutions, projects. Prereq: 5 hrs in Soc. Mr. Bullock, Mr. Corwin, Mr. Nissen
Sociological background of school children, current social trends as they affect education and resultant social functions of the school.

505 (5) A.W.S. The Sociology of Urban Life. 4 cl, 1 2 hr lab. Prereq: 5 hrs of Soc or equiv with permission of instructor. Mr. Jonassen, Mr. Schwirian
The place of the city in social organization. The emergence, nature, and problems of modern urbanism. Projects based on census and field data.

506 (3) W. Race Problems in the United States. 3 cl. Prereq: 5 hrs of Soc. Not open to students who have credit for 664. Mr. Vander Zanden
The cultural background, distribution, and adjustments of selected racial and ethnic groups in the United States.

507 (5) Su, A.W.S. Fundamentals of Sociology. 5 cl. Prereq: Hist 423. Not open to students who have credit for 401, 410, or 511. Mr. Berry and Staff
A study of the nature of society and the factors affecting its development; culture, personality; groups and institutions; selected social problems.

510 (4) S. The Standard of Living. 4 cl. Prereq: 5 hrs of Soc or equiv with permission of instructor, or Econ 402. Mr. Nissen
A consideration of the content of the various standards of living in American society, their economic and social significance. Problems in family budgets and retail buying.

518 (3) W. Social Implications of Low Income. 3 cl. Prereq: 5 hrs of Soc, or equiv with permission of instructor. Mr. Nissen
A study of low-income peoples, especially concerning the effect of low-income on them, and their consequent social participation.

520 (3) Su, A.W.S. Factors in Successful Marriage. 3 cl. Mr. Clarke, Mr. Dynes, Mr. Nissen
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.
562 (3) A. Social Change. 3 cl. Prereq: 5 hrs of Soc or equiv with permission of instructor. Not open to students who have credit for 662. Mr. Dinitz
Recent social changes, especially in Western civilization and the United States. Types of societies in historical perspective. Requirements of a good society.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 (4) Su,A,W,S. The Modern Family. 4 cl. Mr. Oyler, Mr. Nissen
Impact of modern culture upon the family, including size of family, member relationships, economic problems, divorce, desertion, status of women.

601 (4) W. Types of Family Organization. 4 cl. Prereq: 600. Mr. Oyler
Analysis of family organization in various societies and groups; problems of comparative study.

602 (3) S. Marriage Education Programs in the United States. 3 cl. Prereq: 600. Mr. Oyler
A critical examination of programs designed as preparation for family life in the United States.

604 (3) Su,A,W,S. Race Relations. 3 cl. Mr. Berry
A survey of the problems arising from the contacts of people who differ as to race and culture.

612 (3) A,W. Human Relationships in Industry. 3 cl. Miss Helfrich
Social processes and problems associated with contemporary industry including growth of formal and informal organizational structure, communication processes, attitude problems and morale.

614 (4) A. The Community. 4 cl. Mr. Jonassen
Development of the modern community. Approaches to the study of communities. Significance to processes and value systems for community organization and disorganization.

620 (5) S. Sociological Interpretation of Modern Values. 5 cl. Prereq: 401 or 507. Mr. Geiger
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.

621 (5) W. Contemporary Soviet Society. 5 cl. Prereq: 25 hrs of social science of which at least 10 must be in Soc, or permission of instructor. Mr. Geiger
Organization, development, and problems of the Communist Party, the collective farm, the school, professional occupations, economic planning and other contemporary Soviet institutions.

622 (4) A. Social Factors in Personality. 4 cl. Mr. Quarantelli

623 (3) Su,W,S. Collective Social Behavior. 3 cl. Mr. Quarantelli
A study of the kinds of mass action arising in crowds, mobs, strikes, audiences, and the public. Problems and techniques of study and control.

624 (3) S. Culture Patterns and Personality. 3 cl. Prereq: 622 or Psychol 521 or equiv. Mrs. Bourguignon
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.

625 (5) Su,A,W,S. Criminology. 5 cl. Mr. Dinitz, Mr. Eynon, Mr. Reckless
The nature, variation, and causes of crime and delinquency. Studies of criminal liability, criminal careers, and organized racketeering.

626 (5) A.S. Penology. 5 cl. Prereq: 625. Not open to students who have credit for Soc Work 626. Mr. Eynon
The handling and treatment of adult offenders by courts, jails, reformatories, prisons, probation, and parole.

627 (3) S. Sociological Aspects of Mass Communication. 3 cl. Prereq: 10 hrs of Soc or equiv with the permission of the instructor. Mr. Quarantelli
Selective analysis of communicators, contents, audiences, and effects of mass media. Research procedures, findings, and theoretical formulations, drawn primarily from studies of popular culture.
629 (4) A. General Sociology. 4 cl. Mr. Hinkle
A critical examination of the more fundamental ideas and concepts of modern scientific sociology.

643 (4) A. Analysis of Small Groups. 4 cl. Prereq: 10 hrs of Soc and 10 hrs of Psychol or equiv with permission of instructor. Mr. Haas
Effect of size on group processes. Analysis of social interaction, communication patterns, and functional roles within small groups. Observation techniques.

644 (3) S. Sociology of Complex Organizations. Prereq: 10 hrs of Soc or equiv with permission of the instructor. Mr. Haas
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.

645 (4) A.S. Leisure and Recreation. 4 cl. Mr. Clarke

648 (3) A.S. Religious Institutions in Modern Society. 3 cl. Mr. Dynes
The social role of religious institutions and beliefs, with particular reference to the United States; the relation between religion and other aspects of society.

650 (3) A.S. Medical Sociology. Prereq: 10 hrs of Soc or equiv with permission of the instructor. Mr. Nagi
An analysis of the sociological factors in illness and health, as well as the role of medicine and the health professions in modern society.

660 (5) W.S. Development of Sociological Thought. 5 cl. Prereq: 15 hrs of Soc or equiv. Mr. Hinkle
A survey of major concepts and conceptions in sociology in relation to their social-historical setting, from 1886 to the present time.

663 (3) S. Social Control. 3 cl. Mr. Hinkle
A theory of social control and analyses of selected cases of social control. Text, class reports, projects.

668 (4) A. Development of Social Thought. Prereq: 10 hrs of Soc or equiv with permission of the instructor. Mr. Hinkle
A sociological analysis of Western ideas on social relations before the advent of the social sciences.

675 (4) W. Social Stratification. 4 cl. Mr. Dynes
Class distinctions as phase of social differentiation. Origin and characteristics of social classes. Significance for modern society of class consciousness, class struggle, and social mobility.

677 (4) A. Social Organization in a Changing World. 4 cl. Mr. Cuber
An examination of present institutional organization in American society. The impact of world problems upon American culture.

678 (3) W. The School and the Community. 3 cl. Mr. Jonassen
The school as a social institution in the American community. The sociological importance of community, processes, and problems in determining school-community relationships.

680 (4) Su (Offered 1st term only), W. Social Orientation of Children. 3 cl and 1 hr for field study of a child group. Prereq: 402 or 407 or permission of instructor. Mr. Clarke
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.

684 (5) A.W.S. Types of Sociological Inquiry. 3 cl, 2 2 hr lab. Prereq: 20 hrs of Soc or equiv with permission of the instructor. Mr. Eynon
Introduction to sociological research techniques, methodological approaches, and relevant quantitative procedures.

700 (1-4) Su, A.W.S. Special Problems. Prereq: 10 hrs of Soc. Permission of instructor.
INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

700A Sociological Theory
700B Social Organization and Planning
700C Medical Sociology
700D Criminology and Penology
700E Educational Sociology
700F Race Relations
700G Social Psychology
700H The Family
700I Research Methodology
700J Urban Sociology
700K Undergraduate Seminar on Contemporary Sociological Issues
700L Unclassified
704 (3) W. Population Dynamics and Social Change. 2 cl, 1 2 hr lab. 
Prereq: 10 hrs of Soc or equiv with permission of instructor. Mr. Zelnik 
Changes in size, composition, and distribution of populations, the dynamics underlying 
them, and their social consequences.

705 (4) A.W. Sociological Research Methods. 4 cl. Prereq: 402, 407, 410, 
or 507, a course in elementary statistics and senior standing. Not open to stu-
ents who have credit for 800. Mr. Bullock, Mr. Nagi 
Delineation of a research problem in sociology. Uses of available sources of data. Sampling 
procedures of sociological research. Field methods for collecting original data. Sociometric 
Instruments.

706 (4) W. Methods of Social Measurement. 4 cl. Prereq: 705 or Soc Work 
720. Not open to students who have credit for 880. Mr. Bullock 
A critical evaluation of social surveys, areal and regional studies, the ecological approach, 
sociometric studies, prediction of outcome, and case study methods.

707 (4) S. Experimental Design in Sociological Research. 4 cl. Prereq: 705 
or Soc Work 720 and Math 435 or its equiv. Mr. Bullock 
Analysis of the use of social sampling procedures, control groups, replication, and validation 
of research findings.

714 (3) S. Sociological Analysis of the Community. 3 cl. Prereq: 505 or 
614 or equiv with permission of instructor. Mr. Jonassen 
Methods, techniques, sources of data and objectives of community analysis.

725 (3) A. Control and Prevention of Crime and Delinquency. 1 2 hr cl. 
One field project. Prereq: 625. Mr. Reckless 
Analysis of the operational effectiveness of special measures and programs pointed toward 
the control and prevention of crime and delinquency.

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the 800 or 900 group 
except by permission of the Graduate Council.

861 (3) A. 862 (3) W. Problems in Social Organization. Not open to stu-
dents who have credit for 860. Mr. Cuber, Mr. Haas 
A critical examination of problems in social organization, theory, and research.

884 (3) S. Advanced Criminology. Prereq: 825. Mr. Reckless, Mr. Eynon 
A critical study of the most important aspects of criminology.

855 (3) S. Contemporary Sociological Theory. Prereq: 660 or equiv. Mr. 
Hinkle 
A critical examination of problems and issues central to recent developments in sociological 
theory.

899 (1-5) Su,A,W,S. Interdepartmental Seminar. 
(See under Interdepartmental Seminars)

900 (1-4) Su,A,W,S. Seminars in Sociology. Fields of specialization are 
listed under the description of 700, and registration in 900 should be followed by 
an alphabetical letter indicating the field of the seminar.

950 (are) Su,A,W,S. Research in Sociology. 
Research for thesis or dissertation purposes only.

SPANISH

Department of Romance Languages and Literature
Office, 115 Derby Hall

PROFESSORS BABCOCK, RIVERS, AND ROGERS, ASSOCIATE PROFESSORS ARMITAGE, 
GRiffin, BOZELL, AND SCHOLBERG, ASSISTANT PROFESSORS ANGELO, 
MARY BORELLI, MARTHA FROSCH, AND ROBERTSON (EMERITUS), MR. BERN, 
MISS LEVISI, MR. LARKINS, MR. PARDO, MISS WALSHE (EMERITUS), AND 
ASSISTANTS

FOR UNDERGRADUATES

401 (5) Su,A,W,S. Elementary Spanish. Sections limited to 25 students. 
This course may not be taken simultaneously with French 401-402, Itali 401-402, 
or by students ineligible to take Engl 416. Credit in Spanish 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. Staff 
Elements of Spanish grammar, with oral and written exercises. Attention to ear training 
and oral practice. Elementary reading based on Spanish geography, history and customs.
402 (5) Su,A,W,S. Elementary Spanish. Prereq: 401. Sections limited to 25 students. This course may not be taken simultaneously with French 401-402, Ital 401-402. Staff

The elements of Spanish grammar with abundant oral and written exercises. Development of conversational skill. Reading, vocabulary building, attention to Spanish idioms.


Continuation of Spanish grammar, attention to idioms. Reading of short stories, plays and novels.


Reading of Spanish plays, short stories, and novels. Emphasis on oral practice and Spanish idioms.

410 (5) A,W,S. Elementary Spanish Conversation and Composition. Prereq: 404. Course conducted in Spanish. Sections limited to 15 students. Mr. Pardo

Intensive practice in oral and written Spanish, based on texts and periodicals concerned with contemporary Spain and Spanish America. Grammar and idiom review.

415 (5) W. 416 (5) S. Elementary-Intermediate Spanish for Selected Students. 5 cl. Prereq: Grade "A" in 401 and permission of Department. Successful completion of 401-415 fulfills language requirements and satisfies prereq for 500 courses. Staff


Not open to students who have credit for 417. Staff

Reading and discussion of important modern works.

518 (2) A,S. Review Grammar and Composition. Prereq: 410. Mr. Angelo

Review of Spanish grammar; composition on assigned topics and practice in translation.

521 (2) A. Intermediate Spanish Conversation and Composition. Prereq: 410. Mrs. Froesch, Mr. Pardo

Vocabulary building, practice in speaking Spanish, conversation and composition dealing with aspects of Spanish life.

522 (2) W. Intermediate Spanish Conversation and Composition. Prereq: 410. Mrs. Froesch, Mr. Pardo

Vocabulary building, practice in speaking Spanish, conversation and composition dealing with aspects of Spanish and Spanish American life.

530 (5) A. Masterpieces of Spanish Literature. Prereq: 417 or 517. Mr. Babcock

705 (3-10) A. 706 (3-10) W. 707 (3-10) S. Honors Courses in Spanish. Prereq: senior standing with a record of A in at least half of the Spanish courses and an average of B in the remainder, and the approval of the department. This course is intended to give undergraduates of special aptitudes a greater opportunity to do independent study than is possible in the ordinary course.

Work in conference, library or phonetics laboratory.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

According to University regulations, courses in this group are open to freshmen or sophomores.

Students intending to major in Spanish in the College of Arts and Sciences and in the Graduate School may elect the following courses outside the department: Latin 627, Classical Languages 520-521-522, Philosophy 515, 661, 662, 663, 604, German 705, 706, History 845-846, and Fine Arts 674-675.

605 (3) Su,S. Advanced Composition and Conversation. Prereq: 520, 521 or 522 and either 530 or a 600 course in Spanish literature. Staff

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.

#1607 (5) A. The Spanish Novel of the Nineteenth Century. 4 or 5 cl. Prereq: 417 or 517.

A study of the development of the modern Spanish novel with particular attention to the works of Pérez Galloé.
#608 (5) S. The Spanish Novel of the Twentieth Century. 4 or 5 cl. Prereq: 417 or 517. Mrs. Froshch
Works of Pio Baroja, Valle-Inclán, Píve de Ayala, Ramón Sender, and others.

#610 (5) W. Modern Spanish Drama. 4 or 5 cl. Prereq: 417 or 517.
The development of the Spanish drama in the late nineteenth and twentieth centuries. Works of Benavente, Valle-Inclán, and García Lorca will receive special emphasis.

#611 (5) W. Drama of the Golden Age. 4 or 5 cl. Prereq: 417 or 517.
equiv. Mr. Rozzell
An intensive study of a limited number of plays of the representative dramatists, particularly Lope, Tirso, Alarcón, and Calderón.

#613 (5) S. The Picaresque Novel. 4 or 5 cl. Prereq: 417 or 517.
An intensive study of Lazarillo de Tormes, Guamán de Alfarache, El Bucón and El diablo cojuelo.

614 (5) W. Cervantes. 4 or 5 cl. Prereq: 417 or 517. Mr. Rogers, Mr. Rivers
An intensive study of Don Quijote.

#615 (5) A. Survey of Spanish Literature of the Twelfth to Sixteenth Centuries. 4 or 5 cl. Prereq: 417 or 517. Mr. Scholberg

#616 (5) Spanish Literature of the Seventeenth Century. 4 or 5 cl. Prereq: 417 or 517.

617 (5) A. Modern Spanish Syntax. Prereq: 517 and 518 (or 520) or equivalent. Mr. Rozzell
Systematic study of Spanish grammar with composition and other exercises based on contemporary authors. Modern tendencies in syntactic analysis.

#618 (5) A. Survey of Spanish Literature of the Sixteenth Century. 4 or 5 cl. Prereq: 417 or 517. Mr. Rivers

620 (5) A. Spanish Pronunciation and Diction. 4 cl hrs, 1 hr lab. Prereq: 417 or 517. Class limited to 12 students. Mr. Griffin
Introduction to Spanish phonology. A systematic analysis of the speech sounds of Peninsular and American Spanish.

623 (3) W. Spanish Translating. Prereq: 617 or equiv. Mr. Rozzell
Translations from Spanish to English and from English to Spanish.

#631 (5) A. Romanticism in the Hispanic World. 4 or 5 cl. Mrs. Froshch
A study of dramatists, poets, novelists, and essayists designed to bring out the literary unity of the Hispanic world in the Romantic period.

#639 (5) S. The Modern Spanish American Novel. 4 or 5 cl. Prereq: 417 or 517.
The development of the novel in the various regions of Spanish America in the twentieth century.

640 (3) W. Twentieth Century Spanish Literature. Prereq: 417 or 517. Mrs. Froshch
Principal figures and works of the twentieth century from Unamuno to the present day.

641 (5) S. Contemporary Hispanic Poetry. Prereq: 417 or 517. Mrs. Froshch
Currents of Spanish and Spanish American poetry from Rubén Darío to the present time.

645 (3-5) Su. Spanish Literature. Prereq: 417 or 517. Repeatable to a maximum of 15 cr hrs.
Topic: To be announced.

701 (1-5) Su, A,W,S. Minor Problems in Spanish. Prereq: permission of instructor. Staff

729 (3) A. History of the Spanish Language. Req'd of M.A. candidates; others by permission of instructor. Mr. Scholberg
A survey from Roman times to the present with emphasis on cultural and social factors. The relations of language to literature.

FOR GRADUATES

407 (0) Su, A,W,S. Reading of Spanish. 3 cl. no prereq. Graduate students only. The fee for this course will be the same as that for a three-hour credit course. No hours credit will be allowed for this course of graduation. Mr. Larkin
Designed primarily for students who have had no formal preparation in Spanish and who wish to acquire a reading knowledge.
SPANISH

805 (3) W. Old Spanish. Prereq: knowledge of Latin. Reqd of all Ph.D. candidates. Mr. Griffin
Development of Old Spanish Phonology and Morphology.

806 (3) S. Old Spanish. Prereq: 805. Mr. Griffin
History of Spanish syntax and vocabulary.

816 (2-3) Su. (3-5) A. Seminar in Spanish Literature. Prereq: permission of instructor
Su. 1st Term. Mr. Rivers: To be announced.

817 (2-3) Su. (3-5) W. Seminar in Spanish Literature. Prereq: permission of instructor
Su. 2nd Term. Mr. Rivers: To be announced.
W. Mr. Rivers: The XVI Century Sonnet.

818 (3-5) S. Seminar in Spanish Literature. Prereq: permission of instructor. Mr. Babcock
S. The poetry of Antonio Machado.

821 (3) S. Old Spanish Literature. Req'd of all M.A. candidates. Mr. Scholberg
A literary approach to medieval poetry and prose.

880 (3) S. Bibliography and Method. Req'd of all Ph.D. candidates in Spanish. Mr. Rozzell
A course to acquaint graduate students with problems, tools, and methods of linguistic and literary research.

950 Su, A,W,S. Research in Spanish Language or Literature.
Research for thesis purposes only.

SPEECH
Office, 205 Derby Hall

PROFESSORS YEAGER, WILEY (EMERITUS), HARDING, SUMMERS, KNOBER, SANDERSON, MOSER, BLACK, MCDOWELL, UTTERBACK, HULL, AND SCHLENGER, ASSOCIATE PROFESSORS SCHRECK, CARMACK, IRWIN, FOTHERINGHAM, LEWIS, EWIN, RILEY, MALL, DEWEY, BOWEN, LYNCH, BROOKS, AND STROMSTA, ASSISTANT PROFESSORS MORRISON, CREPEAU, RUTTER, CRAWFORD, AND TAYLOR, MR. RIEKE, MR. BAKINS, MR. FISHER, MISS FITCH, MR. MOWROR, AND ASSISTANTS

FOR UNDERGRADUATES

401 (5) Su, A,W,S. Effective Speaking. 5 cl. Mr. Knowler and Staff
The principles of effective speaking. Preparation and presentation of informative and persuasive speeches. The speech process with emphasis on speech as a thinking process.

402 (5) Su, A,W,S. Group Discussion. 5 cl. Mr. Utterback and Staff
Designed to develop the attitudes, skills, and knowledge of methods favorable to effective participation in discussion by conferences, committees, and other small groups.

reqd. Mr. Black, Mrs. Morrison
Auditory training to identify sounds, stress, and intonation patterns and training in speaking to acquire the language, articulation, pronunciation, and rhythm of American speech. 5 or hrs will be added to graduation requirements.

410 (0 or 3) Su, A,W,S. Personal Speech and Hearing Rehabilitation. 5 cl. Repeatable. Credit shall not count toward graduation. Mrs. Morrison, Mr. Stromsta, Mrs. Irwin, Mr. Moser, Mr. Taylor

INCLUDE LETTER WITH NUMBER ON SCHEDULE CARD

For students with speech or hearing disorders.
A. Articulation
B. Voice
C. Stuttering
D. Impaired Hearing
E. Foreign Dialect (Permission of Instructor)

416 (2) Su, A,W,S. Introduction to Speech. 2 cl. Mr. Yeager and Staff
This course is designed for students who wish to have a broad overview and understanding of the field of speech.
417 (2) Su,A.W.S. Voice and Diction. 3 cl. Repeatable. Mr. Black, Mr. Moser, Mrs. Irwin, Mrs. Morrison
Introductory study of the principles of a satisfactory speaking voice. Designed for the student concerned about the adequacy of his speech.

430 (3) Su,A.W.S. Introduction to Theatre. 4 cl. Mr. Bowen, Mr. Crepeau and Staff
A study of the theatre with emphasis upon its cultural and social influences in our society.

470 (5) A.W.S. Argumentation and Debate. 5 cl. Prereq: 401. Mr. Rieke
Principles of reasoned discourse and their application to controversial issues.

501 (3) A.W.S. Principles of Effective Speaking. 3 cl. Open only to juniors and seniors. Not open to students who have credit for Speech 401. Mr. Knowler and Staff
A short course in the speech processes and speech composition. Audience analysis and adaptation. Preparation and presentation of informative and persuasive speeches.

504 (3) Su,A.W.S. Speech Functions and Responsibilities of the Teacher. 3 cl. Mr. Schlander and Staff
A study of speech and hearing deviations commonly found in classrooms and of the teacher’s role in an improvement program.

505 (5) Su,A.W. Fundamentals of Oral Interpretation. 5 cl. Mr. Brooks
Introductory course to develop understanding and appreciation of literature through the oral re-creation of literary materials and critical listening.

506 (3) A.W. Persuasion. 3 cl. Mr. Fotheringham
Analysis of the motivations which lead to belief and action of individuals and audiences.

508 (2) A.S. The Speech Situation. 2 cl. Mr. Fotheringham
A study of oral communication as a social process in terms of speaker-listener relationships.

509 (2) A.W.S. Personal Speech Effectiveness. 2 cl. Not open to students with credit in Speech 517. Mr. Riley and Staff
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.

511 (2) A.W.S. Parliamentary Law. 2 cl. Mr. Carmack, Mr. Rieke

521 (3) Su,A.W.S. Acting I. 2 2 hr cl. (Su, 3 2 hr cl). Mr. Ritter
Fundamentals of acting for stage, radio and television.

522 (3) Su,W.S. Acting II. 2 2 hr cl. (Su, 3 2 hr cl). Mr. Ritter
Imaginative creation of character for stage, radio and television.

525 (1) W. Stage Make-up. 1 3 hr lab. Mr. Crepeau
Fundamentals of stage make-up for straight and character roles.

541 (3) A.W. Elementary Stagecraft. 2 cl. 1 3 hr lab. Mr. Dewey
Basic aspects of stagecraft for theater and television.

545 (3) Su,A.S. Play Production. Mr. Schreck, Mr. Lewis
Principles of mounting and staging a play including the theories of play selection and analysis.

560 (3) A.W.S. Radio and Television Speech. 5 cl. Mr. Riley and Staff
Speaking in the radio or television situation; basic training in preparation and presentation of radio and television talk and interview materials.

565 (2) W.S. Introduction to Radio and Television Production. 5 cl. Prereq: 560 or equiv. Mr. Mall and Mr. Lynch
Basic experience in the production and directing of radio and television programs of types presented by local stations.

566 (1) A,W,S. Broadcasting Laboratory Practice. 1 cl, 1 3 hr lab. Prereq: 560 or equiv. Repeatable to a maximum of 5 cr hrs. Mr. Mall and Staff
Experience in presentation of radio and television programs under broadcasting conditions.

571 (2) W. Radio and Television Program Departments. 3 cl. Prereq: 560 or permission of instructor. Not open to students with credit in Speech 572. Mr. Mall
Organization and functions of station program departments; staff requirements, traffic, music library organization, continuity department operations.
580 (3) Su,A,W,S. Bases of Speech Production. 3 cl. Mr. Moser, Mr. Stromsta
An analytical study of speech, particularly an orientation to the psychological, neurological, physiological, physical, genetic, phonetic, sociological, linguistic, and semantic aspects of speech production.

585 (3) Su,W. Introduction to Phonetics. 3 cl. Prereq: 580 recommended.
The International Phonetic Alphabet as applied to American Speech. Analysis of the physiological positions and movements involved in the production of English speech sounds.

590 (3) Su,W. Speech Development in Children. 3 cl. Mr. Moser
Language growth from the first vocalization to the expression of abstract thought. Deviations from the normal patterns are noted.

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 for forensic activities, see Mr. Rieke; for tryouts for theatre activities, see Mr. Dewey.
Do not register for these courses without written permission of the instructor. Students accepted for the Forensic Activity group will register for Speech A; those accepted for the Theatre Activity group will register for Speech B.

A (1) Su,A,W,S. Forensic Activities. A minimum of 3 hrs of group participation each week. Repeatable to a maximum of 6 cr hrs. Mr. Rieke

B (1) Su,A,W,S. Theatre Arts. Mr. Dewey
A minimum of three hours of theatre work each week.

FOR ADVANCED UNDERGRADUATES AND GRADUATES
According to University regulations, courses in this group are not open to freshmen or sophomores.
University requirements for any of the courses in this group specify a prerequisite of junior standing and either (a) thirty quarter hours in not more than two allied subjects, or (b) ten hours in such allied subjects, plus ten hours in Speech. Five hours each from the 401-402 and 410-417 sequences are advisable.

601 (5) Su,A. The Forms of Public Address. 5 cl. Mr. Carmack
The organization, style, and delivery of speeches for special occasions.

603 (5) A,S. Group Thinking and Conference Leadership. 5 cl.
The methods and procedures employed in setting up conferences and in leading conferences and committee discussion.

610 (5) S. Advanced Argumentation and Debate. 5 cl. Prereq: 470. Mr. Carmack
History of the theories of formal argument with study of representative examples of oral argumentation.

617 (3) Su. Problems of American Phonetics. 3 cl. Prereq: 585
The chief problems treated are: phonetic alphabets and dictionaries, research in dialect, and phonetic analysis.

620 (3) W. Ancient Rhetorical Theory. 3 cl. Mr. Harding
A study of the contributions of early Greek and Roman speech teachers and theorists.

621 (3) S. British Rhetorical Theory. 3 cl. Mr. Carmack
The contributions of British speech teachers and theorists from the Renaissance to the present.

623 (3) S. British Speakers and Speech Making. 3 cl. Prereq: 621. Mr. Harding
Analysis and criticism of leading British speeches from the Renaissance through World War II.

624 (3) S. American Speakers and Speech Making. 3 cl. Prereq: 621.
Mr. Carmack
Analysis and criticism of historic American speeches.

625 (3) Su,W. Advanced Acting. 2 2 hr cl. Prereq: 522 or equiv. Mr.
Bowen, Mr. Ritter
Advanced study of the theories of acting as related to historical and contemporary developments.

627 (2) Su,A. Stage Design. 1 cl, 3 hrs lab. Prereq: 541 or concur.
Mr. Crepeau
Principles of design as applied to dramatic production.
Ed. 627. The Teaching of Speech in Secondary Schools.  
(See under Education)

Ed. 628. The Teaching of Dramatics and Oral Interpretation in Secondary Schools.  
(See under Education)

629 (3) Su,S. Stage Lighting. 2 cl, 1 3 hr lab. Prereq: 541. Mr. Dewey  
Theories in the illumination of stage productions and the creation of aesthetic effects.

631 (3) Su,A. 632 (3) W. 633 (3) S. History of the Theatre. 3 cl. Prereq: Engl 550 or 555; Engl 670 is recommended. May be taken in partial fulfillment of the Humanities requirement in Arts and Sciences and Education. Mr. McDowell  
The rise and development of the theatre; Classical, Medieval, Renaissance, Commedia dell’arte, later English and Continental, and Modern.

Psych 632 (3) W. The Psychology of Speech.  
(See under Psychology)

Psych 633 (2) S. The Psychology of the Audience.  
(See under Psychology)

641 (3) W. History of Stage Costume. 2 2 hr cl. Prereq: 631 or concur. Mr. Crepeau  
History of costume from the Egyptian period through the 19th century.

646 (3) W. Stage Direction. 3 2 hr cl. Mr. Schreck  
Theories and principles of play direction.

651 (3) A. Modern Theatre Styles. 3 cl. Prereq: Engl 670 or equiv. Mr. Schreck, Mr. Bowen  
Realistic and non-realistic styles in the modern theatre.

652 (3) Su,A,W,S. Broadcast Programs and Audiences. 3 cl. Mr. Summers, Mr. Mall  
Broadcast program types, requirements of effective structure, listener characteristics and preferences in relation to program selection and listener attention.

654 (3) A.S. Writing for Radio and Television. 3 cl. Prereq: 652, Engl 505 or equiv. Mr. Mall, Mr. Lynch  
Writing of continuities for non-dramatic radio and television programs of types presented on local stations.

662 (3) S. Radio and Television Drama. 3 cl. Prereq: at least 10 cr hrs in radio-television, theatre or dramatic literature. Mr. Riley  
Analysis of dramatic program forms and elements in broadcast dramatic programs; study of radio and television dramatic program scripts; writing of original scripts for broadcast.

670 (2) Su,A,W. Radio and Television Program Planning. 3 cl. Prereq: 652. Mr. Summers, Mr. Lynch  
The planning of new programs for radio and television, to the format stage. Replanning programs already on the air, for increased effectiveness.

672 (3) Su,A,S. Television Programming. 3 cl. Prereq: 652. Mr. Mall, Mr. Lynch  
Critical analysis and evaluation of television programs and program forms; factors considered in the over-all scheduling of programs on television stations.

677 (5) A.S. Anatomy and Physiology of the Ear and Vocal Mechanisms. 3 cl, 2 2 hr lab. Mr. Stromsta  
The structure and functions of the speaking and hearing mechanisms.

678 (3) W. Hearing and Speech. 3 cl. Prereq: 682 or equiv and Physics 645. Mr. Black  
Theoretical concepts and supporting data of the process of hearing with particular reference to the reception of speech.

682 (3) Su,A. Introduction to Audiology. 3 cl. Prereq: 10 cr hrs in Speech and Psychol. Mr. Taylor  
Introduces the student to the study of aberrant hearing. Information on prevalence, causes, types, and effects of impairments of hearing.
683 (3) W. Speech Reading. 5 cl. Prereq: 580, 585, 682. Mr. Taylor
Study of major theories of speech reading.

684 (2 or 3) A.W.S. Speech Reading Clinic. 5 cl. Prereq: 683. Repeatable one time. Mr. Taylor
Clinical application of principles studied in Speech 683.

688 (3) Su.W. Audiometry: Principles and Practices. 3 cl, 1 3 hr lab.
Prereq: 682. Mr. Taylor
Study of the functional tests of hearing including individual and group screening and threshold tests.

690 (3) Su. The Pre-School Deaf Child. 5 cl. Prereq: 590.
Study of the problems of communication of the deaf child.

694 (3) Su.A. Speech Disorders Survey. 3 cl. Prereq: 580, 585, 590. Mr.
Moser, Mrs. Morrison
Introduces the student to the study of disorders of speech. Information on prevalence, causes, types, and effects.

695 (3) W. Speech Pathology I. 3 cl. Prereq: 694. Mr. Moser
Consideration of the deviant voice and articulation that accompanies cleft palate, cerebral palsy, maxillo-facial injuries, and other physical disabilities.

696 (3) Su.S. Speech Pathology II. 3 cl. Prereq: 694 and 10 hrs of Psychol.
Mrs. Irwin
Consideration of psychological aspects of speech disorders, including stuttering and psycho- genic disabilities.

697 (3) Su.W. Clinical Principles in Speech Therapy. 5 cl. Prereq: or concur: 694. Mrs. Irwin
A study of the examination, diagnosis, and correction of speech disorders.

698 (2 or 3) Su.W.S. Clinical Practice in Speech Therapy. 5 cl. other hrs
arranged. Prereq: 417, 695, 697 or permission of instructor. Repeatable one
-1time. Mrs. Irwin
Clinical application of the principles studied in Speech 697.

700 (1-5) Su.A.W.S. Minor Problems in Speech. Conf, library and lab
work. Prereq: permission of the instructor and chairman of the department.
Repeatable to a maximum of 15 cr hrs.

Psych 704 (3) Su.A.S. Tests and Measurements in Speech Education.
(See under Psychology)

705 (3) Su.A. Areas and Techniques of Research in Speech. 3 cl. Prereq:
-25 hrs in Speech. Mr. Knowler
A review and critical commentary on typical methods of research in each of the principal areas of graduate research in speech. Research reports.

[710] (3) W. Contemporary Speeches. 3 cl. Mr. Harding
Analysis of important speeches delivered since World War II.

727 (3) S. Period Scene Design. 2 cl, 3 hrs lab. Prereq: 627 and 631, 632,
633 or concur. Mr. Crepeau
Advanced study in the aesthetics of stage design related to major historical periods.

735 (5) S. Theatrical Criticism. 5 cl. Prereq or concur: one of the following:
Engl 676, or 677, or 670. Mr. McDowell
Critical theories from the Greek to the modern period with particular reference to the influence of the theorists, church, state and press.

[740] (3) W. Theatre Organization and Management. 3 cl. Mr. Schreck
Organization and management of the school, college, church and community theatres.

741 (2) Su.S. Costume of Period Drama. 1 cl, 3 hrs lab. Prereq: 641 and
631, 632, 633 or concur. Mr. Crepeau
An intensive study of the design factors requisite to the successful costuming of the plays of major historical periods.

743 (3) Su.A. Children's Theatre. 3 cl. Prereq or concur: 646. Mr. Schreck,
Mr. Lewis
Directing and producing plays for children.
SPEECH 305

745 (5) S. Advanced Theatre Direction and Production. 3 2 hr cl. Prereq: 500. Mr. Bowen, Mr. Ritter
Advanced theory of play direction in the educational theatre. Class members will produce a modern or an historical play for public presentation.

760 (3) S. Radio and Television Program Policies. 3 cl. Mr. Summers
Standards applied by networks and stations; effect on program standards of FCC regulatory activities, court decisions and industry codes.

764 (2) W. Advanced Writing for Television. 3 cl. Prereq: 504 or equiv and 572. Mr. Mall
Advanced course in writing of program continuities for television in format form, partial script form and complete script form.

765 (3) A.W. Television Production and Directing. 2 cl, 1 3 hr lab. Prereq: 10 cr hrs in radio-television courses, including 505 or equiv. Mr. Lynch
Plotting of television shows, planning of sets, use of studio, projection and film equipment, supervision of programs through the rehearsal stage.

766 (2) W.S. Advanced Television Production and Directing. 4-6 lab hrs. Prereq: 105 and permission of instructor. Repeatable to a maximum of 4 cr hrs. Mr. Lynch and Staff
Continuation of 765, with supervised experience in production and directing of programs broadcast over local television stations.

778 (3-5) S. Experimental Phonetics. 3 cl, 2 2 hr labs. Prereq: 585, 678 or permission of instructor. Repeatable to a maximum of 8 cr hrs. Mr. Black
A study of laboratory investigations of problems of phonetics as they are related to functional speech.

781 (3) S. Curricular and Instructional Adjustment for the Deaf Child. 6 cl. Prereq: 500.
Laboratory projects directed toward the development of language, silent reading, lip-reading among deaf children.

785 (1-15) S. A.W.S. Advanced Clinical Practice in Speech, Hearing and Instruction of the Deaf. 1 cl, 3 clinical hrs for each hour of credit per week. Prerequisites as indicated or permission of instructor. Each practicum 1-2 hrs per qtr, repeatable to a maximum of six hours.
(a) Su, W. Diagnostic and Appraisal in Speech Pathology. Prereq: 585, 788, and 10 hours of psychology. Irwin
(b) A.W.S. Stuttering. Prereq: 585 and 10 hrs of psychology. Stromsta
(c) Su, A.W.S. Cleft Palate and Laryngeal Speech Disorders. Prereq: 585, 880. Moser, Schlander
(d) A.W.S. Foreign Accent. Prereq: 585. Black, Morrison
(e) Su, A.W.S. Voice. Prereq: 585, Moser, Irwin
(f) Su, A.W.S. Articulation. Prereq: 585. Morrison
(g) Su, A.W.S. Parent Education and Counseling. Prereq: 675 and 10 hrs of psychology. Irwin, Morrison
(i) Su, A.W.S. Auditory Rehabilitation. Prereq: 585, 880. H. Stromsta, Taylor
(j) Su, A.W.S. Diagnostic Audiology. Prereq: 585, 880. F. Stromsta, Taylor
(k) Su, A.W.S. Speech Reading and Auditory Training of the Deaf. Prereq: 781. Taylor, Crawford

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

Ed 800 (2-5). Seminars in Education.
(U) Speech.
(See under Education)

820 (2-5) S. A.W.S. Seminar in Public Address. Repeatable. Mr. Harding, Mr. Carmack, Mr. Fotheringham
Topics:
(a) Rhetoric of Cicero. Su (1st term), 1963
(b) Rhetoric of Quintilian. Su (2nd term), 1963
(c) Current Addresses of President Kennedy and Premier Khruschev. A. 1963
(d) Quantitative Studies in Public Address. W. 1964
(e) New Rhetoric of Kenneth Burke. S. 1964
840 (2-5) Su.A.W.S. Seminar in Theatre. Mr. McDowell, Mr. Schreck, Mr. Dewey, Mr. Bowen
Topics:
(a) Continental Scene Design. Su (1st term), 1963
(b) The Integration of Technical Elements. Su (2nd term), 1963
(c) Actor-Managers' Staging of Shakespeare. A, 1963
(e) The Epic Theatre Movement. W, 1964
(g) The Development of Dramatic Art: Nineteenth and Twentieth Centuries. S, 1964
(h) Pioneers of the Modern Theatre: Directors. S, 1964

860 (2-5) Su.A.W.S. Seminar in Radio and Television Programming. 3-4 cl. Repeatable. Mr. Summers, Mr. Riley, Mr. Mall, Mr. Lynch
Topics:
(a) Self Regulation by Broadcasters. Su (1st term), 1963. Mr. Summers
(b) Programming for Specialized Audiences. Su (2nd term), 1963. Mr. Mall
(c) Audience Research Methods in Radio and Television. A, 1963. Mr. Summers
(d) History and Development of Television since 1946. A, 1963. Mr. Lynch
(e) Changing Patterns in Television Dramatic Programs since 1948. W, 1964. Mr. Summers
(f) Influence of TV Programs on the Audience Image as Seen in Other Countries. W, 1964. Mr. Riley
(g) Organization of Instruction in Radio and Television in American Colleges and Universities. S, 1964. Mr. Summers
(h) Problems in Expanding the Local Station Audience. S, 1964. Mr. Mall

877 (2) W. Advanced Speech and Hearing Pathology. 1 3 hr cl. Prereq: 677, 678, 698. Mr. Stromsta and Medical Consultants to the Speech and Hearing Clinic.
Major impairments traceable to diseases of the ear and vocal mechanisms in relation to the sources of rehabilitation.

880 (1-5) Su.A.W.S. Seminar in Speech and Hearing Science. Repeatable. Mr. Black, Mr. Moser, Mr. Schlanger, Mrs. Irwin, and Mr. Stromsta
Topics:
(b) Comparative Phonetics and Dialect. Su, 1964.

881 (1-5) Su.W.S. Seminar in the Nature of Oral Language. Repeatable. Mr. Krouer, Mr. Black, Mr. Fotheringham, Mr. Brooks
Analysis of the bases of word symbols and meanings. The relationship of words and behavior to speech problems.
Topics:

899 (1-5) A.W.S. Interdepartmental Seminar.
(See under Interdepartmental Seminars)

Research for thesis or dissertation purposes only.
SURGERY
(Office, University Hospital)


OPEN ONLY TO STUDENTS REGISTERED IN THE COLLEGE OF MEDICINE

625 (1) W. Introduction to Surgery. 2 hr conf. Med, 1st yr. Open only to students in the College of Medicine. Staff

An introductory lecture-demonstration course on first aid and the principles of management of the injured patient. The various aspects of accidents with special emphasis on mechanism of occurrence and emergency treatment are presented and discussed.

670 (1) A. 671 (1) W. Introduction to Clinical Surgery. 2 hr conf. Med, 2nd yr. Open only to students in the College of Medicine. Staff

An introductory course in Surgery designed to demonstrate how the basic sciences studied in the first two years of medical school are fundamental to daily patient care. Various members of the staff demonstrate patients and discuss the application of the basic sciences to the patients' disease progress and medical management.

715 (17) Su,A,W,S. Clinical Surgery. Med, 3rd yr. Open only to students in the College of Medicine. Staff

The quarter is spent on the General Surgical Services. The student serves as clinical clerk both in inpatient and outpatient departments. He is responsible for the following total patient care.

The student is required to record a complete case history, perform thorough physical examination, and to follow and record the patients hospital course. He must be able to present, professionally and in detail, his findings during teaching ward rounds.

The student performs certain routine procedures under supervision of the staff, observes others and is an assistant at any surgical procedure performed upon any patient assigned to him.

Didactic and semi-didactic instruction consists of daily one hour sessions covering basic areas of general surgery, three weekly bedside rounds and weekly conferences in surgical pathology, radiology and physiology.

The student also attends the departments morbidity, mortality and tumor conferences as well as surgical grand rounds.

736 (16) Su,A,W,S. Clinical Surgery. Med, 4th yr. Open only to students in the College of Medicine. Staff

This quarter is divided into eight equal periods of which one each is spent in the following areas of surgery:—anesthesiology, ophthalmology, otolaryngology, emergency clinic, orthopedics, neuro-surgery, thoracic surgery, and urology.

On each assigned service the student is responsible for both inpatient and outpatient care. He records an independent history and physical examination on each assigned patient, then follows and records his observations on these patients throughout the hospital course. Advantage is taken of his increasing maturity and more independent, though supervised, activity is encouraged and expected.

Didactic instruction includes daily one hour conferences covering the areas above listed. There are weekly surgical pathology, clinico-pathologic, diagnostic X-ray, mortality, morbidity and tumor conferences, as well as surgical grand rounds. In addition each subspecialty staff conducts specific conferences on a regular basis at least weekly.

755 (2) Su,A,W,S. Anesthesia. 2 cl. Elective. Mr. Hameleberg

A lecture course in principles and practices of anesthesia including discussion of normal physiology of respiration and circulation, the pathological conditions that arise during anesthesia and their treatment, various gases used in modern anesthesia, the liquids used in anesthesia, the intravenous agents used, rectal anesthetics, spinal anesthesia with the various agents and techniques, and indications and contra-indications for use of the various agents.

780 (1-5) Su,A,W,S. Minor Problems. Prereq: adequate preclinical training and permission of instructor. Mr. Zollinger and Staff

Library, conference, clinic and laboratory work.

FOR GRADUATES

900 (3-5) Su,A,W,S. Seminar in Surgery. Students are responsible for the material presented at these seminars at least twice a year. Attendance at weekly Grand Rounds on the surgical service, as well as weekly attendance of X-ray and surgical pathological conference is required. Staff


Research for thesis purposes only.
SURVEY COURSES IN AGRICULTURE
FOR UNDERGRADUATES

401 (1) Su,A,W,S. Survey of Agriculture. 1 cl. Reqd of 1st qtr students in all curricula in the College, except Home Ec. (Special section for transfer students, see Time Schedule). Mr. Ritchie, Mr. Vastine
A development of objectives and an exploration of curricula, opportunities, student services, study skills and resident instruction, research and extension.

501 (1) A,W. Survey of Agriculture. 1 cl. Mr. Hutchison
Problems of employment in agriculture, business and industry; interviews; selection and application for positions.

502 (2) W. Agricultural Honors Colloquium. 2 cl. Prereq: enrollment in Agricultural Honors Program or permission of instructor. Mr. Ritchie
The relationships of technology, science, and economics in agriculture to society. Discussions are led by faculty members or outside speakers.

SURVEY COURSES IN ARTS AND SCIENCES
FOR UNDERGRADUATES

401 (6) Su,A,W,S. Orientation to the College of Arts and Sciences. 1 cl every other week. For all 1st qtr freshmen.
Conferences for orientation of new students in the University and the College of Arts and Sciences.

489 (1) W. Essentials of a Liberal Education. 1 cl. Prereq: open only by invitation to qualified freshmen.
Problems of belief and of the individual’s personal and social responsibilities in the present age. Discussions are led by faculty members or outside speakers.

490 (2) S. Methods of Inquiry. 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.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

605 (3) A,S. Foundations of Contemporary Civilization, Mr. Evans
A study of the major movements of thought in science, social philosophy, the humanities, and religion in the development of Western civilization.

608 (5) A,W,S. Development of Modern Science. 5 cl. Prereq: senior standing. Mr. Spieler, Mr. Williams
The nature of science and its place in human culture as revealed by detailed sequences of discovery from the history of its development.

700 (6) Su,A,W,S. Arts-Graduate Course. Prereq: senior standing and approval by the Honors Committee of the College of Arts and Sciences and the Graduate School. A progress 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 degree.

SURVEY COURSES IN COMMERCE
FOR UNDERGRADUATES

Required for entering freshman and others entering the College of Commerce and Administration with less than 45 quarter hours credit.

402 (3-5) A,W,S. Business and Society. 3 to 5 cl. Prereq: permission of instructor. Repeatable to a maximum of 15 cr hrs. Required of participants in the College of Commerce Junior Division Honors Program. Mr. Lynn and others
A critical examination of the socio-economic framework of business. Seminar discussion of selected readings.

798 (2-5) A,W,S. College Seminar. 2 to 5 cl. Prereq: permission of instructor. Repeatable to a maximum of 15 cr hrs. Mr. McCoy, Mr. Lynn, Mr. Schleider and others
SURVEY COURSES IN ENGINEERING

FOR UNDERGRADUATES

401 (1) A. 402 (1) S. Elements of Engineering. 1 cl. Req'd of first year students in College of Engineering.

The nature of the engineering profession, the work of the professional engineer, and unique characteristics of the various branches of engineering.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

#(601) (5) Su.S. Engineering Concepts and Methods. 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. Engineering Staff

The science of professional engineering; methodology of engineering analysis and design and its relation to mathematics and physical sciences.

GRADUATE SCHOOL COURSE

701 (2) A.W. College Teaching. 2 cl. Prereq: permission of director of course.

This course is designed to acquaint prospective college teachers with the major problems involved in college teaching.

SURVEY COURSE IN SOCIAL WORK

FOR UNDERGRADUATES

401 (1) A.S. Survey of Social Work. 1 cl. Req'd of all freshmen and transfer students in the School of Social Work with less than 90 academic cr hrs. Mrs. Zupancic

Purposes of social welfare services. Philosophy, vocational opportunities and qualifications for practice. Orientation to college life; study methods; time budgeting, scheduling and counseling. Placement services.

VETERINARY ANATOMY

Office, 102-A Sisson Hall

PROFESSORS VENZKE AND DIESEM, ASSISTANT PROFESSOR ANDREES, AND MR. HOROWITZ, MR. LATSHAW

FOR UNDERGRADUATES

451 (5) A. Veterinary Anatomy. 5 cl. Not open to veterinary medical students. Mr. Horowitz

Lectures and demonstration on specimens from the various anatomical systems of domestic animals.

OPEN ONLY TO STUDENTS REGISTERED IN THE COLLEGE OF VETERINARY MEDICINE

610 (7) A. Anatomy of Domestic Animals. 4 cl., 8 lab hrs. Prereq: Vet Med 1 yr. Mr. Diesem, Mr. Venzke, Mr. Horowitz

The morphology of the cow, sheep and goat.

611 (7) W. Anatomy of Domestic Animals. 4 cl., 8 lab hrs. Prereq: Vet Med 1 yr and 610. Mr. Diesem, Mr. Venzke, Mr. Horowitz

The morphology of the horse, pig and fowl.

616 (4) W. Veterinary Histology. 3 cl., 4 lab hrs. Prereq: Vet Med 1 yr. Mr. Andres, Mr. Latshaw

The microscopic structure of the cell and fundamental tissues.

617 (4) S. Veterinary Histology. 3 cl., 4 lab hrs. Prereq: Vet Med 1 yr and 616. Mr. Andres, Mr. Venzke, Mr. Latshaw

The microscopic structure of organs.

618 (4) A. Veterinary Embryology. 3 cl., 4 lab hrs. Prereq: Vet Med 1 yr. Mr. Venzke, Mr. Andres, Mr. Latshaw

The developmental anatomy of the chick, pig, cat, and dog.

620 (5) S. Surgical Anatomy. 2 cl., 6 lab hrs. Prereq: Vet Med 2 yrs. Mr. Diesem, Mr. Horowitz, Mr. Venzke

A thorough dissection of the dog and lecture-demonstrations on areas of special surgical significance in other animals.
FOR ADVANCED UNDERGRADUATES AND GRADUATES

701 (2-5) A.W.S. Minor Problems. 1 cl, 6-15 lab hrs. Prereq: 611, 617, 618. Mr. Venzke, Mr. Diesem, Mr. Andres
A course offering training in laboratory investigation of special problems.

731 (2-5) S.A.W.S. Anatomical Techniques. 1 cl, 6-15 lab hrs. Prereq: 611, 617. Mr. Diesem, Mr. Venzke, Mr. Andres
Theory and practice of macroscopic and microscopic methods. Includes specimen preparation for dissection, fixing, embedding, sectioning, mounting, and staining of animal tissue.

755 (3-5) S.A.W.S. Veterinary Endocrinology. 3 cl, 4 lab hrs. Vet Physiol 610, 611 or Physiol 691. Mr. Venzke
Special consideration is given to the correlation of the endocrine control of cellular metabolism.

FOR GRADUATES

550 S.A.W.S. Research in Veterinary Anatomy.
Research for thesis or dissertation purposes only.

VETERINARY CLINICS
Office, 115 Veterinary Clinic Building

VERNON L. THARP, DIRECTOR
RICHARD L. RUDY, ASSOCIATE DIRECTOR

DEPARTMENTS PARTICIPATING IN VETERINARY CLINICS: VETERINARY ANATOMY; VETERINARY MEDICINE; VETERINARY HEPATOLOGY; VETERINARY PATHOLOGY; VETERINARY PHYSIOLOGY AND PHARMACOLOGY; VETERINARY PREVENTIVE MEDICINE; VETERINARY SURGERY AND RADIOLOGY; MICROBIOLOGY

721 (1) A. Veterinary Clinics. 7 2 hr lab. Prereq: Vet Med 3 yr. Not open to students who have credit for 731. Staff

722 (3) W. Veterinary Clinics. 7 2 hr lab. Prereq: 721. Not open to students who have credit for 722. Staff

723 (3) S. Veterinary Clinics. 7 2 hr lab. Prereq: 722. Not open to students who have credit for 723. Staff

724 (6) S. Veterinary Clinics. 7 24 hr lab. 1 cl. Prereq: 723. Not open to students who have credit for 740. Staff

725 (15) A,W.S. Veterinary Clinics. 2 qtrs reqd. 7 24 hr lab, 1 cl. Not open to students who have credit for 741. Staff

VETERINARY MEDICINE
Office, 101 Sisson Hall

PROFESSORS KIRK, THARP, HENTHORNE, AND VENZKE, ASSOCIATE PROFESSORS DONOVAN, KING, WEARLY, ASSISTANT PROFESSORS DONHAM, GARDNER, AND WHITESIDE, MR. MURDICK, MR. AKINS, AND MISS MARTIN

OPEN ONLY TO STUDENTS REGISTERED IN THE COLLEGE OF VETERINARY MEDICINE

FOR UNDERGRADUATES

619 (1) A. Survey of Veterinary Medicine. 1 cl. Prereq: Vet Med 1 yr. Mr. Krill
A series of lectures designed to acquaint the student with the history and purpose of the profession, professional ethics, and conduct of professional students.

629 (2) S. Physical Diagnosis. 1 cl, 1 2 hr lab. Prereq: Vet Med 2 yr. Mr. Wearly, Mr. Murdick, Mr. Donovan and Mr. Whiteside
To acquaint the student with the principles, techniques, and instrumentation required to conduct a thorough physical examination of all the domestic animals.

719 (1) W. 720 (1) S. Veterinary Practice. 2 cl, 4 hr. Prereq: Vet Med 4 yr. Mr. Donovan, Mr. Wearly, Mr. Whiteside
To acquaint the student with veterinary laws, business practices, opportunities and responsibilities that will be thrust upon him at graduation.

730 (3) A. Disease of Small Animals. 3 cl. Prereq: 620. Mr. Donovan
A study of the diseases of small animals with emphasis on the diagnosis and treatment.
### VETERINARY MEDICINE

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prereq</th>
<th>Credits</th>
<th>Instructor(s)</th>
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<tbody>
<tr>
<td>731 (3)</td>
<td>W. Diseases of Small Animals</td>
<td>730</td>
<td>3</td>
<td>Mr. Donovan</td>
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<td>732 (3)</td>
<td>S. Diseases of Small Animals</td>
<td>731</td>
<td>3</td>
<td>Mr. Donovan</td>
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<tr>
<td>735 (4)</td>
<td>A. Diseases of Large Animals</td>
<td>620</td>
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<td>Mr. Wearly, Mr. Donham, Mr. Gardiner</td>
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<td>736 (3)</td>
<td>W. Diseases of Large Animals</td>
<td>735, 740</td>
<td>3</td>
<td>Mr. Wearly</td>
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<tr>
<td>738 (5)</td>
<td>S. Obstetrics and Genital Diseases</td>
<td>Vet Med 3 yr</td>
<td>5</td>
<td>Mr. Tharp, Mr. Murdock, Mr. Akins</td>
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<tr>
<td>740 (4)</td>
<td>A. Diseases of Large Animals</td>
<td>620</td>
<td>4</td>
<td>Mr. Wearly, Mr. Murdock</td>
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<td>750 (3)</td>
<td>A.W.S. Ophthalmology</td>
<td>626, 732, Vet Physiol and Pharmacol 610, 611</td>
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<td>Mr. Donovan</td>
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**FOR ADVANCED UNDERGRADUATES AND GRADUATES**

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<tr>
<td>701 (2-8)</td>
<td>Su,A.W.S. Minor Problems</td>
<td>adequate Clinical training and permission of instructor. Mr. Wearly, Mr. Donovan, Mr. Tharp</td>
<td>2-8</td>
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<tr>
<td>750 (3)</td>
<td>A.W.S. Ophthalmology</td>
<td>626, 732, Vet Physiol and Pharmacol 610, 611</td>
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**FOR GRADUATES**

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<td>827 (1)</td>
<td>A.W.S. Seminar in Veterinary Parasitology</td>
<td>1</td>
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<tr>
<td>850 (arr)</td>
<td>Su,A.W.S. Research in Veterinary Parasitology</td>
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### VETERINARY PARASITOLOGY

Office, 304 Sissom Hall

PROFESSORS KOUTZ, REBRASSIER (EMERITUS), ASSOCIATE PROFESSOR GROVES, MR. SCOTHORN

OPEN ONLY TO STUDENTS REGISTERED IN THE COLLEGE OF VETERINARY MEDICINE

**FOR UNDERGRADUATES**

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<th>Course Code</th>
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<th>Prereq</th>
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<tr>
<td>621 (5)</td>
<td>A. Parasitology</td>
<td>4</td>
<td>Vet Med 2 yr, Mr. Koutz, Mr. Groves</td>
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**FOR ADVANCED UNDERGRADUATES AND GRADUATES**

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<th>Credits</th>
<th>Prereq</th>
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<tr>
<td>623 (2-5)</td>
<td>Su,A,W.S. Advanced Veterinary Parasitology</td>
<td>2-5</td>
<td>621, 622, or equiv, and permission of chairman. Repeatable to a maximum of 15 cr hrs. Mr. Koutz, Mr. Groves</td>
</tr>
<tr>
<td>701  (2-8)</td>
<td>Su,A,W.S. Minor Problems</td>
<td>2-8</td>
<td>621, 622, Vet Clin 723, or equiv, and permission of chairman. Mr. Koutz, Mr. Groves</td>
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<td>1</td>
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<tr>
<td>850 (arr)</td>
<td>Su,A.W.S. Research in Veterinary Parasitology</td>
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</table>
621 (6) A. General Pathology. 4 cl, 4 lab hrs. Prereq: Vet Med 2 yr. Mr. Koestner, Mr. Wolf, Mr. Capen
The principles of pathology, including etiology, reaction to injury, course and termination of disease. Emphasis on functional, chemical and morphological alterations in disease.

622 (6) W. Systemic Pathology. 4 cl, 4 lab hrs. Prereq: 621. Mr. Griesemer, Mr. Koestner, Mr. Storts
Diseases of the nervous, endocrine, cardiovascular, hemopoietic, lymphatic, digestive, respiratory, urinary, genital, musculo-skeletal and integumentary systems, and organs of special senses.

731 (4) A. Pathology of Infectious Diseases. 3 cl, 2 lab hrs. Prereq: 622. Mr. Farrell and Mr. Griesemer
Reaction of the animal body to injury by specific infectious agents. Functional pathology is correlated with morphological and chemical lesions.

732 (3) W. Avian Pathology. 3 cl. Prereq: 731. Mr. Marshall, Mr. Wolf
Diseases of chickens, turkeys, caged birds, game birds and water fowl.

733 (2) A. Veterinary Clinical Pathology. 2 cl, 2 lab hrs. Prereq: 731. Mr. Loeb, Mr. Storts
Techniques and interpretation of laboratory determinations applicable to clinical patients. Hematology, urinalysis, chemistry, function studies, and fertility studies are considered.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

610 (2-10) Su,A,W.S. Pathology Technic. Prereq: 621 or equiv and permission of instructor. Mr. Farrell, Mr. Griesemer

701 (1-10) Su,A,W.S. Minor Problems. Prereq: Vet Path 621 or equiv and permission of instructor. Mr. Cole, Graduate Staff
Laboratory, library, conference and reports concerning animal disease problems.

776 (2-10) Su,A,W.S. Advanced Systemic Pathology. Prereq: 610, 622, 701 or equiv and permission of instructor. Mr. Farrell, Mr. Koestner, Mr. Griesemer
An advanced study of animal diseases as they affect all organ systems of the body.

778 (2-10) S. Veterinary Surgical Pathology. Prereq: 776, Vet Surg 623 or equiv and permission of instructor. Mr. Koestner
Biopsy methods and diagnosis. Surgical specimens are studied and emphasis is placed upon the correlation of lesions and functional pathology.

786 (2-10) A. Animal Oncology. Prereq: 776 or equiv and permission of instructor. Mr. Cole, Mr. Griesemer
A study of neoplasms occurring in animals, including identification, epidemiology, experimental production, cell culture, transplantation and biological behavior.

FOR GRADUATES

807 (1) Su,A,W.S. Seminar in Veterinary Pathology. Repeatable. Graduate Staff

950 (arr) Su,A,W.S. Research in Veterinary Pathology.
Research for thesis or dissertation purposes only.
VETERINARY PHYSIOLOGY AND PHARMACOLOGY

Office, 351 Sisson Hall

PROFESSORS SMITH AND POUNDEN, ASSOCIATE PROFESSOR REDDING, ASSISTANT PROFESSOR POWERS, MR. RAY, MR. HAMLIN

OPEN ONLY TO STUDENTS REGISTERED IN THE COLLEGE OF VETERINARY MEDICINE

FOR UNDERGRADUATES

516 (5) S. Animal Physiology. 4 cl, 1 3 hr lab. Prereq: Chem 408 or Chem 412. Not open for students having credit for Vet Physiol 610 and 611. C. R. Smith and Staff
Concepts and principles involved in function of various body systems and principles of growth and ageing will be considered.

517 (5) W. Animal Physiology. 4 cl, 1 3 hr lab. Prereq: Chem 408 or Chem 412. Not open for students having credit for Vet Physiol 622. C. R. Smith and Staff
Comparative study of physiological concepts and principles involved in reproduction and metabolism in various species of domestic animals.

610 (5) W. Physiology of Domestic Animals. 4 cl, 3 lab hrs. Prereq: Vet Med 1 yr. Mr. Redding
Physiology of peripheral nerve, central nervous system, sense organs, blood lymph, and special fluid systems of body.

611 (5) S. Physiology of Domestic Animals. 4 cl, 3 lab hrs. Prereq: 610. Mr. Smith, Mr. Hamlín
Physiology of the cardiovascular and respiratory systems, digestion in the simple stomach and rumen.

619 (3) S. Veterinary Pharmacology. 3 cl. Prereq: 610. Mr. Redding
Pharmaceutical standards, pharmaceutical preparations, weights and measures, prescription writing, drug administration, drugs acting on the nervous system and histamine antagonists.

620 (3) A. Veterinary Pharmacology. 3 cl. Prereq: 619. Mr. Redding, Mr. Smith
Drugs acting on skin, mucous membranes, digestive tract, heart, and parenteral fluid replacement.

621 (3) W. Veterinary Pharmacology. 3 cl. Prereq: 620. Mr. Powers
Anti-infective drugs, antisepsics and disinfectants, diuretics and hormones used as drugs.

622 (5) A. Physiology of Domestic Animals. 4 cl, 3 lab hrs. Prereq: 621. Mr. Smith, Mr. Powers
Physiology of digestion, metabolism; renal physiology, reproduction, and endocrinology.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

701 (3-15) Su,A,W,S. Minor Problems. Prereq: Vet Physiol 621 and 622 or equiv and permission of the instructor. Mr. Smith, Mr. Redding, Mr. Pounden

FOR GRADUATES

Research for thesis or dissertation purposes only.

VETERINARY PREVENTIVE MEDICINE

Office, 252 Sisson Hall

PROFESSORS HELWIG, JONES, TYZNIK, HENTHORNE, AND TREXLER, ASSOCIATE PROFESSOR KOHL, MR. ADAMS, MR. VENDLER, MR. BULLER, MR. GRYER, MR. BOYD, MR. GOLDSMITH, MR. WITTICH, MR. MYERS, AND MR. SCHAUERENBERGER

OPEN ONLY TO STUDENTS REGISTERED IN THE COLLEGE OF VETERINARY MEDICINE

FOR UNDERGRADUATES

452 (3) A. Basic Animal Hygiene. 3 cl. Prereq: 2nd yr standing. Mr. Helwig, Mr. Jones, Mr. Buller
Lectures designed to acquaint the student with the causes of disease and the relationship of these causes to the animal's environment.
314 VETERINARY PREVENTIVE MEDICINE

453 (3) W. Applied Animal Hygiene. 3 cl. Prereq: 452 or equiv. Mr. Helwig, Mr. Jones, Mr. Buller
Lectures on the various common diseases responsible for losses to the livestock industry, with emphasis on control.

620 (3) S. Hygiene and Environmental Sanitation. 3 cl. Prereq: Vet Med 2 yr. Mr. Helwig, Mr. Jones, Mr. Buller
A disease prevention study of the environmental factors which have a direct influence on animal and human health. An introduction to epidemiology and biostatistics.

740 (15) A,W,S. Applied Preventive Medicine. 1 qtr reqd. Off-campus cl and lab. Mr. Helwig, Mr. Jones, Mr. Adams, Mr. Buller, Mr. Geyer, Mr. Boyd, Mr. Bender, Mr. Wittich, Mr. Goldstein, Mr. Tyznik, Mr. Schnurrenberger
This course is designed to give the student an interpretation of the field of preventive medicine as it relates to the veterinarian. Intensive practical training is emphasized in the following divisions: Public Health and Food Hygiene; meat inspection; Federal Disease Control Programs; State Disease Control Programs; and Herd Disease Management. Approximately one-third of the senior class will complete this course requirement each quarter. The students will be divided into five groups and assigned to one of five sections. A rotating schedule will allow each student to experience two weeks in each section. The work will be an off-campus and general supervision will be under the Chairman of the Department of Veterinary Preventive Medicine.

The direct supervision of the various sections will be under the men in charge of the United States Animal Disease Eradication in Ohio; the Columbus Department of Public Health; the United States Meat Inspection Division in Columbus; the Veterinarian in Charge of the State Herds and Flocks; and the Division of Animal Industry, Ohio Department of Agriculture. This course cannot be taken concurrently with any other scheduled courses.

742 (4) S. Food Hygiene and Public Health. 3 cl, 2 2 hr lab. Prereq: Vet Med 3 yr or permission of instructor. Department Staff
Principles and practices of food sanitation with emphasis on the veterinarian's role in protecting the public food supply.

745 (3) W. Prevention and Control of Communicable Diseases. 3 cl. Prereq: Vet Med 3 yr or permission of instructor. Mr. Helwig
The prevention of animal communicable diseases based on contemporary medical knowledge is correlated with administrative control and public health.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

701 (2-5) Su,A,W,S. Minor Problems. Prereq: 620, and permission of instructor. Mr. Helwig, Mr. Jones, Mr. Schnurrenberger, Mr. Gale

730 (3) A,W,S. Biological Research Techniques. 2 2 hr cl and lab. Prereq:
Advanced standing in biological sciences, Microbiology 607 or equiv, and permission of instructor. Mr. Hentthorne and Staff
The more common laboratory animals used in biological research and testing will be dealt with as they relate to research purposes, design, and application.

750 (5) W,S. Germfree and Gnotobiotic Animals. 3 2 hr cl and lab. Prereq:
Advanced standing in biological sciences, Microbiology 607 or equiv and permission of instructor. Mr. Hentthorne and Staff
The introduction of biological research through the application of germfree and gnotobiotic animals.

FOR GRADUATES

800 (1) A,W,S. Seminar in Veterinary Preventive Medicine. Department Staff


VETERINARY SURGERY AND RADIOLOGY

Office, 111 Veterinary Clinic

PROFESSORS RUDY, GUARD (EMERITUS) AND JOHNSON, ASSISTANT PROFESSORS ROENIGK, GABEL, AND WILSON

OPEN ONLY TO STUDENTS REGISTERED IN THE COLLEGE OF VETERINARY MEDICINE

FOR UNDERGRADUATES

623 (5) S. General Surgery. 4 cr, 2 2 hr lab. Prereq: Vet Med 2 yr. Mr. Rudy, Mr. Gabel, Mr. Wilson
Lectures, recitations and demonstrations of surgery.

731 (2) A. Veterinary Radiology. 2 cr, 2 hr lab. Prereq: Vet Med 3 yr. Mr. Roenigk
Presentation of the principles of diagnostic and therapeutic radiology, including nuclear medicine. Laboratory demonstrations include interpretation of radiographs and radiological technic and protection.

732 (6) W. Special Surgery. 6 cr. Prereq: 623, 731. Mr. Rudy, Mr. Johnson, Mr. Wilson
Lectures, recitations and demonstrations on the treatment of surgical diseases of all species.

733 (6) S. Special Surgery. 6 cr. Prereq: 732. Mr. Johnson, Mr. Gabel
Continuation of Veterinary Surgery 732.

741 (1) A.W.S. Surgical Operations. 14 hr lab. Prereq: 733. Staff
Surgical exercises.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

701 (1-5) Su, A.W.S. Minor Problems. Prereq: Vet Med 4 yr. Open only to students registered in the College of Veterinary Medicine. Mr. Rudy, Mr. Johnson, Mr. Roenigk
Advanced work in surgery and radiology.

FOR GRADUATES

950 (arr) Su, A.W.S. Research in Veterinary Surgery or Veterinary Radiology.
Research for thesis or dissertation purposes only.

WELDING ENGINEERING

Office, 128 Industrial Engineering Building

PROFESSORS McCauley, B. S. Green, and McMaster.
MR. W. L. GREEN, AND ASSISTANTS

7415 (3) A.W.S. Forging, Heat Treating, and Welding. 3 cr, 3 1 hr lab.
Not open to students who have credit for Weld E-418. Safety glasses must be worn in the laboratory. See footnote. Staff
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 (6) A. Practical Experience in a Welding Organization. Ten weeks during the Su Qtr and before beginning the work of 4th yr. Staff
Experience in an engineering organization and the preparation of an acceptable report on the organization and the work done.

510 (4) W. Applied Engineering Analysis. 3 cr, 1 3 hr lab. Prereq: Physics 533 and Math 544. Mr. McMaster
The analysis of engineering systems by the application of fundamental principles of conservation of matter and energy, and operational techniques.

* Courses Induct E 404, 420, 519, and Weld E 415, 791, 792, 763, 739, 741, and 742 require the use of a pair of safety glasses; however, each student need own 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 Optometry Clinic, Room 15, Optometry Building, or through any registered optometrist.
640 (2) S. Welding Engineering Inspection Trip. One week between the W and S Qtrs. Staff
A group visit to various industrial plants. The plants selected are generally grouped in one community. A written report is required.

649 (6) A. Practical Experience in Welding Industry. Ten weeks during the Su Qtr and before beginning 5th yr. Staff
Experience in an engineering organization and the preparation of an acceptable report on the organization and the work done.

740 (2) S. Welding Engineering Inspection Trip. One week between the W and S Qtrs. Staff
A group visit to various industrial plants. The plants selected are generally grouped in one community. A written report is required.

748 (3-15) Su,A.W.S. Special Problems in Welding Engineering. Prereq: 741. Staff
Special studies not offered in the fixed curriculum in the areas related to courses 701, 702, 703, 739, 741, and 742. This work may be taken in more than one area.

754 (3-12) A,W,S. Thesis. 6 lab hrs. Staff

FOR ADVANCED UNDERGRADUATES AND GRADUATES

646 (3) W. Welding Science and Its Application. 3 cl. Prereq: Eng Mech 602 and 4th yr standing in Engineering. Mr. Green
A study of the engineering fundamentals of welding. Design, materials, and processes are considered as related to the welding field.

701 (4) A. Physics of Welding. 3 cl, 1 3 hr lab. Prereq: Indus E 519, Eng Mech 605. Safety glasses must be worn in the laboratory. See footnote. Mr. McCaulay
The application of basic physical principles in the welding processes.

702 (4) A. Principles of Resistance Welding. 3 cl, 1 3 hr lab. Prereq: 610 and Elec E 644. Mr. McMaster
Theory and operation of resistance welding equipment, power supplies, electronic controls, welding codes and schedules, and process controls.

703 (4) A. Nondestructive Testing. 3 cl, 1 3 hr lab. Prereq: Elec E 643, Math 543. Safety glasses must be worn in the laboratory. See footnote. Mr. McMaster
Principles, equipment, techniques, and interpretation of nondestructive test with X-rays, radiography, magnetic fields, penetrants, ultrasonics, eddy currents, and other probing media; with materials serviceability evaluation.

739 (4) S. Principles of Welding. 3 cl, 1 3 hr lab. Prereq: 610, Indus E 519, Elec E 642, 643. Safety glasses must be worn in the laboratory. See footnote. Mr. McMaster
Theory, equipment, techniques, and control of fusion welding with electric arc, gas, and other special processes. Welding codes and specifications. Application of electrodes and processes.

741 (5) W. Theory of Welding. 4 cl, 1 3 hr lab. Prereq: 739, Chem 683, concur Met E 703. Safety glasses must be worn in the laboratory. See footnote. Mr. McCaulay
The application of basic metallurgical principles in the welding processes. The weldability of metals is studied. Laboratory work involves physical and metallographic examination of welded specimens.

742 (4) S. Application of Welding Engineering. 3 cl, 1 3 hr lab. Prereq: 741. Safety glasses must be worn in the laboratory. See footnote. Mr. McCaulay
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.

743 (3) A. Welding Design. 3 cl, 2 3 hr lab/comp. Prereq: Civil E 741. Mr. Green
The analysis and design of statistically determinate and indeterminate members and structures. A study of welding procedures for shop fabrication and field erection.

Courses Indus E 404, 429, 519, 521, and Weld E 415, 701, 702, 703, 739, 741, and 742, require the use of a pair of safety glasses; however, each student need 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 Optometry Clinic, Room 15, Optometry Building, or through any registered optometrist.
744 (5) W. Welding Design. 3 cl, 2 3 hr lab. Prereq: 742, Mech E 736. Mr. Green
The analysis and design of machine elements and frames to a given set of shop conditions and facilities. Emphasis in placed on cost factor considerations.

745 (5) S. Welding Design. 3 cl, 2 3 hr lab. Prereq: 702 and 744. Mr. Green
The design of resistance welded products. A selection of process and equipment and a study of feeling used in high production work.

FOR GRADUATES
An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

841 (2-6) Su,A, W.S. Advanced Problems in Welding Engineering. Prereq: written permission of instructor. Repeatable for a maximum of 24 cr hrs. Staff
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 (arr) Su,A, W.S. Research in Welding Engineering.
Research for thesis or dissertation purposes only.

ZOLOGY
(Department of Zoology and Entomology)
Office, 101 Botany and Zoology Building
PROFESSORS WHARTON, DAMBACH, HAUB, KOSTIR (EMERITUS), LANGLOIS, D. F. MILLER (EMERITUS), J. A. MILLER, J. N. MILLER, PETERLE, PRICE, PUTNAM, TIDD, VENARD, ASSOCIATE PROFESSORS BRETT, BROAD, GILZE, GOOD, HOUSE, JOHNSON, MYSER, PADDOCK, PLAIN, REES, ASSISTANT PROFESSORS CRITES, KESSLER, PARRISH, STANISBERY, CURATOR TRAUTMAN, AND ASSISTANTS

FOR UNDERGRADUATES
400 (5) Su,A, W.S. Principles of Biology. 3 cl, 2 1 hr lab. Mr. Wharton and Staff
A study of biological principles common to all living things: protoplasm, cells, development, organization, coordination, genetics, homeostasis, ecology, evolution, and systematics.

401 (5) Su,A, W.S. General Zoology. 2 cl, 3 1 hr lab. Prereq: 400. Staff and Assistants
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 (5) Su,S. General Zoology. 3 cl, 2 2 hr lab. Prereq: 401 or Bot 401 or equiv or concur with permission. Staff and Assistants
A survey of the animal kingdom with emphasis on classification, function and biology.
Bot 505 (5) Introduction to Ecology.
(See Botany and Plant Pathology.)

508 (5) S. Ornithology. 2 cl, 1 2 hr lab and Saturday field trip. Prereq: 401, 402, or 10 cr hrs of biological science. Not open to students who have credit for 408. Mr. C. B. Reese
A study of the general biology and classification of birds, with emphasis on field identification of local species. Field trip each Saturday.

509 (5) A.S. Evolution. 5 cl. Prereq: 401, 402, or Bot 401, 402, or equiv. Mr. Tidd
The principles of organic evolution. Demonstrations and discussions of the facts and theories underlying the evolution of man and other living things.

FOR ADVANCED UNDERGRADUATES AND GRADUATES
604 (5) Su,A, W.S. Genetics. Prereq: 401 or Bot 402 or equiv, Math 401 or equiv and 10 hrs of science. Staff
A consideration of the principles, concepts, and applications of classical and modern genetics.
318 ZOOLOGY

605 (3 or 5) A. Animal Behavior. 2 cl, 2 2 hr lab. Prereq: 401, 402, and 10 additional cr hrs of biological science. Mr. J. A. Miller
An experimental study of the anatomical basis of animal reactions.

607 (5) S. Management of Fisheries. 5 cl and field trips. Mr. Langlais
An appraisal of the condition of environment to meet the needs of fishes and a review of programs directed towards the improvement of fishing.

610 (5) Su,W,S. Animal Parasites. 2 cl, 3 2 hr lab. Prereq: 401, 402 or equiv and 10 additional hrs of biological science. Mr. J. N. Miller
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.

617 (5) W. General Cytology. 3 cl, 1 3 hr lab. Prereq: 3 Qtrs Chem and 20 hrs of biological science. Mr. Myser
A study of the nature of protoplasm, the inner organization of living cells and the fundamental phenomena of life.

618 (3) W. The Cytological Basis of Genetics. 2 cl, 2 2 hr lab. Prereq: 603 or 604 or equiv. Mr. Paddock
Documentation of the correlation between genetic principles and chromosome behavior by studying the mitotic and meiotic cells of several organisms with oil immersion microscopy.

620 (5) S. Advanced Zoology of Vertebrates. 3 cl, 2 2 hr lab. Prereq: 401, 402 or equiv and at least 10 additional hrs of biological science. 509 and Anat 613 or equiv recommended. Permission of instructor. Mr. Price
A study of the various vertebrate groups, emphasizing their origin, phylogeny, classification, life histories, habits, distribution and economic importance.

623 (4) Su. Fish Ecology. 2nd term. All day classes—3 days per week. Prereq: 624 or equiv and permission of instructor. Given only at the Franz Theodore Stone Laboratory. Not open to students who have credit for Hydrobiology 623. Staff
Studies of life histories and interspecific relationships of fishes and of the various factors influencing their abundance.

624 (4) Su. Ichthyology. 1st term. All day classes—3 days per week. Prereq: 401, 402 or equiv, 15 additional cr hrs Biol or equiv, and permission of instructor. Given only at the Franz Theodore Stone Laboratory. Staff
A field and laboratory study of the distribution and classification of fishes, which includes methods of identification, collection and preservation.

629 (3) W. Mammalogy. 3 2 hr cl. Prereq: 620 or 640 or equiv. Mr. Good
The comparative morphology, taxonomy, life histories, distribution, and importance of the mammals.

630 (5) Su,A. The Interpretation of Biological Data. 4 cl, 1 2 hr lab. Prereq: Math 418 or 440 or equiv and 15 cr hrs in biological science. Staff
Application of statistical methods to biological problems. Emphasis on understanding principles and concepts, including estimation, testing hypotheses, regression, chi-square, and analysis of variance.

631 (4) Su. Animal Parasitology. All day classes—3 days per week. Prereq: 401, 402 or equiv and at least 10 additional cr hrs of biological science. Given only at the Franz Theodore Stone Laboratory. Staff
A course emphasizing the parasites infesting freshwater vertebrates, including field and laboratory experiences, host examination, and techniques dealing with staining, fixing, and mounting of specimens.

632 (5) A. Comparative Embryology. 3 cl, 2 2 hr lab. Prereq: 401, 402 or equiv and at least 10 additional cr hrs of biological science. Mr. Price
A survey of various modes of embryonic development, illustrated with both invertebrate and vertebrate type material with emphasis on fundamental aspects and processes.

633 (4) Su. Invertebrate Zoology. 2nd term. All day classes—3 days per week. Prereq: 20 cr hrs biological science including 401, 402 or equiv. Given only at the Franz Theodore Stone Laboratory. Staff
The collection and identification of invertebrate animals, development of methods of classification and use of keys.
634 (3) W. Biology of Birds. 2 cl, 1 2 hr lab. Prereq: 508 or equiv and at least 10 additional cr hrs of biological science. Mr. Putnam

The aspects of anatomy, physiology, taxonomy, and behavior which are pertinent to the study of birds.

636 (5) S. Principles of Animal Ecology. 3 cl, 2 2 hr lab. Prereq: 401, 402, Bot 401, 402. Mr. Stansbery

Principles and methods of animal ecology and their application to other closely related biological sciences. Frequent Saturday field trips.

#(637) (4) Su. Ecological Physiology of Aquatic Animals. 2nd term. All day classes—3 days per week. Prereq: 401, 402 or equiv and permission of instructor. Organic Chem, Physics, Physiol recommended. Given only at the Franz Theodore Stone Laboratory. Staff

Study of the aquatic habitat includes physical and chemical adjustment, tolerance, and acclimatization to environment of vertebrates and invertebrates.

640 (5) A. Wildlife Conservation. 3 cl, 2 2 hr lab. Prereq: 20 cr hrs of biological science. Mr. Good

An introductory course in the conservation and management of wildlife resources. Particular attention will be given to Ohio problems.

641 (5) W. Methods and Techniques in Wildlife Management. 3 cl, 2 2 hr lab. Prereq: 20 cr hrs of biological sciences. Mr. Good

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 (4) Su. Field Zoology. 1st term. All day classes—3 days per week. Prereq: 20 cr hrs of biological science including 401, 402 or equiv. Given only at the Franz Theodore Stone Laboratory. Staff

Field and laboratory identification of aquatic and terrestrial vertebrates and invertebrates of the region, in relation to habitats occupied. Of special interest to biology teachers.

652 (4) Su. Limnology. 1st term. All day classes—3 days per week. Prereq: 401, 402 or equiv. 15 additional cr hrs in Biol, 10 cr hrs in Chem and 10 cr hrs in Physics. Given only at the Franz Theodore Stone Laboratory. Not open to students who have credit for Hydrobiology 655 or Zool 655. Mr. Britt

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.

654 (4) Su. Advanced Ornithology. 1st term. All day classes—3 days per week. Prereq: 401, 402 or equiv and at least 10 additional cr hrs of biological science. Given only at the Franz Theodore Stone Laboratory. Not open to students who have credit for Hydrobiology 655 or Zool 655. Mr. Putnam

Topics include distinctive behavior in the life of birds, the breeding cycle, social relations of territory, ecology, characteristics of population, and techniques in field study of birds.

#(656) (4) Su. Herpetology. 2nd term. All day classes—3 days per week. Prereq: 401, 402, or equiv and at least 10 additional cr hrs of biological science. Bot 620 and Anat 618 desirable. Given only at the Franz Theodore Stone Laboratory. Mr. Britt

Local species of reptiles and amphibians, their habits, life histories, ecology, and classification.

#(657) (5) A. Basic Concepts and Recent Advances in Zoology. 3 2 hr cl. Prereq: 401, 402, Bot 401, 402 or equiv and high school teacher status.

Animal functions and genetic and environmental interrelationships in time and space as illustrated by selected animal types.

658 (5) W. Invertebrate Zoology. 3 cl, 2 2 hr lab. Prereq: 401, 402 or equiv and at least 10 additional hrs of biological science. Not open to students who have credit for 625, 627. Mr. Broad

A survey of the invertebrates with emphasis on morphology and relationships of representative types.

Bot 690 (5) Topics in Biological Sciences.

(See Botany and Plant Pathology)
ZOOLOGY

(589) (5) Su. Radiation Biology. Prereq: 401, 402 or equiv, Physics 63c or concur, and at least 10 hrs in Gen Chem and Physics, and high school teacher status. Open only to students enrolled in the N.S.F. Summer Institute. Mr. Mysers
A study of the principles of radiation biology and their application to high school and college teaching.

701 (2-5) Su,A,W,S. Special Problems. Prereq: satisfactory preparation for individual work in the field of the chosen problem and permission of instructor.
(a) Animal Behavior. Mr. J. A. Miller, Mr. J. G. Haub
(b) Animal Ecology. Mr. Peterle, Mr. Good (Aquatic), Mr. Britz, Mr. Stansbery, Mr. Gates
(c) Embryology and Vertebrate Zoology. Mr. J. A. Miller, Mr. Price
(d) Biometry.
(e) Genetics. Mr. House, Mr. Paddock, Mr. Plaine
(f) Invertebrate Zoology. Mr. Britz, Mr. Broad
(g) Ornithology. Mr. Borror, Mr. Putnam, Mr. Reese
(h) Parasitology. Mr. Crites, Mr. J. N. Miller, Mr. Tidd, Mr. Venard
(i) Cytology. Mr. Mysers, Mr. Paddock, Mr. Parrish
(j) Teaching of Biology. Mr. Haub, Mr. Kessler
(k) Wildlife Management. Mr. Peterle, Mr. Good
(l) General Limnology. Mr. Britz, Mr. Langlois

FOR GRADUATES

An undergraduate student shall not be permitted to take any course in the 800 or 900 group except by permission of the Graduate Council.

801 (1-5) Su,A,W,S. Special Problems. Staff
Research or special instruction at the graduate level not related to the thesis.

Full time of the student will be required travelling and living away from the campus. Intensive field work in a variety of environments will involve both supervised and independent study.

(516) (5) S. Mathematical Genetics. Prereq: 604, Math 537 or Math 636 or equiv and permission of instructor. Not open to students with credit for any two of 706, 707, 708. Mr. McIntosh
Effects of mating system, mutation, selection, migration, and drift on gene frequencies in populations. Elements of biometrical genetics. Applications of human genetics.

817 (3) A. Principles of Systematics. 2 cl, 2 hr lab. Prereq: 15 hrs of Zool or Entom at the 600 level or above. Mr. Borror
A study of the principles and methods of zoological taxonomy; a study of the rules of zoological nomenclature.

#(503) (5) S. Physiological Genetics. 5 cl. Prereq: 603 and Agr Bio 601 or Physiol Chem 628 or equiv. Mr. Plaine
A consideration of the theoretical and experimental aspects of physiological genetics, pertaining to the concept of the gene, its biochemical nature, replication, and mutation.

#831 (5) S. The Nature of Gene Action. 5 cl. Prereq: 603, 632, Agr Bio 601, Physiol Bio 628, or equiv. Mr. House
A study of the action of genes at all levels of expression with special emphasis on the role of genes in developmental processes.

#832 (5) S. Advanced Zoology of Invertebrates. 3 cl, 2 2 hr lab. Prereq: 401, 402 or equiv and 15 cr hrs of biological science at the 500 or higher levels, plus permission of instructor. Not open to students who have credit for 626. Field trips including a one week optional trip to a marine laboratory. Mr. Broad
A study of the morphology, physiology, life histories, and classification of the aquatic and pseudocoelomate invertebrates and the annelid worms.
Advanced Zoology of Invertebrates. 3 cl, 2 hr lab. Prereq: 401, 402 or equiv and 15 cr hrs of biological science at the 500 or higher levels, plus permission of instructor. Not open to students who have credit for 627. Field trips including a one week optional trip to a marine laboratory. Mr. Broad
A study of the morphology, physiology, life histories, and classification of the eucoelomate invertebrates exclusive of annelid worms.

897 (1) A,W,S. Interdepartmental Seminar in Natural Resources.
(See under Interdepartmental Seminars.)

900 (1 to 2) A,W,S. Seminar. Prereq: selection by the staff. Repeatable to a total of 7 cr hrs. Must be scheduled for a hrs by all incoming graduate students during the first Autumn Quarter of residence.

Research for thesis and dissertation purposes only.
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