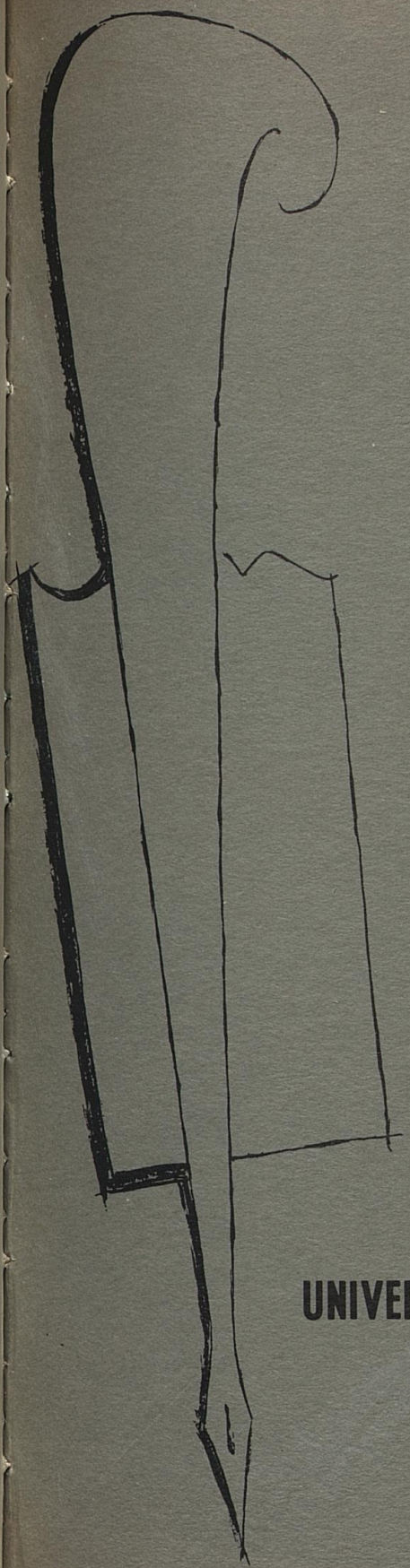

UNIVERSITY OF KENTUCKY BULLETIN

Graduate School • July, 1966

BULLETIN OF THE
UNIVERSITY OF KENTUCKY

JULY, 1966

Graduate School

1966-67

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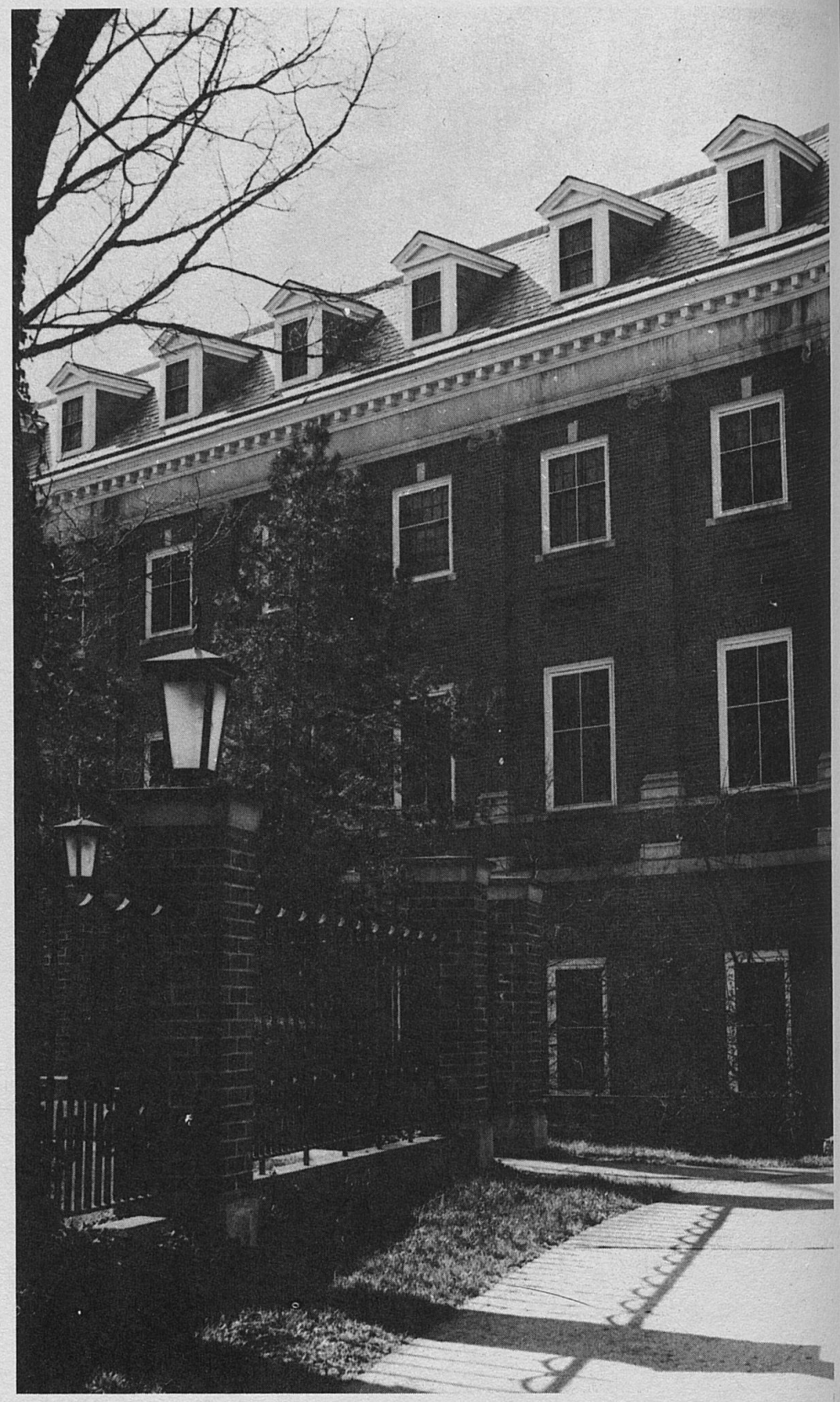

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University Calendar for the Year 1966-67

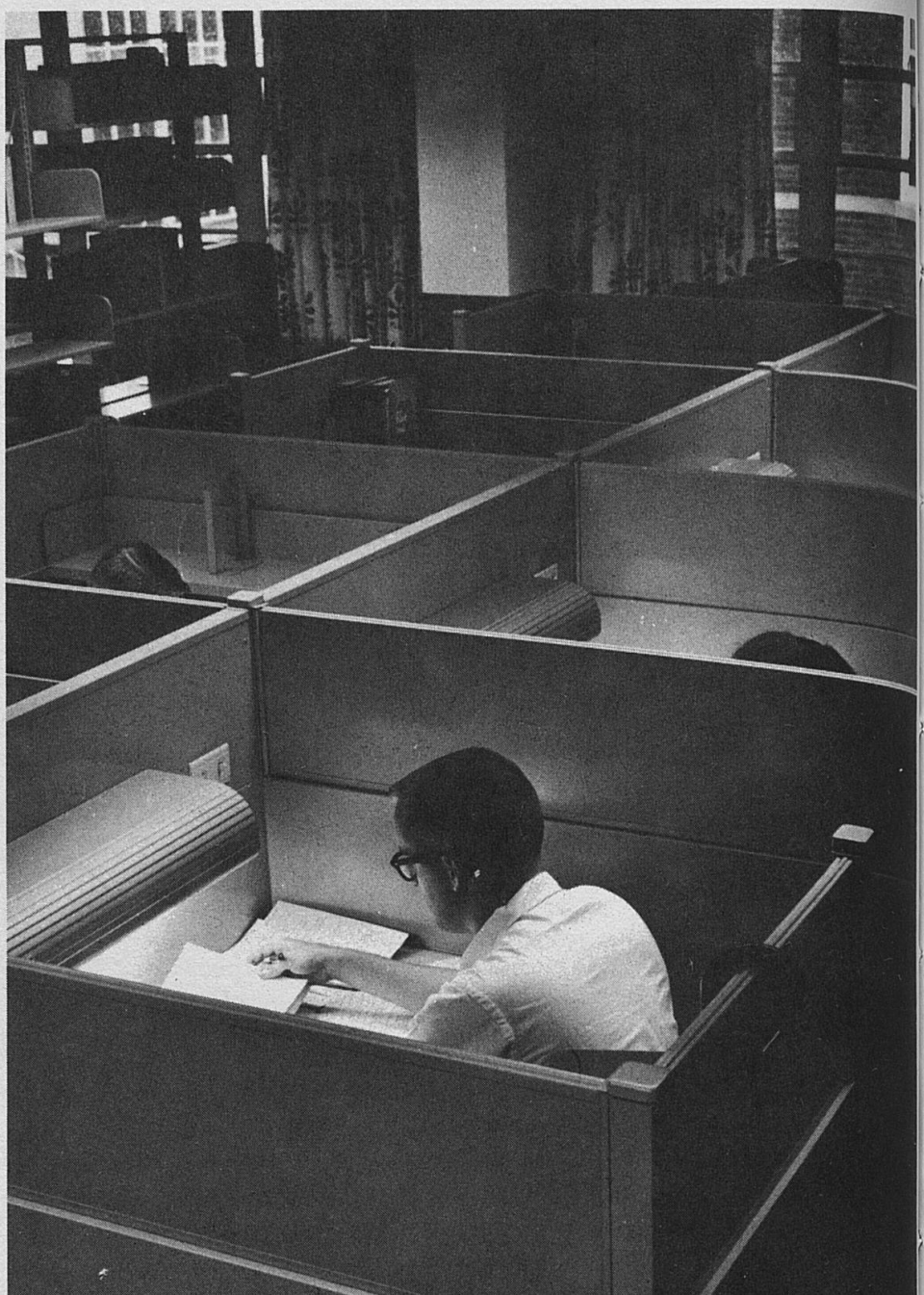
1966	*Fall Semester*
July 30	Saturday—Last day to submit application and transcripts to Admissions Office for Fall Semester 1966
Aug. 29, 30	Monday and Tuesday—Classification, registration, and orientation for students not pre-registered
Aug. 31	Wednesday—Class work begins
Sept. 5	Monday—Labor Day Holiday
Sept. 7	Wednesday—Last day to enter an organized class for the Fall Semester
Sept. 16	Friday—Last day to drop a course without a grade
Sept. 21, 22	Wednesday and Thursday—Last days for filing application for a December degree in College Dean's Office
Sept. 24 and Oct. 1	Graduate Record Examinations
Nov. 24,25,26	Thursday, Friday, and Saturday—Thanksgiving Holidays
Nov. 26	Saturday—Last day to drop a class before final examinations
Dec. 5	Monday—Thesis Deadline
Dec. 12	Monday—Last day to submit application and transcripts to Admissions Office for Spring Semester, 1967
Dec. 13	Tuesday—Class work ends
Dec. 14-20	Wednesday through Tuesday—Final Examinations
Dec. 20	Tuesday—End of Fall Semester
Dec. 22	Thursday—All grades due in Registrar's Office by 4:00 p.m.

1967	*Spring Semester*
Jan. 7, 9, 10	Saturday, Monday, and Tuesday—Registration
Jan. 11	Wednesday—Class work begins
Jan. 17	Tuesday—Last day to enter an organized class for the Spring Semester
Jan. 23	Monday—Last day to drop a course without a grade

Jan. 25, 26	Wednesday and Thursday—Last days for filing application for a May degree in College Dean's Office
Feb. 4 and 11	Graduate Record Examinations
March 11-19	Saturday noon through Sunday—Spring vacation. Class work resumes Monday, March 20, at 8:00 a.m.
April 1	Saturday—Last day for out-of-state freshmen to submit application to Registrar's Office for Fall Semester, 1967
April 17	Monday—Last day to drop a class before final examinations
April 20	Thursday—Thesis Deadline
April 29	Saturday—End of class work
May 1-6	Monday through Saturday—Final Examinations
May 6	Saturday—End of Spring Semester
May 7	Sunday—Vesper Services for graduating seniors
May 8	Monday, 10:00 a.m.—One Hundredth Annual Commencement
May 9	Tuesday—All grades due in Registrar's Office by 4:00 p.m.
May 12	Friday—Last day to submit application and transcripts to Admissions Office for Summer Session, 1967

1967 *Summer Session*

June 9, 10	Friday and Saturday—Registration
June 12	Monday—Class work begins
June 15	Thursday—Last day to enter an organized class for the Summer Session
June 23, 24	Graduate Record Examinations
June 26	Monday—Last day to drop a course without a grade
June 26, 27	Monday and Tuesday—Last days for filing application for an August degree in College Dean's Office
July 4	Tuesday—Independence Day Holiday
July 18	Tuesday—Thesis Deadline
July 31	Monday—Last day to submit application and transcripts to Admissions Office for the 1967 Fall Semester
Aug. 4	Friday—End of Summer Session
Aug. 8	Tuesday—All grades due in Registrar's Office by 4:00 p.m.



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The Graduate School

ALBERT DENNIS KIRWAN, M.A., LL.B., PH.D., Dean
JAMES C. HUMPHRIES, M.S., PH.D., Assistant Dean
DOROTHY C. LINVILLE, A.B., Admissions Officer
LUCY ROBERTA HOGAN, A.B., Administrative Assistant
ROSA LENA BRUMFIELD, B.S. in Com., Administrative Secretary

Introductory Statement

THE UNIVERSITY OF KENTUCKY began offering graduate work in 1870, and awarding graduate degrees in 1876, although the Graduate School as a distinct unit was not organized until 1912.

The Graduate School is concerned with advanced study and research carried on by the faculty and students of all colleges and departments. Under it the total graduate resources of the University are merged in order to promote the achievement of knowledge in an atmosphere of free and lively inquiry.

Graduate work is offered in all colleges in the University. Directors of graduate study in the various subjects are listed in this bulletin just before the list of courses.

The following advanced degrees are conferred:

MASTER OF ARTS
MASTER OF SCIENCE
MASTER OF SCIENCE IN AGRICULTURE
MASTER OF ARTS IN COMMUNICATIONS
MASTER OF SCIENCE IN CLINICAL NUTRITION
MASTER OF SCIENCE IN HOME ECONOMICS
MASTER OF SCIENCE IN AGRICULTURAL ENGINEERING
MASTER OF SCIENCE IN CIVIL ENGINEERING
MASTER OF SCIENCE IN ELECTRICAL ENGINEERING
MASTER OF SCIENCE IN ENGINEERING MECHANICS
MASTER OF SCIENCE IN LIBRARY SCIENCE
MASTER OF SCIENCE IN MECHANICAL ENGINEERING
MASTER OF SCIENCE IN METALLURGICAL ENGINEERING
MASTER OF SCIENCE IN MINING ENGINEERING
MASTER OF SCIENCE IN NUCLEAR ENGINEERING
MASTER OF SCIENCE IN PUBLIC HEALTH
MASTER OF ARTS IN EDUCATION
MASTER OF SCIENCE IN EDUCATION
MASTER OF BUSINESS ADMINISTRATION
MASTER OF MUSIC
SPECIALIST IN EDUCATION
DOCTOR OF EDUCATION (ED.D.)
DOCTOR OF PHILOSOPHY

The degree of Doctor of Philosophy is offered with major work in the following fields: Agricultural Economics, Anatomy, Animal Sciences, Biology, Biochemistry, Chemistry, Civil Engineering, Diplomacy and International Commerce, Economics, Education, Engineering Mechanics, English, French, Germanic Languages (to start fall 1967), History, Mathematics, Mechanical Engineering, Metallurgical Engineering, Microbiology, Pharmacology, Physics, Physiology and Biophysics, Political Science, Psychology, and in the combined fields of Sociology and Rural Sociology. Minor work may be carried in any department offering graduate courses.

Organization of the Graduate School

THE GRADUATE FACULTY consists of the Dean of the Graduate School and all persons appointed thereto by the President of the University in the manner set forth below. As the chief University agency for the promotion of the ideals of graduate study, it determines the policies of the Graduate School and makes recommendations to the University Faculty on such matters as require the approval of that body, and it may make recommendations on other matters to the President, or to other administrative officials. All rules affecting graduate work and the inauguration of new graduate majors must be approved by the Graduate Faculty.

New Graduate Faculty members may be proposed to the Dean of the Graduate School at any time by the college deans and department heads concerned, or in the case of persons not attached to a college faculty, by the Executive Vice-President of the University. Eligibility qualifications are as follows:

1. The doctor's degree or its equivalent in scholarly reputation.
2. The rank of assistant professor (or equivalent), or higher.
3. Scholarly maturity and professional productivity as demonstrated by publications, editorial services, research surveys, creative work, or patents; and research in progress at the time of proposal.
4. Definite interest in graduate work and the willingness to participate in the graduate program.

Appointment to the Graduate Faculty is made by the President of the University on nomination by the Dean of the Graduate School after he and the Graduate Council have studied the credentials submitted in support of the proposed members.

Administrative officers assigning teaching and other duties to members of the Graduate Faculty who are taking an active part in the graduate program (i.e., are heavily engaged in directing theses, carrying on pro-

ductive research, etc.) should make appropriate reduction in the duties required of such teachers.

THE DEAN AND HIS OFFICE. The Dean of the Graduate School is charged with the administration of the policies adopted by the Graduate Faculty and the University Faculty relating to graduate studies. He presides over all meetings of the Graduate Faculty and calls meetings of this faculty whenever he thinks it advisable or whenever requested to do so by one fourth of the membership. He makes recommendations to the Graduate Faculty respecting the requirements for advanced degrees, the regulations necessary to insure a high standard of graduate work, the departments of colleges authorized to offer courses leading to graduate degrees, and all other aspects of the graduate program. He appoints a committee for each graduate student, arranges for final examinations, advises students with regard to their studies and the requirements of the Graduate School, and in all other ways administers the graduate program in the interests of efficient instruction and the highest attainment possible on the part of each graduate student. He is responsible for determining and certifying to the Registrar candidates who have fulfilled requirements for advanced degrees, and he reports annually to the President of the University on the work of the Graduate School and its needs.

The President and the Dean of the Graduate School are members ex-officio of all committees of the Graduate Faculty.

THE GRADUATE COUNCIL is composed of eleven members and the Dean of the Graduate School, who is chairman. There are eight elected representatives and three members appointed by the Dean of the Graduate School. One of the elected members is from the College of Agriculture and Home Economics, two from the College of Arts and Sciences, one from the College of Commerce, two from the College of Education, one from the College of Engineering, and one from the College of Medicine. The member or members from each of these colleges are elected by the Graduate Faculty members in that college. The term of office of the elected and appointed members is three years, and no member may succeed himself until three years have elapsed since the completion of his last term.

The Graduate Council approves or disapproves proposals concerning courses offered for graduate credit, and advises and lends assistance to the Dean in his execution of policies and regulations determined by the Graduate Faculty. Specifically, the Council

1. Studies requests of departments relating to proposed graduate programs.
2. Reviews existing programs and courses.

3. In cooperation with the Dean, initiates recommendations to the Graduate Faculty. (This procedure is not intended to prevent a faculty member from bringing any recommendation or request directly before the Graduate Faculty.)

The Graduate Council has only such authority as is herein granted, or such as the Dean or the Graduate Faculty may delegate to it. A majority of the Graduate Council constitutes a quorum for the transaction of business.

Directors of Graduate Study. A director of graduate study serves as adviser to each student majoring in his area until the student has a thesis director. The director of graduate study then recommends that this thesis director be appointed the student's adviser or committee chairman. In areas where theses are not required, the director of graduate study is the adviser for all students not writing theses. All student classification schedules must be endorsed by the student's adviser.

If it is desirable, a director of graduate study may recommend that additional advisers in the area be appointed. A director of graduate study who is to be absent from the University for as long as a semester must call this fact to the attention of the Dean so that a substitute may be appointed.

Directors of graduate study make annual reports to the Dean of the Graduate School on the progress and needs of graduate work in their areas in time to permit the Dean to use this information in his annual report to the President of the University.

The Dean of the Graduate School, with the advice of the college dean(s) and the approval of the President, may recommend to the Graduate Faculty the areas of graduate study and research into which the University may be divided. (The logical unit for an area is a department. By common consent, however, certain departments may be grouped into an area; and in exceptional cases a department may be divided into two or more areas.) The Directors of Graduate Study for the various areas are recommended to the President of the University by the Dean of the Graduate School after he has conferred with the respective graduate staffs and college deans of the areas concerned.

Establishment and Modification of Graduate Programs. An area which wishes to establish a new graduate program or modify an existing one must submit its program to the Graduate Council, which will make recommendations concerning it to the Graduate Faculty.

Honorary Degrees. The selection of candidates for honorary degrees originates in the Graduate Faculty, and the Graduate Faculty makes its recommendations to the University Faculty.

Honorary degrees are normally conferred at the May Commencement, but may be conferred at other times with the approval of the Graduate Faculty. Recipients must be present in order to receive honorary degrees.

Admission

A student who is a graduate of a fully accredited institution of higher learning and has an undergraduate grade-point standing of 2.5 on a basis of 4.0 may apply for admission to the Graduate School by submitting to the Graduate Admissions Office two official transcripts of all college courses and a written application at least a month before anticipated entrance. Application blanks may be obtained from the Admissions Office of the Graduate School. A student with a grade-point average of less than 2.5, or a graduate of a non-accredited institution, may be admitted only after the Graduate Record Examination or other evidence acceptable to the Dean of the Graduate School, and to the Department, indicate that he is capable of doing satisfactory graduate work. Individual departments may establish higher requirements.

It should be clearly understood that a graduate student may not be able to begin immediately a full graduate program leading to the degree he desires. It may be necessary for him to demonstrate his ability to write accurate and effective English or he may have to satisfy certain prerequisites which he omitted in his undergraduate curriculum. Deficiencies are determined by the department in which the major work is to be done. Ordinarily, a graduate student may begin a full program in any field in which he has a balanced undergraduate major or its equivalent.

Admission to the Graduate School entitles a student to take such courses as he desires, provided he has the necessary prerequisites. *However, admission does not automatically make a student a candidate for a graduate degree.*

Attendance in the Graduate School at the University of Kentucky is not a right. It is a privilege which may be withdrawn by the University or any area of graduate study if it is deemed necessary by the Dean of the Graduate School in order to safeguard the University's standards of scholarship and character.

ADVANCED DEGREES FOR FACULTY MEMBERS

Members of the faculty of the University of Kentucky having a rank higher than that of instructor may not be considered as candidates for advanced degrees from this institution. They may take graduate courses, but these may not apply toward a degree from the University.

THE GRADUATE RECORD EXAMINATION

All students working for graduate degrees must take the Graduate Record Examination (the Aptitude Test, and the Advanced Test in the major subject). This must be done no later than the first term of graduate work. (See the calendar at the front of this bulletin.)

APPLICATION FOR FULL GRADUATE STANDING

A graduate student desiring to earn a graduate degree must be approved for full graduate standing by the department in which he intends to major and by the Graduate School. Application should be made as soon as scores on the Graduate Record Examination are available, and in any case prior to the beginning of the semester or term in which the degree is sought.

To be admitted to full graduate standing, a student (in addition to meeting the admission requirements) must have scores on the Graduate Record Examination satisfactory to the department concerned and to the Dean of the Graduate School, and a *B* average or higher on all graduate work completed at the University of Kentucky.

Graduate work taken before a student is admitted to full graduate standing will be evaluated by the Director of Graduate Study in the major area and by the Dean of the Graduate School at the time the application for full graduate standing is considered.

GRADUATING SENIORS AS PART-TIME GRADUATE STUDENTS

A senior in the University of Kentucky lacking no more than six credit hours for graduation and having an undergraduate average of at least 2.5 may register in the Graduate School with the consent of his college dean and the Dean of the Graduate School. Approval of the appropriate director of graduate study is required if the student is to be an applicant for a degree. The total load of such a student may not exceed twelve credit hours. The graduate residence assigned is one and one-half weeks for each credit hour of graduate work beyond the six or fewer credit hours needed to complete undergraduate requirements. The incidental fee is that of a full-time student in the school in which more than half of the work is taken. In cases where the load is evenly divided between the schools, the larger fee is assessed. Requirements for the undergraduate degree must be completed during the semester in which the student is allowed to register for part-time graduate work. Students desiring to enroll in the Graduate School under these conditions must fill out in duplicate a petition listing the course or courses to be taken in order to complete their undergraduate requirements. The petition must be approved by both deans concerned.

General Requirements for All Advanced Degrees

COURSES AND GRADES

All courses numbered 500 through 799 may be counted for credit toward a graduate degree provided they are approved as an appropriate part of the student's graduate program by his graduate adviser or committee. Courses numbered 400 to 499 carry graduate credit for non-majors only. An over-all average of *B* on all work taken as a graduate student, as well as a *B* average on all work carrying graduate credit, must be attained before an advanced degree may be awarded. All work is to be counted and none of it may be omitted in computing the average except those grades in courses which do not give graduate credit may be omitted from a student's average by the Dean of the Graduate School on recommendation of the student's adviser. *D* grades are not given to graduate students. An "incomplete" (*I*), unless the Dean of the Graduate School grants an extension of time, must be removed within one calendar year after the close of the term in which the *I* is assigned if the student is to receive credit.

DROPPING OF COURSES

During the first ten class days of the term a graduate student may drop a regular course without a grade, provided he has the approval of his instructor, his director of graduate study, and the Dean. Regular courses may not be dropped later in the term without the assignment of a grade: *W* if a student withdraws passing, *E* if he is failing. However, only under very special circumstances may he be allowed to withdraw from a class within two weeks of the final examination period.

GRADES

The official grades of graduate students are recorded in the office of the Registrar. The Registrar provides official transcripts on the same basis as for undergraduate students. Also, he provides the Dean with the grades of all students in order that the Dean may be able to advise students concerning their programs.

The grading of graduate students is done according to the following scale:

A—high achievement	4 grade points per credit
B—satisfactory achievement	3 grade points per credit
C—minimum passing grade	2 grade points per credit
E—failure	0 grade points per credit
I—incomplete	see explanation below
S—satisfactory	see explanation below

A grade of *I* (incomplete) may be assigned to a graduate student if a part of the work of a course remains undone and there is a reasonable possibility that a passing grade will result from completion of the work. No student may graduate with an *I* on his record without the permission of his adviser and the approval of the Dean of the Graduate School.

A grade of *S* (satisfactory work in progress) may be recorded for students in graduate courses which carry no credit; and in graduate seminars, independent work courses, and research courses which extend beyond the normal limits of a semester or summer term. The grade may not be given to a student in a course carrying credit if the student has done unsatisfactory work or if he has failed to do a reasonable amount of work. The project must be substantially continuous in its progress. When the work has been completed, a final grade will be substituted for the *S*.

Once a grade (other than an *I* or *S*) has been reported to the Registrar's Office, it may not be changed unless an error was made at the time the grade was given and recorded, and then only upon the written unanimous approval of the instructor, the Registrar, and the Dean of the Graduate School.

REGISTRATION AND CLASSIFICATION

All students expecting graduate credit must be enrolled in the Graduate School. Graduate Students will conform to the general registration schedule of the University and may not enter later than the last allowable date set by the Registrar.

Before registering, a graduate student must obtain his adviser's approval of his proposed program.

STUDENT LOADS AND SHORT COURSES

The normal load of a graduate student during any semester is twelve credit hours, and under no circumstances may it exceed fifteen credit hours. In the summer session the normal load is six credit hours and the maximum nine. Graduate students serving in the University as assistants or part-time instructors should register for less than the normal load, as determined by their advisers. Persons holding full-time working or professional assignments, whether employed by the University or not, may not take for graduate credit toward a degree in any single semester or term more than 5 credit hours. A student may petition for a waiver of this rule if he meets the following conditions: (1) has satisfactorily completed six credit hours of graduate work; (2) has attained higher than national average scores on the aptitude and advanced tests of the Graduate Record Examination; (3) and has appropriate employment facilities and conditions. Two short courses of 4 weeks or less, or two

full-term courses and a short course, may not be taken simultaneously. A short course may not carry credit greater than the number of weeks during which it is offered.

"RESIDENCE" DEFINED

One of the requirements to be met by a candidate for an advanced degree is that of residence. Meeting this requirement does not, however, qualify a candidate for a degree. A longer time may be required to meet other requirements.

Full-time residence (18 weeks) requires a minimum of 9 credit hours of graduate course work, or the equivalent in thesis research during the regular academic term. In the summer session full-time residence (9 weeks) requires a minimum of 6 credit hours. Part-time residence is computed on the basis of one and one-half weeks of residence for each credit hour earned, except for short courses of less than eight weeks, in which case the number of residence credits may not exceed the actual number of weeks involved. If a full-time student becomes a part-time student by failing courses or dropping courses, he receives one and one-half weeks of residence per credit hour in courses completed with a satisfactory grade.

The summer school student is assigned full residence (9 weeks) provided he is taking courses which together require residence for the full eight weeks and provided he earns a minimum of six credit hours, whether in short courses alone or in a combination of short and full-term courses.

The Registrar makes the computations for short courses and recommends to the Graduate Office the amount of residence earned. The final evaluation of residence, as well as of course and other requirements, rests with the Dean of the Graduate School.

A master's candidate working on his thesis and in need of residence credit may register for a maximum of nine weeks of residence in course No. 768 in the appropriate department.

A doctoral candidate working on his thesis and in need of residence credit may register for course No. 769 in the appropriate department.

TIME LIMIT FOR DEGREES

No course or residence credit may be given for graduate study completed more than eight years prior to the end of the semester at which the student expects to receive his degree unless such credit or residence is specifically validated by the Graduate Council on written recommendation of the appropriate director of graduate study. No course or residence credit may be validated in this manner if completed more

than twelve years prior to the end of the semester in which the student expects to receive his degree.

GRADUATION

Advanced degrees may be conferred at the close of any semester or summer session, but commencement exercises are held only at the close of the academic year. A student who is scheduled to receive his degree at the close of the academic year is expected to attend the commencement exercises unless he is excused in writing by the Dean of the Graduate School. Students who are eligible to receive degrees at the end of a first semester or a summer session may elect to defer their graduation and participate in the next commencement exercises. Appropriate academic costume must be worn. The graduation fee covers the cost of the diploma, the hood, and, in the case of the master's degree (with thesis), the binding of the thesis.

Students intending to graduate at the close of a given semester or term must make formal application (at the Graduate Office) for the degree within the first two weeks of the semester or term.

FEES

Registration fees per semester are $140 for residents of Kentucky, $410.00 for non-residents. Part-time graduate students who are legal residents of the state pay $17.00 per semester credit; non-residents pay $46.00 per semester credit. Resident students carrying full loads in the summer will pay $80.00, non-resident students $220.00. Those taking less than full loads pay the regular semester credit fee. The Registrar determines the status of one's residence for purposes of assessing fees.

Graduate fellows, graduate assistants, and instructors pay the fees assigned to Kentucky residents.

General Requirements for All Masters' Degrees

(See also pages 11-16)

TRANSFER OF CREDITS

With the approval of his graduate adviser and the dean, a student may transfer up to six credit hours (but no residence) toward the satisfaction of the minimum requirements for masters' degrees, provided the work in question was taken while he was enrolled in residence in an approved graduate school.

EXTENSION AND CORRESPONDENCE WORK

Under certain conditions, up to six of the credit hours required for any master's degree may be earned in extension courses given in person by University of Kentucky instructors. No graduate credit is given for courses taken by correspondence.

M.A. OR M.S. DEGREE

Whether a candidate selects a Master of Arts or a Master of Science degree is left to the option of the candidate and his major department. In general it may be said that a candidate with major work in the natural sciences should take the M.S. degree; others the M.A.

COURSES AND CURRICULA

Graduate students are eligible to take regular courses which meet as organized classes and independent-study or research courses in which each student carries on investigations independent of class meetings. Independent study or research courses may not duplicate thesis work; thesis work must be done in addition to the minimum course requirements. At least two-thirds of the minimum requirements for the master's degree must be in regular courses, and at least half of the minimum requirements must be in courses numbered on the 600 or 700 level. Exceptions to this rule may be made only with the approval of the Graduate Council. Courses numbered at the 600 or 700 level shall be taught only by members of the Graduate Faculty or by such other instructors as are approved by the Graduate Dean.

A student may work toward only one master's degree at a time. He must establish at least one year of residence while earning a second master's degree.

RESIDENCE

The minimum residence required for the M.A. and M.S. degrees is one academic year of 36 weeks. A portion of this residence may be earned in part-time work, but normally candidates for masters' degrees must spend at least two full summer terms or one semester in full-time residence at the University. For individual superior students the full-time residence requirement may be waived if recommended by the director of graduate study in the student's major area and approved by the Graduate Dean. Minimum eligibility for being so recommended includes: (1) the satisfactory completion of 12 credit hours of graduate work, (2) the attainment of national average scores on the Graduate Record Examination, and (3) the availability of employment facilities and conditions which make feasible satisfactory completion of degree requirements

while the student is fully employed. A total graduate program may not be made up entirely of courses offered in short terms of 3 or 4 weeks each, and not more than one-third of the course work requirements for a degree may be taken in courses that meet only once a week.

This statement does not mean, however, that the work described for each individual can always be completed in the minimum length of time designated for the degree. Services performed as a graduate assistant or inadequate preparation for graduate work, for example, generally make a longer period of study necessary.

EXAMINATIONS

A final examination (oral and/or written) is given all candidates for masters' degrees not later than eight days before the close of the semester in which the degree is to be awarded. The examination is scheduled by the Graduate Dean and the report is returned to him upon completion of the examination, which in no case may be later than two weeks after the start of the examination. The examining committee consists of at least three qualified members recommended by the director of graduate study and appointed by the Dean of the Graduate School.

If the candidate fails his final examination, the committee may recommend to the Graduate Council the conditions under which a second examination may be administered. Insofar as it is practicable the same examining committee gives this examination. In all decisions the majority opinion of the committee prevails. If the committee is evenly divided, the candidate fails. A third examination may not be allowed.

FEES

Before any master's degree may be conferred the student must pay a commencement fee of $22.50 at the Bursar's office.

Requirements for the Degrees of Master of Arts and Master of Science

The Graduate School authorizes all departments which are approved for graduate work and which wish to do so to permit students to satisfy the requirements for the M.A. and the M.S. degrees by either of two plans.

Plan A

In addition to meeting all general requirements for masters' degrees (see pp. 11-16 above) the candidate must complete at least 24 semester credit hours of graduate course work with a standing of 3.0 (*B*) or higher,

satisfy the language requirements, and write a thesis. A candidate must have a major area (defined usually as an academic department) and must (with the exceptions noted below) take at least two thirds of his courses in this area; the other one third may be taken in this area or in areas which have a graduate relationship to it. In Education, Agriculture, and Communications only one half of the work must be in the major area. When the setting up of major topics seems to require it, the Dean or (in unusual cases) the Graduate Council may, on recommendation of the appropriate director of graduate study, authorize courses taught outside the major to count on the major.

THESIS

Two typewritten, unbound copies of the thesis must be presented to the Graduate School Office not later than two weeks before the last day on which grades may be reported to the Registrar's office. These copies must be approved by the thesis director and the appropriate director of graduate study, must be on 100 per cent rag or cotton fiber paper, and must be in a form acceptable to the Graduate School. Instructions for the preparation of theses should be obtained from the Graduate Office before the thesis is typed. The candidate must also submit an abstract of his thesis which does not exceed two hundred words and is suitable for publication. The final examination may not be taken before the thesis has been accepted by the Graduate School Office.

Theses must be developed under the direction of a member of the Graduate Faculty, except that in special cases the Graduate Dean may authorize a staff member not on the Graduate Faculty to serve as co-director. Collaborative group effort by two or more graduate students is not forbidden, but there must be enough independent effort to enable each student to make a separate contribution and to prepare an individual thesis.

Each thesis must be acceptable to the examining committee at the time of the final examination.

Theses submitted by candidates become the physical property of the University of Kentucky and authors agree that the University may decide the conditions under which they may be used or published. The University protects the authors' rights by placing certain restrictions upon borrowers' use of theses as long as they are unpublished. A copy of the following regulations (to be prepared by the student) is placed before the title-page of every thesis.

> Unpublished theses submitted for the masters' and doctors' degrees and deposited in the University of Kentucky Library are as a rule open for inspection, but are to be used only with due regard to the rights of the authors. Bibliographical references may be noted, but quotations or sum-

maries of parts may be published only with the permission of the author, and with the usual scholarly acknowledgments.

Extensive copying or publication of the thesis in whole or in part requires also the consent of the Dean of the Graduate School of the University of Kentucky.

A library which borrows this thesis for use by its patrons is expected to secure the signature of each user.

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FOREIGN LANGUAGE REQUIREMENT:

A reading knowledge of a modern foreign language is required. Ordinarily this language will be French, German, or Russian, but another language may be substituted if it can be shown to be pertinent to the student's program and is approved by the adviser and the Dean of the Graduate School. The language requirement must be satisfied by an examination given by the appropriate language department of the University or by such persons as the Graduate Dean may specify. A candidate for a degree in the language which is his native tongue must do a full minor (one third of his work) in areas in which English is the language employed.

Plan B

Plan B (which is not necessarily available in all departments that have Plan A) has the same minimum requirements as Plan A except that six or more credit hours of course work may be substituted for a thesis and that in some departments a reading knowledge of a foreign language may not be required. A student may follow this plan only with the approval of the department concerned.

A student should consult his adviser for any additional requirements that may have been set up for Plan B by his area of study.

Specialized Masters' Degrees

Special requirements concerning the Master of Science in Agriculture, the Master of Science in Home Economics, the Master of Science in Library Science, the Master of Arts in Education, the Master of Science

in Education, the Master of Science in Public Health, the Master of Music, the Master of Business Administration, and the Masters' Degrees in Engineering are explained in the section of this Bulletin which outlines departmental offerings.

Requirements for the Degree of Doctor of Philosophy

The degree of Doctor of Philosophy is conferred upon a candidate who, after completing not fewer than three years of graduate work devoted to study of a special field of knowledge, presents a satisfactory thesis, passes a comprehensive examination on his thesis subject and chosen field, and shows sufficient promise of scholarly attainment.

The doctor's degree is intended to represent, not a specified amount of work covering a specified time, but the attainment, through long study, of independent and comprehensive scholarship in a special field. Such scholarship should be evidenced both by the student's grasp of subject matter and by his capacity to do research.

Information concerning admission may be found on p. 11 above.

THE STUDENT'S ADVISER AND SPECIAL COMMITTEE

The director of graduate study in the student's major area serves initially as the student's adviser and signs his schedule before it is presented to the Dean. When the thesis director has been chosen, the student's special committee is set up by the Dean after he has conferred with the student, the director of graduate study, and the thesis director.

The special committee consists of the thesis director as chairman, two or three other members from the major area, and at least one representative from each minor area—in all, no fewer than five members. This committee advises the applicant and sets the requirements which the student must meet before he may be admitted to the qualifying examination. The special committee keeps minutes of all meetings and sends abbreviated copies to the Dean to be made a part of the student's record. Ordinarily this committee determines when the qualifying examination is to be administered, and the chairman schedules the examination in writing, sending a copy of the announcement to the Dean. The committee is the final judge on a majority basis of the questions to be asked on the qualifying examination and of whether the student passes.

A department which elects to do so may give a uniform departmental qualifying examination to its candidates instead of delegating full responsibility to the special committee.

MAJOR AND MINOR SUBJECTS

Every applicant for the Ph.D. degree must select one major area of study and no more than two minor areas, at least one of which must be outside the major area. (See p. 19 for definition of an area.) The major area is one in which the student intends to concentrate his efforts.

The minor area(s) must be approved by the representative of the major area and by the Graduate Dean, and the subjects to be taken in the minor area(s) by the representative of the minor(s) on the special committee. Normally, at least one-sixth of a student's time should be devoted to an outside minor, but if the student appears already to have an adequate degree of proficiency in an acceptable area, he may, with the approval of his special committee (including the representative of the minor area), be permitted to proceed to this portion of his qualifying examination without taking additional course work.

RESIDENCE

A minimum of three collegiate years of resident graduate work is required for the doctorate. At least two semesters (exclusive of summer sessions) of the required residence above the master's degree (or its residence equivalent) must be earned at the University of Kentucky in full-time devotion to graduate study, or to a combination of graduate study, research, and not more than half-time assignment as a research or teaching assistant. "Residence equivalent" to the master's degree is interpreted as thirty-six weeks of official residence. (See definition of residence on p. 15.) The amount of residence to be transferred on account of prior graduate work at some other institution is determined jointly by the director of graduate study in the area, the Dean of Admissions, and the Dean of the Graduate School. Ordinarily, however, graduate students may be allowed only one year of residence toward the doctorate for earlier study which has been used to satisfy the requirements for a master's degree or masters' degrees.

A year of residence is required after the qualifying examination before the degree is conferred. If an examination is completed within the first six weeks of a semester, that semester will count as half of the year. If a student has passed his qualifying examination but has earned less than one year of residence after the qualifying examination, he may petition the Graduate Dean for a waiver of this requirement in order to complete his dissertation in absentia. Even if the petition is granted, however, a minimum of one academic year must elapse between the time of the qualifying examination and the conferring of the degree.

While it is expected that a well-prepared student of good ability may secure the degree upon completion of three years of full-time study,

it should be understood that this requirement is a minimum and is wholly secondary to scholarly accomplishment.

LANGUAGE REQUIREMENTS

An applicant must have a reading knowledge of at least two modern foreign languages, normally to be chosen from French, German, and Russian. (A department or interdisciplinary Ph.D. program, with the special permission of the Graduate Council, may be authorized to offer only one foreign language.) With the approval of the student's special committee, the director of graduate study in the area, and the Graduate Dean, however, certain substitutions may be made:

1. Some other language may be substituted for one of those normally required if it can be demonstrated that the student's scholarly needs will be better served thereby.
2. In special cases fluency in one foreign language may be substituted for a reading knowledge of two languages.

If after four semesters of full-time graduate work (i.e., above the A.B.) the student has not satisfied the foreign language requirement, he must have the special approval of his adviser and the Graduate Dean before registering for further work. The language requirement must be satisfied before the applicant may be admitted to the qualifying examination. Proficiency in foreign languages is determined by examinations conducted by the appropriate language department or by such persons as the Graduate Dean may specify.

THE QUALIFYING EXAMINATION

A qualifying examination is required of all applicants for the doctorate in order to determine whether the applicant should be admitted to candidacy. Normally this examination is prepared by the student's special committee (see p. 21) and should be taken during or after the student's fourth semester of full-time graduate study, or the equivalent. This examination is both written and oral and covers both the major and the minor areas. The special committee reports to the Dean the result of the examination. If the result is failure, the committee recommends the conditions to be met before another examination may be administered. The minimum time before another examination may be given is six months. The same committee, or as many of the members as are available, plus those added by the Dean to fill vacancies, gives the second examination. This examination must be completed and the result reported to the Graduate Dean within sixty days of the beginning of the examination. A third examination may not be allowed.

THE THESIS

Each candidate must present a thesis which is the result of original research and adds to or otherwise modifies what was previously known on the subject. Unless the director of the thesis specifically recommends departures, the thesis must be in conformity with the instructions prepared by the Graduate School, must be on 100 per cent rag or cotton fiber paper, and must be satisfactory in style and composition.

Before the thesis is formally submitted, the student must bring it to the Graduate Office to have it checked for form. Two typewritten copies of the thesis (unbound) and two typewritten copies of an abstract, usually of not less than 400 words nor more than 600 words, must be presented to the Dean of the Graduate School at least two weeks before the final date on which the Registrar's Office will receive grades of candidates for degrees at the next commencement. An approval sheet signed by a majority of the special committee (including the director of the thesis) must accompany the thesis. When theses are submitted, a standard form containing RULES FOR THE USE OF THESES must be prepared and must be included with the manuscript, before the title page. (See p. 19 for these RULES.)

It is expected that every doctoral thesis will be worthy of publication either in its entirety in book form or as articles in the leading journals and periodicals of the field. The candidate is urged to make every reasonable effort to obtain such publication for his own sake and in the interest of the Graduate School, and is required to make a deposit of $50.00 in order to guarantee publication. If within five years after the degree is received a substantial portion of his thesis has been published, the director of graduate study in his area may recommend that the deposit be refunded. Failing to meet the publication requirement, he will forfeit his deposit and the thesis will be microfilmed and copyrighted by the University in the name of the author. One positive microfilm copy will be deposited in the University Library and will be available for inter-library loan. Microfilm copies of theses may be purchased at cost. The abstract of each microfilmed thesis will be printed in an issue of Microfilm Abstracts (published by University Microfilms, Ann Arbor, Michigan).

THE FINAL EXAMINATION

After the acceptance of the thesis by the special committee and the Dean of the Graduate School, the candidate is given a final oral, or, if the examining committee elects, an oral and a written examination. The examining committee consists of a minimum of five persons, appointed by the Dean of the Graduate School, after he has conferred with the director of graduate study for the area. The director of graduate study

(or his delegate) serves as chairman of the committee. Other members include the thesis director, a third representative of the department, a representative of the minor area, and one member of the Graduate Faculty associated with neither the major nor minor areas. (The President of the University and the Dean of the Graduate School are ex-officio members of all examining committees.) The final examination includes a defense of the thesis and may be as comprehensive in the major and minor areas as the committee desires to make it. In all decisions the majority opinion of the committee prevails. If the committee is evenly divided, the candidate fails.

If the candidate fails, the committee may recommend to the Graduate Dean the conditions under which the candidate may have another examination. This examination will be administered by as many of the original committee members as are available, plus new members appointed by the Dean to fill vacancies.

If the student passes this examination, he will be recommended for the degree at the next commencement, provided one academic year has elapsed since the qualifying examination.

Before any doctor's degree may be conferred, a fee of $27.50 must be paid at the Bursar's office. The graduation fee covers the cost of the diploma and the hood.

Requirements for the Degree of Doctor of Education

The requirements for the degree of Doctor of Education are the same as for the degree of Doctor of Philosophy with the following exceptions:

1. No foreign languages are required for the Ed.D. degree.
2. A minimum of 72 credit hours is required, at least one third and not more than one half of which must be in departments outside the College of Education.

Applicants for the Ed.D. degree, who are required to do at least one third of the minimum requirements outside of areas of the College of Education, must declare at least one area other than Education when their special committees are appointed. Two members must be chosen from areas outside the College of Education.

The Dean of Admissions, the Graduate Committee of the College of Education, and the Graduate Dean will evaluate credits and residence to be allowed transfer students. It is understood, however, that the special committee may accept only such courses as fit into the graduate program of the student.

Requirements for the Degree of Specialist in Education

The degree of Specialist in Education is conferred upon a candidate who satisfactorily completes a sixth-year planned program in Education under the general requirements of the Graduate School (p. 13) and the following special requirements.

Admission

The student, prior to admission to the program, must (1) have a master's degree, (2) ordinarily have a standing of 3.4 or higher on his graduate work, (3) meet the requirements for a teaching certificate or have credentials appropriate to his field of specialization, and (4) have at least 30 credit hours in courses in education (undergraduate and graduate).

A student must file an application with the Dean of the College of Education. The application will be considered by an admissions committee of the College of Education and each student must be recommended to the Graduate School by the division or department in which he plans to major.

Program

The student must earn a minimum of 24 credit hours of graduate work beyond the master's degree (of which at least 12 must be in courses numbered 600 or above) with a limit of 12 credit hours per semester for a full-time student, 6 credit hours per summer session, and 3 credit hours for a three-week intensive course.

The division or department in which the student majors is responsible for helping the student plan a program to meet his needs. The program should contribute to specialization in a field but should not neglect the broader development of the individual.

The student must complete an independent research problem (equal to 3 but not to exceed 6 credit hours) and submit a written report, a copy of which is to be filed with the division or department directing the research.

With the approval of the Graduate Dean and of the division or department in which he is to major, the student may transfer a maximum of 6 hours of residence credit earned beyond the master's degree from an institution which is approved to offer work above the master's level.

Final Examination

The final examination required of all candidates is administered by an examining committee consisting of at least three qualified members

recommended by the adviser and the director of graduate study and appointed by the Dean of the Graduate School.

Graduate Students Not Applicants for Degrees

Graduate students who are not working toward advanced degrees are not required to designate major or minor subjects, but may elect their work with a view to the special purposes for which they are in attendance at the University.

Any course of study announced for advanced undergraduates and graduates is open for election by such students under the same conditions as apply to candidates for degrees.

Should a graduate student who has not taken his work with a view to obtaining a degree subsequently desire to become an applicant for a degree, the number of credit hours he is to receive for work already done will be determined at the time he applies for admission as applicant for the degree.

Research Program at Oak Ridge Institute of Nuclear Studies

The University is one of the Sponsoring Universities of the Oak Ridge Institute of Nuclear Studies located at Oak Ridge, Tennessee. Through this association, the University of Kentucky Graduate Research Program has at its disposal all of the facilities of the National Laboratories in Oak Ridge and of the research staffs of these laboratories. When masters' and doctoral candidates have completed their course work, it is possible by special arrangement for them to go to Oak Ridge to work on their research problems and prepare their theses. In addition, it is possible for staff members of the University to go to Oak Ridge for varying periods, usually for not less than three months, for advanced study in their particular fields.

Students on Oak Ridge Graduate Fellowships receive stipends which vary according to the number of their dependents and the level of work they are doing. Staff members may work in Oak Ridge on stipends commensurate with their present salary and rank.

Information concerning stipends and other matters may be obtained from the office of the Graduate School or from the Chairman of the University Relations Division of the Oak Ridge Institute of Nuclear Studies, Box 117, Oak Ridge, Tennessee.

Southern Regional Training Program in Public Administration

Since 1945 the University of Kentucky, the University of Alabama, and the University of Tennessee have conducted a joint program in public administration leading to a master's degree. Part of the course work is completed at each institution, and three months of successful internship are required. Detailed information concerning the program may be obtained from the Department of Political Science of the University of Kentucky.

Advanced Study and Research by Guests of the University

When appropriate resources are available at the time desired, the President of the University, upon the recommendation of the Dean of the Graduate School and the department affected, will welcome advanced scholars as guests of the University, with the privilege of auditing seminars and research courses and of carrying on research in laboratories and libraries. Normally there will be no charge except for laboratory expenses. Negotiations for such arrangements should be conducted in advance through the Graduate Office.

Graduate School Fellowships

University of Kentucky Research Foundation Fellowships: The University of Kentucky Research Foundation supports several graduate fellowships of $1,800 to $2,400, each carrying with it waiver of out-of-state fees.

Haggin Fellowships: The Haggin fellowships, endowed by Margaret Voorhies Haggin in memory of her father, George Voorhies, carry a stipend ranging from $1,500 to $2,400, plus remission of out-of-state fees.

Both Haggin fellowships and Kentucky Research Foundation fellowships are open to all students who hold a bachelor's degree or higher from any college or university of recognized standing. All fellows are expected to devote their entire time to graduate work, and no teaching or other departmental work may be required of them; nor are they permitted to perform any duties for extra pay. The award is paid in nine equal monthly installments.

The Dr. Paul I. Murrill Memorial Scholarship: This scholarship was set up by Mrs. Paul I. Murrill in honor of her husband, who was a graduate of the University of Kentucky. It pays a variable stipend

of approximately $2,500 a year to a student who possesses outstanding qualities of character and aptitude for fruitful graduate work. Preference shall be given to scholars in the field of Chemistry.

Forms for making application may be secured from the office of the Dean of the Graduate School and must be submitted not later than February 15 of each year.

Other Fellowships

The George W. Pirtle Fellowship in Geology: A grant of $500 a year is given by George W. Pirtle to a graduate student in geology upon the recommendation of the faculty of the Department of Geology. The award is made upon the basis of need and promise of future achievement in the geological field. Mr. Pirtle has set up this grant in appreciation of the training he received in the Geology Department. He was the first student to obtain the master's degree from the University with a major in Geology. The grant is given in honor of Dr. A. C. McFarlan.

J. Stephen Watkins Foundation Fellowship for Civil Engineering: The Watkins Fellowship, contributed by the J. Stephen Watkins Foundation, carries a stipend of $2,400, plus remission of out-of-state fees, and will be offered every other year beginning in 1965.

Information concerning other fellowships (National Science Fellowships, National Science Traineeships, NASA Traineeships, National Defense Fellowships, etc.) may be obtained from the Graduate Office.

Research and Teaching Assistantships

Most departments employ part-time teaching and research assistants at stipends ranging up to $3,000, plus waiver of out-of-state fees. Information concerning assistantships may be obtained from the various departments.

Subjects and Directors of Graduate Study

The courses offered for graduate work are listed under the following groups:

Subjects	*Directors of Graduate Study*
I. Agriculture and Home Economics	
Agricultural Education	Harold R. Binkley
Agricultural Economics	A. J. Brown
Agricultural Engineering	Blaine F. Parker

Agricultural Entomology ..... L. H. Townsend
Agricultural Extension Education .... Frank Santopolo
Agronomy ..... H. F. Massey
Animal Sciences ..... W. P. Garrigus, George E. Mitchell, Jr.
Forestry
Home Economics ..... C. Milton Coughenour
Home Economics Education (See Education)
Horticulture ..... Hubert C. Mohr
Plant Pathology ..... R. A. Chapman
Rural Sociology ..... Melvin DeFleur
Veterinary Science

II. Arts and Sciences

Anthropology ..... (Acting) Frank Essene
Art ..... (Acting) Richard B. Freeman
Biology ..... H. P. Riley
Botany ..... R. A. Chapman
Chemistry ..... William F. Wagner
Classics ..... Richmond Y. Hathorn
Computer Science (At present no graduate majors are offered in this subject)
Diplomacy and International Commerce ..... Richard Butwell
Dramatic Arts (See English)
Economics (See Business and Economics)
English, Speech, and
Dramatic Arts ..... Jacob H. Adler, Robert D. Jacobs, W. S. Ward, A. L. Cooke
French Languages ..... Walter G. Langlois
Geography ..... J. R. Schwendeman
Geology ..... A. C. McFarlan
Germanic Languages ..... Paul K. Whitaker
Greek (See Classics)
History ..... Holman Hamilton
Hygiene and Public Health ..... W. A. Heinz
Journalism (Communications) ..... Robert D. Murphy
Latin (See Classics)
Library Science ..... (Acting) Maurice D. Leach, Jr.
Mathematics and Astronomy ..... W. C. Royster
Microbiology ..... Ralph H. Weaver
Music ..... Rey M. Longyear
Philosophy ..... John Kuiper
Physical Education ..... Don Cash Seaton
Physics ..... Fletcher Gabbard
Political Science ..... S. Sidney Ulmer
Psychology ..... Jesse G. Harris, Jr.
Radio-TV-Films (At present no graduate majors are offered in this subject)

Social Work (At present no graduate majors are offered in this subject)
Sociology and Rural Sociology ..... Melvin DeFleur
Spanish
Speech (See English)
Zoology ..... J. M. Carpenter

III. Business and Economics

Business Administration ..... Joe Logan Massie
Economics ..... Charles F. Haywood

IV. Education

Administration and Supervision ..... J. R. Ogletree
Agricultural Education ..... Harold R. Binkley
Business Education ..... V. A. Musselman
Elementary Education ..... James T. Moore
Foundations of Education .. Ivan Russell and Herbert Sorenson
Home Economics Education ..... (Acting) Anna M. Gorman
Secondary Education .... Harry Barnard and Lyman V. Ginger
Guidance and Counseling ..... (Acting) William T. Carse

V. Engineering

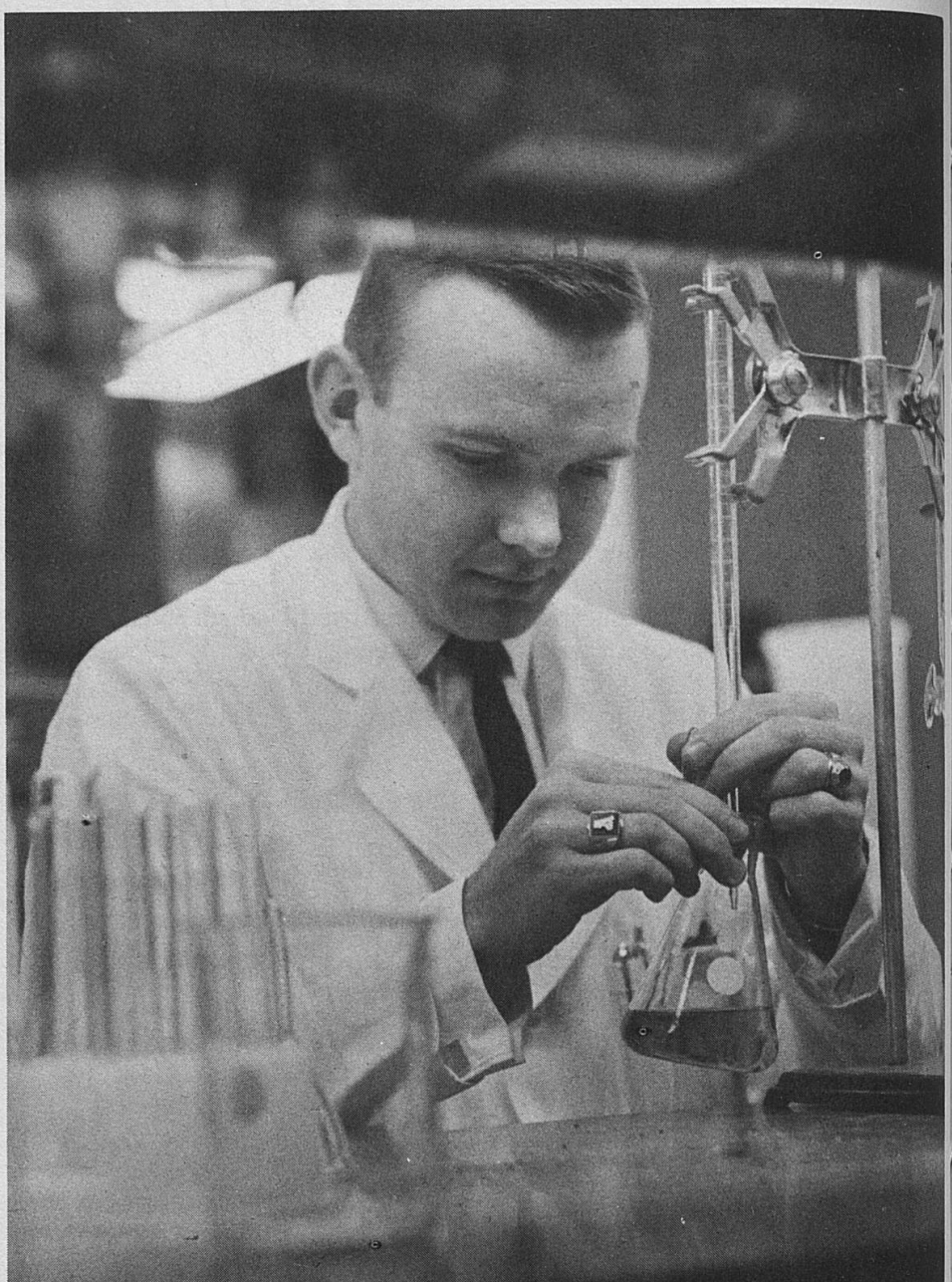
Agricultural Engineering ..... Blaine F. Parker
Civil Engineering ..... R. A. Lauderdale
Electrical Engineering ..... N. B. Allison
Engineering Mechanics ..... M. A. Jaswon
Mechanical Engineering ..... Robert M. Drake
Metallurgical and Mining Engineering ..... Richard S. Mateer

VI. Law (At present no graduate majors are offered in this subject)

VII. Medicine

Anatomy ..... Harold F. Parks
Biochemistry ..... David C. White and Alfred D. Winer
Pharmacology ..... Tihamer Z. Csaky
Physiology and Biophysics ..... Loren D. Carlson

VIII. Pharmacy (At present no graduate majors are offered in this subject)



Graduate Courses of Study

Note. Arabic numbers in parentheses indicate the number of semester hours given for each course and the Roman numerals refer to the semester in which the course is offered; S stands for the summer session.

I. AGRICULTURE AND HOME ECONOMICS

Requirements for the Degree of Master of Science in Agriculture, Master of Science in Agricultural Engineering and Master of Science in Home Economics

(See also pages 16-20.)

Students who are graduates of fully accredited institutions of higher learning may obtain the degree of Master of Science in Agriculture, Master of Science in Agricultural Engineering, or Master of Science in Home Economics by satisfying the following requirements.

1. The completion of 24 semester hours of graduate work with an average standing of 3.0 or better, 36 weeks in residence, and a thesis, or at the option of the major professor (except in Agricultural Engineering), the completion of 36 semester hours of graduate work with a standing of 3.0 or better, 45 weeks in residence, and no thesis requirement. At least one-half of the hours must be on the 600 level or above.
2. Under either plan no grade below C may be counted.
3. One-half of the work must be in one department, the remainder in any other department or departments approved by the major professor.
4. There is no language requirement for either of these professional degrees.

In either case a final oral examination is given the candidate not later than 8 days before the close of the semester in which the degree is to be secured. The candidate is expected to show a comprehensive knowledge of the subject matter related to the field of his major work and in case a thesis has been prepared to defend it.

AGRICULTURAL ECONOMICS

The degrees of Master of Science, Master of Science in Agriculture, and Doctor of Philosophy may be earned with a major in Agricultural Economics. The student will be expected to concentrate, in addition to Agricultural Economics, in Economics and Research Methodology. Those without sufficient background or training will be expected to make up deficiencies indicated by the department.

The Ph.D. program emphasizes training in research. In addition to Agricultural Economics and Economics courses the student can select courses from a broad array of agricultural and social science disciplines. The student will be expected to demonstrate ability to interrelate knowledge gained within and among the areas of concentration, and to demonstrate his ability to do independent thinking in preparation for his dissertation.

Prior to being admitted to the qualifying examination, the applicant must fulfill one of the following options to meet the language requirement for the Ph.D.:

A. Demonstrate a reading knowledge of two modern foreign languages.

B. Demonstrate a fluency in one modern foreign language.

C. Demonstrate a reading knowledge of one modern foreign language and proficiency in a supplementary allied discipline or research technique contributing to professional competency. Proficiency may be demonstrated either (1) by passing a special examination administered by the allied department or (2) by successfully completing an integrated program of at least six (6) semester hours of courses in an allied discipline recommended by the student's special committee and approved by the Director of Graduate Studies for Agricultural Economics.

Examples of allied disciplines which might be proposed are Philosophy, Psychology, Mathematics, Sociology, and Political Science. The specific allied discipline or research techniques which may be submitted in fulfillment of Option C will be areas other than those normally required as part of course work preparation for the doctorate in Agricultural Economics.

Selection among the above options (A, B, or C) and among modern foreign languages must be approved by the Director of Graduate Studies for Agricultural Economics and the student's special committee.

AGRICULTURAL MARKETING

400 *Agricultural Marketing.* (3) I, II

Principles and methods of marketing farm products, with attention to systems and agencies at both country and central markets. Prereq: Econ. 251 and Agr. Econ. 100. *Gooch.*

401 *Marketing Tobacco.* (2) II

Special emphasis on the marketing of and the market system for tobacco. Application of marketing principles and methods to tobacco. Prereq: Agr. Econ. 400. *Clark.*

402 *Tobacco Market Grades and Grading.* (1) II

Procedures and problems in establishing market standards for tobacco, including practice in grading. Prereq. or concur: Agr. Econ. 401 or approval of instructor. *Clark.*

403 *Marketing Livestock and Livestock Products.* (2) I
Analysis of livestock and dairy markets; market organization, agencies, institutions, and services; and public regulations. Prereq: Agr. Econ. 400. *Gooch.*

500 *Agricultural Cooperation.* (3) II, S
Principles, methods, and problems involved in the cooperative marketing of farm products and in the purchase of farm production supplies through cooperatives. Prereq: Ag. Econ. 400. *Binkley.*

606 *Advanced Agricultural Marketing.* (3) I
A critical examination of methods, objectives, and results of various types of research in market organization, marketing functions, market management, and price analysis. Prereq: approval of instructor. *Rudd.*

FARM MANAGEMENT

410 *Farm Management.* (3) I, II
A study of management and of the science of organizing and operating farms. Prereq: Agr. Econ. 100 and Econ. 251. *Criswell.*

415 *Farm Accounting.* (2) I
A study of farm records and farm accounts including farm cost accounting. Prereq: Agr. Econ. 410. *Criswell.*

511 *Advanced Farm Management.* (3) II
An advanced analysis of management and managing farms. Prereq: Agr. Econ. 410. *Thompson.*

514 *Current Farm Management Problems.* (3) S
An analysis of the current economic problems in farming, such as costs, technological developments, demand changes, and resource use. An introductory course designed primarily for professional workers in agriculture. Prereq: Agr. Econ. 410, or approval of instructor.

516 *Land Value and Appraisal.* (odd no. years) (3) II
The capitalization process, and other methods of valuing farm land; appraisal procedures of the Federal Land Banks and other credit institutions. Prereq: Agr. Econ. 410, or approval of instructor. *Bondurant.*

517 *Types and Systems of Farming.* (even no. years) (3) II
Critical study of the business organization and management of Kentucky farm businesses. Field trips required. Prereq: Agr. Econ. 410, or approval of instructor. *Bondurant.*

518 *Farm Labor Utilization.* (3) I
Efficient work method fundamentals as applied to agricultural production, work simplification analysis of specific farm jobs and incentive payment plans for encouraging economic use of farm labor, are studied. Prereq. or concur: Agr. Econ. 410. *Byers.*

PRODUCTION ECONOMICS

520 *Production Economics for the Agricultural Sciences.* (3) I
Economic analysis of agricultural production. A theoretical treatment of land and capital returns, costs and related functions of agricultural production at an elementary level. Prereq: Agr. Econ. 410. *Redman.*

521 *Cost, Price and Production Relationships in Agriculture.* (3) S
Will acquaint the student with data (and their use) on production expenses, cost of production, prices paid, prices received, agricultural production, and farm income. Designed primarily for professional workers in agriculture. Prereq: Agr. Econ. 410, and approval of instructor.

620 *Economics of Agricultural Production: Static Application.* (3) II
Application of economic principles to agricultural production problems of resource combination, enterprise selection, scale of operations, household-firm relationships, inter-regional competition, and national agricultural policies and programs. Prereq: Approval of instructor. *Thompson.*

621 *Economics of Agricultural Production: Dynamic Application.* (3) I
A continuation of 620 with application to dynamic situations. Prereq: 620 and approval of instructor. *Redman.*

AGRICULTURAL STATISTICS AND MATHEMATICAL ECONOMICS

530 *Agricultural Statistics.* (3) I, II
Principles and methods involved in the analysis, interpretation, and use of agricultural statistics including variation, correlation, standard errors, and simple analysis of variance. *Card, Shuffett, Bobst.*

590 *Introduction to Mathematical Economics.* (3) II
A review of mathematical approaches to economic theory. Models applicable to production, marketing and pricing problems. Prereq: Math 201 and Economics 515 or equivalents (same as Economics 590).

630 *Statistics for Agricultural Research—Social Sciences.* (3) I, II
Multiple and partial correlation and regression, tests of reliability, tabular analysis, graphic techniques and sample surveys. Prereq: Agr. Econ. 530 or equivalent. *Shuffett.*

631 *Statistics for Agricultural Research—Plant and Animal Sciences.* (3) I, II
Analysis of variance and covariance; statistical consideration in the design of experiments; test of significance and confidence limits. Prereq: Agr. Econ. 530 or equivalent. *Card.*

690 *Mathematical Economics.* (3) I
Problems of economics amenable to the mathematics of differential and difference equations, vectors, complex numbers and matrix algebra. Agricultural and business applications. Prereq: Agricultural Economics 590 and Economics 618 or equivalents (same as Economics 690).

691 *Econometrics.* (3) II
The application of statistical methods to problems of economic analysis. Building and measuring relationships among economic variables. Econometric models of the economy as a whole and of individual sectors. Prereq: Economics 618, Ag. Econ. 630 or equivalent (same as Economics 691).

AGRICULTURAL POLICY AND LAND ECONOMICS

540 *Agricultural Policy.* (3) I
Historical development of principles underlying agricultural policy; objectives of agricultural policy; appraisal of current and proposed agricultural programs. Prereq: Agr. Econ. 400. *Anschel.*

545 *Land Economics.* (3) II
Institutional, technological and physical forces affecting the use of land resources in agriculture. Analysis of problems connected with land tenure, land conservation and transfer of farm real estate. Prereq: Agr. Econ. 410, or approval of instructor. *Bondurant.*

626 *Agriculture and Economic Development.* (3) II
Analytical consideration of role of agriculture in economic development in relation to overall development strategy at various stages of growth. Theoretical and policy issues of particular relevance to the agricultural development in underdeveloped agrarian economies with various resource, social, political and economic systems. Prereq: ECO 525 or consent of instructor (same as Economics 626). *Smith and Anschel.*

640 *Advanced Agricultural Policy.* (3) I
Impacts of policies upon economic progress, efficiency in resource use, distribution of income, and welfare in agriculture. Prereq: approval of instructor. *Rudd.*

AGRICULTURAL PRICES AND FINANCE

455 *Agricultural and Farm Finance.* (3) I, S
Credit needs of agriculture; problems connected with farm and market agency financing; organization and operation of agricultural credit agencies. Prereq: Agr. Econ. 410. *Clark, Criswell.*

550 *Agricultural Prices.* (3) II
Price behavior of agricultural products including supply-price relationships and general price-level relationships. Prereq: Econ. 251. *Bobst.*

650 *Advanced Agricultural Prices.* (3) II
Advanced study of agricultural price behavior by the application of economic theory and statistical analysis. Prereq: approval of instructor. *Rudd.*

SPECIAL PROBLEMS

580 *Special Problems in Agricultural Economics.* (3) I, II
Directed independent study of a selected problem. Prereq: approval of instructor and head of department. *Brown, Staff.*

780 *Special Problems in Agricultural Economics.* (3) I, II, S
Open to graduate students who have the necessary training and ability to do research on some selected problem. Prereq: approval of head of department. *Brown, Staff.*
May be repeated to a maximum of nine credits.

RESEARCH METHODS

560 *Introduction to Research Methods in Agricultural Economics.* (3) I
Survey of agricultural economics research areas, methods of initiating, preparing and conducting research projects, financing agricultural research. Applicable to problems of agricultural production and marketing. Prereq: consent of instructor. *Smith.*

660 *Research Methods in Agricultural Economics.* (3) II
An analytical examination of research methods and techniques used in agricultural economics. Prereq: approval of instructor. *Redman.*

SEMINAR

770 *Agricultural Economics Seminar.* (0) I, II
Analysis of economic problems which affect agriculture. *Staff.*
May be repeated three times.

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis. *Staff.*

769 *Residence Credit for the Doctor's Degree.* (1 to 18 wks. residence)
Staff.
May be repeated indefinitely.

AGRICULTURAL EDUCATION *(See Education)*

AGRICULTURAL ENGINEERING *(See Engineering)*

AGRICULTURAL ENTOMOLOGY

500 *Economic Entomology.* (3) S

For those interested in agricultural teaching and extension work. Life history, control, and means of identification of economic insects of Kentucky are considered. Lecture, 2 hours; lab, 2 hours. Prereq: Ag. Ent. 100. *Townsend.*

501 *Laboratory to Accompany 500.* (0)

530 *Applied Entomology.* (3) II

Principles of insect damage, populations and distributions. Various types of natural and applied control, including problems of insecticide toxicity, resistance, and residues. Lecture, 2 hours; lab, 2 hours. Prereq: Gen. Ent. 100.

531 *Laboratory to Accompany 530.* (0)

532 *Medical Entomology.* (4) I, S

Study of Arthropod vectors of disease. Structure, collection, identification, control measures and life history studies. Given alternate years. Lecture, 2 hours; lab, 4 hours. Same as Zoo. 532. Prereq: Gen. Ent. 100 or Zoo. 100.

533 *Laboratory to Accompany 532.* (0)

534 *Parasitology.* (4) I, S

Protozoan, helminth and arthropod parasites of man and domestic animals, emphasis on etiology, epidemiology, methods of diagnosis, control measure, and life histories. Techniques for host examination and preparation of material for study. Lecture, 2 hours; lab, 4 hours. Same as Zoo. 534. Prereq: Zoo. 100.

535 *Laboratory to Accompany 534.* (0)

542 *Insect Taxonomy.* (4) I

Methods and principles of systematic entomology and zoology; characterization of taxonomic categories; and international rules of zoological nomenclature. Collection, preparation and identification of insect specimens. Given alternate years. Lecture, 2 hours; lab, 4 hours. Same as Zoo. 542. Prereq: Gen. Ent. 100 and Zoo. 100.

543 *Laboratory to Accompany 542.* (0)

595 *Independent Work.* (2-3) I, II, S

Special problems for individual students who are capable of pursuing independent investigations in the various divisions of entomology. Prereq: Ent. 100 and any two of the following: Ent. 530, 532, or 650. May be repeated once for a total of 6 credits. *Staff.*

602 *Insect Morphology.* (4) I

A study of internal and external insect structure, including function, and variation of form. Given alternate years. Lecture, 2 hours; lab, 4 hours. Same as Zoo. 602. Prereq: Gen. Ent. 100 and consent of instructor.

603 *Laboratory to Accompany 602.* (0)

606 *Insect Toxicology.* (3) II

Toxic action of insecticides: preparation, use, and analysis of insecticides; residues; analytical methods in insect toxicology. Lecture, 2 hours; lab, 2 hours. Prereq: Consent of instructor.

607 *Laboratory to Accompany 606.* (0)

611 *Speciation.* (3) I

Mechanisms of Evolution. A discussion of modern theories and problems concerning the formation of animal and plant species. Three hours per week. Same as Zoo. 611. Prereq: Zoo. 508. *Carpenter, Barr.*

620 *General Acarology.* (4) II

Introduction to study of mites. Classification, morphology, physiology and ecology of mites important to the medical, veterinary and agricultural fields. Lecture, 2 hours; lab, 4 hours. Prereq: Zoology 1, Entomology 100 and consent of instructor. Same as Zoo. 620. *Rodriguez.*

621 *Laboratory to Accompany 620.* (0)

630 *Insect Physiology.* (4) II

Principles of insect physiology, function of organs, circulation, reproduction, respiration, and digestion. Lecture, 2 hours; lab, 4 hours. Same as Zoo. 630. Prereq: Consent of instructor.

631 *Laboratory to Accompany 630.* (0)

650 *Advanced Applied Entomology.* (3) II

Bionomics of insects; representative insecticides, their characteristics, formulation, scope of use, safety factors, and methods of application. Lecture, 2 hours; lab, 2 hours. Prereq: Gen. Ent. 100 or Econ. Ent. 500.

651 *Laboratory to Accompany 650.* (0)

768 *Residence Credit for the Master's Degree.*

(1 to 9 wks. residence) (Staff)

May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis. *Staff.*

780 *Research in Entomology.* (2-3) I, II, S

Independent research work under direction with conferences on objectives, principles, materials, methods, analysis of data and conclusion. Progress reports required at intervals. Prereq: Consent of the instructor. May be repeated once for a total of 6 credits. *Staff.*

781 *Entomological Seminar.* (0) I, II

Current problems in the field of entomology, with special reference to technical research.

AGRICULTURE AND HOME ECONOMICS EXTENSION

The University offers a graduate program in Extension Education leading to the degrees of Master of Science in Agriculture and Master of Science in Home Economics.

With the two exceptions listed below, the requirements for this major are the same as those for all masters' degrees offered by the University (see the introductory portion of this Bulletin) and for other programs leading to the degrees of Master of Science in Agriculture and Master of Science in Home Economics. To those following the program in Extension Education the following regulations apply: (1) instead of the work being concentrated in one department, 15 semester-hours will be considered as a minimum to be taken from the applied and theoretical subject matter areas of Education, Psychology, Economics, Sociology, English, Speech, Journalism and Extension Methods; and (2) no set schedule of required courses will be established for all students,

but instead a complete program will be worked out in advance between the student and his adviser, subject to the approval of the Director of Graduate Programs in Extension Education.

501 *Methods of Extension Work in Agriculture and Home Economics.* (3) II

History, philosophy and development of Extension Work. Legislative background, organizing forces, administration, financing, program building, leader training, relationships, 4-H clubs. Lecture, 3 hours.

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)

May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis. *Staff.*

790 *Special Problems in Extension Research.* (1 to 3) I, II, S

Research in various areas of special interest directly related to the administration, program, development and functions of Extension workers. Lecture, 3 hours by appointment. May be repeated to a maximum of twelve credits.

AGRONOMY

GENERAL COURSES

599 *Special Problems in Agronomy.* (1-4) I, II, S

Prereq: Consent of instructor.
May be repeated for a maximum of nine credits. *Staff.*

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)

May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis. *Staff.*

770 *Agronomy Seminar.* (1) I, II

Reports and discussions of problems and research in soils, crops and related areas.
May be repeated 3 times. *Staff.*

799 *Research in Agronomy.* (1-4) I, II, S

Prereq: Consent of instructor.
May be repeated for a maximum of twelve credits. *Staff.*

COURSES IN CROPS

502 *Ecology of Economic Plants.* (3) I

Critical study of the response of economic plants to natural and man-made environments. Lecture and discussion, 2 hours; lab, 2 hours. Prereq: BOT 101 and AGR 206 or HOR 100, or consent of instructor. *T. Taylor.*

503 *Weed Identification and Control.* (3) I, S

The important characteristics, identification, and control of weeds, with emphasis on identification and control of Kentucky weeds. Lecture and discussion, two hours. Prereq: AGR 206. *Staff.*

504 *Laboratory to Accompany 503.* (0)

Two hours.

506 *Field Crop Improvement.* (3) II

A study of the principles involved and the techniques used in breeding crop plants. Lecture and recitation, 2 hours. Prereq: AGR 206, and BOT 530 or A.I. 260 or consent of instructor. *Loeffel.*

507 *Laboratory to Accompany 506.* (0)
Two hours.

508 *Advanced Crops: Tobacco.* (3) I
Origin of the nicotiana species, botany, pathology, entomology, physiology, breeding, and culture of tobacco, with special emphasis on burley. Lecture and discussion, 2 hours. Prereq: AGR 206 or consent of instructor. *Stokes.*

509 *Laboratory to Accompany 508.* (0)
Two hours.

510 *Pastures and Harvested Forages.* (3) II
A comprehensive study of forage crops with special emphasis upon their production in Kentucky. Lecture and recitation, 3 hours. Prereq: BOT 101; AGR 206 or consent of instructor. *N. Taylor.*

512 *Advanced Crops: Cereals.* (3) II
A study of the grain crops of the world in respect to adaptation, culture and uses. Lecture and recitation, 2 hours. Prereq: AGR 206, or consent of instructor. *Staff.*

513 *Laboratory to Accompany 512.* (0)
Two hours.

730 *Grassland Research.* (3) II
The conduct and interpretation of grassland experiments with emphasis on pasture research and the plant-animal complex. Lecture and discussion, 3 hours. Prereq: Consent of instructor. *Templeton.*

COURSES IN SOILS

566 *Soil Biology.* (3) II
A study of soil organisms and biological soil processes in relation to soil productivity. Lecture, two hours; lab, two hours. Prereq: AGR 266 and MB 200. *Bloomfield.*

568 *Soil Conservation.* (3) II
The scope and nature of the soil conservation problem, and the application of soil conserving methods in the planning and management of farms. Lecture and discussion, 2 hours. Prereq: AGR 266. *Survant.*

569 *Laboratory to Accompany 568.* (0)
Two hours.

570 *Soil Fertility and Fertilizers.* (3) II
Soil reactions of elements essential for plant growth; sources and manufacture of fertilizer materials; profitable use of fertilizers, manure and lime. Lecture and discussion, 3 hours. Prereq: AGR 266. *Ragland.*

571 *Soil Chemistry.* (4) II
Chemical methods applicable to soil fertility and productivity; determination of plant nutrients in soil; study of chemical characteristics of soil by means of modern instrumentation. Lecture and discussion, two hours; lab, four hours. Prereq: AGR 266 or concurrent: CHE 226 or 220. *Massey.*

572 *Laboratory to Accompany 571.* (0)
Four hours.

573 *Soil Origin, Classification and Mapping.* (3) I
Classification of Kentucky soils, use of soil survey equipment, preparation of soil maps and development of a land use plan of an assigned area. Lecture and recitation, 2 hours. Prereq: AGR 266 and GLY 100 or consent of instructor. *Bailey.*

574 *Laboratory to Accompany 573.* (0)
Three hours.

575 *Soil Physics.* (4) II
Physical properties of soils in relation to soil management and conservation. Lecture and discussion, 2 hours. Prereq: AGR 266 and consent of instructor. *Staff.*

576 *Laboratory to Accompany 575.* (0)
Four hours.

712 *Advanced Soil Fertility.* (4) I
Study and discussion of current literature related to soil fertility; research methods especially applicable to soil fertility. Lecture and discussion, 3 hours. Prereq: AGR 570 and AEC 530 or consent of instructor. *Ragland.*

713 *Laboratory to Accompany 712.* (0)
Two hours.

COURSES IN BOTANY

(May be used for agronomy credit, subject to the approval of adviser.)

501 *Plant Physiology.* (3-5)
See course description under Botany.

534 *Cytogenetics.* (3)
See course description under Botany.

701 *Advanced Plant Physiology.* (4)
See course description under Botany.

ANIMAL SCIENCES

On the recommendation of the Special Committee, a Ph.D. student may substitute nine hours in an applied supplementary discipline for one of the foreign languages. Examples of allied disciplines which might be substituted are mathematical sciences (computer science, mathematics, statistics), methods in technique (electron microscopy, radioisotopes) or an area of biology which ordinarily would not be part of a student's major or minor (pharmacology, microbiology).

COURSES IN ANIMAL SCIENCES

500 *Animal Breeding.* (3) I
History of animal improvement; survey of hereditary traits in livestock; inbreeding and outcrossing; progeny tests and herd analysis. Lecture, 3 hours. Prereq: ASC 100 and 260. *Steele.*

502 *Applied Livestock Nutrition.* (offered odd years) (3) S
A discussion of the specific nutritional concepts, feed formulation, and economic considerations. Prereq: ASC 280 and approval of instructors. *Chaney, Woolfolk, Bradley.*

504 *Sheep Production.* (3) II
History and importance of the sheep industry; selection, breeding, feeding, and management of sheep; production and handling of wool. Lecture, 2 hours. Prereq: ASC 100 and 280. *Woolfolk.*

505 *Laboratory to Accompany 504.* (0)
Two hours.

506 *Beef Production.* (3) II
History and importance of the beef cattle industry; selection, breeding, feeding, and management of beef cattle. Lecture, 2 hours. Prereq: ASC 100 and 280. *Bradley.*

507 *Laboratory to Accompany 506.* (0)
Two hours.

508 *Pork Production.* (3) I, II
History and importance of the swine industry; selection, breeding, feeding and management of swine. Lecture, 2 hours. Prereq: ASC 100 and 280. *Waddill.*

509 *Laboratory to Accompany 508.* (0)
Two hours.

771 *Animal Sciences Seminar.* (1) I, II
Staff.
May be repeated to a maximum of three credits.

780 *Special Problems in Animal Sciences.* (3) I, II, S
Approval of instructor required. *Animal Sciences Staff.*
May be repeated to a maximum of nine credits.

790 *Research in Meats.* (3) I, II, S
Problems involving original investigation. *Kemp.*
May be repeated to a maximum of nine credits.

791 *Research in Horse Husbandry.* (3) I, II, S
Problems involving original investigation.
May be repeated to a maximum of nine credits.

792 *Research in Sheep Husbandry.* (3) I, II, S
Problems involving original investigation. *Woolfolk.*
May be repeated to a maximum of nine credits.

793 *Research in Beef Cattle Husbandry.* (3) I, II, S
Problems involving original investigation. *Bradley.*
May be repeated to a maximum of nine credits.

794 *Research in Swine Husbandry.* (3) I, II, S
Problems involving original investigation.
May be repeated to a maximum of nine credits. *Chaney.*

COURSES IN ANIMAL NUTRITION

580 *Principles of Animal Nutrition.* (3) I
The chemistry and physiology of animal nutrition and the nutritive requirements for growth, fattening, reproduction, lactation and other body functions. Lecture, 3 hours. Prereq: Chem. 236 or equivalent. *Mitchell.*

680 *Laboratory Methods in Animal Nutrition and Meats.* (4) I
The use of laboratory techniques and equipment in the solution of fundamental problems of nutrition and meats. Lecture and recitation, 1 hour. Prereq. or concur: ASC 580. *Little.*

681 *Laboratory to Accompany 680.* (0)
Six hours.

682 *Nutrient Metabolism.* (5) S
Present concepts of the metabolic roles of the individual nutrient components of feeds and their relation to practical feeding problems. Lecture. Prereq: ASC 580 or equivalent, one course in introductory physiology or biochemistry and consent of instructor. *Mitchell, Little.*

684 *Advanced Ruminant Nutrition.* (3) II
Introduction to principles of ruminant metabolism in the utilization of feedstuffs for meat, milk and wool production. Lecture, 3 hours. Prereq: one course each in nutrition, physiology and biochemistry or approval of instructor. (Same as DS 684). *Mitchell, Jacobson.*

686 *Swine Nutrition.* (3) I
A study of the nutritional requirements of the non-ruminant animal with special reference to swine and their various stages of growth, lactation and reproduction. An evaluation of the relative value of feed ingredients and mixed feed formulation. Prereq: A.S. 580, Chem. 430. *Chaney.*

784 *Special Problems in Animal Nutrition.* (1-3) I, II, S
Approval of instructor required. *A.N. Staff.*
May be repeated to a maximum of nine credits.

798 *Research in Animal Nutrition.* (3) I, II, S
Problems involving original investigation. *A.N. Staff.*
May be repeated to a maximum of nine credits.

COURSES IN DAIRY SCIENCE

520 *Dairy Cattle Feeding and Management.* (3) I
Application of principles of nutrition to dairy cattle feeding; current methods contributing to maximum production of quality dairy products on the farm. Lecture, two hours. Prereq: ASC 280. *Jacobson, Graden.*

521 *Laboratory to Accompany 520.* (0)
Two hours.

524 *Dairy Cattle Breeding.* (3) II
Application of genetics to problem of breed and herd improvement; progeny testing of sires; type classification, selective registration; prominent families and strains within the leading dairy breeds. Lecture, two hours. Prereq: ASC 260. *Deaton.*

525 *Laboratory to Accompany 524.* (0)
Two hours.

526 *Reproduction in Dairy Cattle.* (2) II
A study of male and female reproductive processes in dairy cattle and the application of artificial breeding to the improvement of dairy herds. Lecture, one hour. Prereq: D.S. 120; ASC 260; Zool. 100 or consent of instructor. *Olds.*

527 *Laboratory to Accompany 526.* (0)
Two hours.

530 *Dairy Bacteriology.* (2) I
Application of bacteriological principles to production and processing of dairy products, entrance of microorganisms into dairy products, effects of their growth and methods for control. Lecture, two hours. Prereq: MB 200 or 400. *Langlois.*

531 *Laboratory to Accompany 530.* (2)
Four hours.

533 *Advanced Dairy Bacteriology.* (3) II
Bacteriological principles and problems relating to specific dairy products and processing. Lab, six hours. Prereq: D.S. 530, 531. *Langlois.*

534 *Principles of Dairy Technology.* (4) II
Chemical and physical characteristics of dairy products; chemical, physical and physico-chemical principles involved in dairy processing; special methods of analysis. Lecture, one hour. Prereq: Math. 101; Chem. 236; D.S. 235. *Freeman.*

535 *Laboratory to Accompany 534.* (0)
Six hours.

536 *Dairy Processing and Plant Management.* (6) II
Methods used for processing milk, butter, ice cream, cheese, and concentrated milk; fundamentals of dairy plant management. Lecture, two hours. Prereq: D.S. 235. *Rudnick, Freeman.*

537 *Laboratory to Accompany 536.* (0)
Eight hours.

572 *Dairy Seminar.* (1) I, II
Dairy Science Staff.
May be repeated to a maximum of four credits.

622 *Current Developments in Dairy Science.* (3) II or S
A course designed to acquaint the advanced student with the more significant problems and scientific developments of current interest in the dairy field. Lecture, three hours. *Dairy Science Staff.*

624 *Population Genetics.* (3) I
Introduction to principles of static and dynamic populations; statistical concepts and tools applied to quantitative inheritance. Lecture, three hours. Prereq: One course each in statistics and genetics and consent of instructor. *Deaton.*

684 *Advanced Ruminant Nutrition.* (3) II
Introduction to principles of ruminant metabolism in the utilization of feedstuffs for meat, milk and wool production. Lecture, three hours. Prereq: One course each in nutrition, physiology and biochemistry, and/or consent of instructor. (Same as ASC 684.) *Jacobson, Mitchell.*

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
Staff.
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis.

769 *Residence Credit for the Doctor's Degree.* (1 to 18 wks. residence)
Staff.
May be repeated indefinitely.

771 *Animal Sciences Seminar.* (Same as Animal Sciences 771) (1) I, II
Animal Industry Staff.
May be repeated to a maximum of three credits.

781 *Special Problems in Dairying.* (1-3) I, II, S
Dairy Science Staff.
May be repeated to a maximum of twelve credits.

795 *Research in Dairying.* (3) I, II, S
Problems involving original investigation in either dairy production or dairy manufacturing. *Dairy Science Staff.*
May be repeated to a maximum of twelve credits.

COURSES IN GENETICS

560 *Genetics.* (3) I, II, S
Lectures of ASC 260 and assigned readings. Primarily for graduate students. Lecture, 3 hours. Prereq: one course in biology. *Steele.*

561 *Genetics Laboratory.* (1) I, II, S
Similar to ASC 261 but additional work required. Primarily for graduate students. Lab, 2 hours. Concurrently with ASC 560 at student's option. *Steele.*

562 *Advanced Genetics.* (3) II
Concerned chiefly with the physical basis of heredity, mutations, chromosomal aberrations, linkage, genetics and development, and reports on current literature. Lecture, 3 hours. Prereq: ASC 260. *Steele.*

660 *Physiology of Reproduction.* (3) II
Physiological processes of reproduction in farm animals; gonadal functions; endocrine relationships; fertility; and factors affecting reproductive efficiency. Lecture, 3 hours. Prereq: ASC 500 or D.S. 524; or P.S. 540 and A.P. 501. *Dutt.*

662 *Population Genetics.* (3) I
Introduction to principles of static and dynamic populations; statistical concepts and tools applied to quantitative inheritance. Lecture, 3 hours. Prereq: One course each in statistics and genetics and consent of instructor.

783 *Special Problems in Genetics.* (3) I, II, S
Approval of instructor required. *Genetics Staff.*
May be repeated to a maximum of nine credits.

797 *Research in Genetics.* (3) I, II, S
Problems involving original investigation. *Genetics Staff.*
May be repeated to a maximum of nine credits.

See also ASC 500, Animal Breeding; D.S. 524, Dairy Cattle Breeding; P.S. 540, Poultry Breeding; and ASC 771, Animal Sciences Seminar.

COURSES IN POULTRY SCIENCE

540 *Poultry Breeding.* (3) I
Genetic principles involved in poultry breeding; disease resistance, inheritance of egg production and related characters; development of breeding programs. Lecture, 3 hours. Prereq: P.S. 140, 141, ASC 260. *MacLaury.*

542 *Advanced Poultry Production.* (3) I
Advanced principles and practices of poultry production including types of enterprises; facilities; management and operations; products and markets and financial arrangements. Lecture, 2 hours. Prereq: P.S. 140. *Johnson.*

543 *Laboratory to Accompany* 542. (0)
Two hours.

548 *Poultry Nutrition.* (3) II
A study of nutrients, feed ingredients, deficiencies, formulation, and feeding practices for broilers, replacement stock, and layers. Lecture, 2 hours. Prereq: Chem. 236, 237; P.S. 140 and consent of instructor. *Begin.*

549 *Laboratory to Accompany* 548. (0)
Two hours.

771 *Animal Sciences Seminar.* (Same as Animal Sciences 771) (1) I, II
ASC. *Staff.*
May be repeated to a maximum of 3 credits.

782 *Special Problems in Poultry.* (1 to 3) I, II, S
Prereq: Permission of instructor. Insko, Begin, MacLaury, Abbott.
May be repeated to a maximum of nine credits.

796 *Research in Poultry.* (1-3) I, II, S
Problems involving original investigation. Insko, Begin, MacLaury, Abbott.
May be repeated to a maximum of nine credits.

COURSES APPLICABLE TO ALL DIVISIONS

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
Staff.
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis.

769 *Residence Credit for the Doctor's Degree.* (1 to 18 wks. residence)
Staff.
May be repeated indefinitely.

FORESTRY

400 *Wood Identification and Technology.* (3) II
General anatomy of wood, identification of commercial species of the United States based on gross and microscopic features. Properties and uses. Lectures, two hours. Prereq: For. 100; Bot. 101; and approval of instructor. *Davenport.*

401 *Laboratory to Accompany 400.* (0)
Two hours.

410 *Lumber.* (3) II
The production, processing and merchandizing of lumber. Prereq: For. 100 and approval of instructor. *Davenport.*

415 *Wood Conditioning.* (3) I, S
The methods and principles involved in seasoning, changes in physical properties, and preservation of wood. Prereq: For. 100. *Davenport.*

780 *Special Problems in Forestry.* (1 to 3) I, II, S
This course is designed to meet the need for advanced work. Prereq: For. 400, 410; and approval of instructor. *Davenport.*
May be repeated to a maximum of nine credits.

HOME ECONOMICS

COURSES IN FOODS AND NUTRITION

401 *Principles of Nutrition.* (3) I, II, S
Fundamental facts of nutrition presented as basis for planning adequate diets for people of different ages, activities and needs and at different income levels. Practical aspects are emphasized. Lecture and discussion, three hours. Not open to home economics majors. *Clemmons.*

402 *Dietetics.* (3) I, II, S
Daily food requirements at different age levels and different economic levels. Practice is given in setting up normal dietaries for individuals, families, and other groups. Lecture, two hours. Prereq: H.E. 106, 211. *Taylor.*

403 *Laboratory to Accompany 402.* (0)
Two hours.

503 *Community Nutrition.* (3) I, II
Study of nutrition education programs on a community level. Experience is provided for presenting nutrition in health clinics, schools and state institutions. Lecture, two hours. Prereq. or Concur: H.E. 402. *Clemmons.*
May be repeated to a maximum of six credits.

504 *Laboratory to Accompany 503.* (0)
Two hours.

505 *Experimental Cookery.* (3) II, S
Study of factors that affect results obtained in cooking and food preparation processes. Experimental work under controlled conditions. Lecture, one hour. Prereq: H. E. 104, 211. *Brownlie.*

506 *Laboratory to Accompany 505.* (0)
Four hours.

507 *Workshop in Applied Nutrition.* (2)
The application of scientific knowledge of nutrition to the promotion of positive health. Emphasis is given to communications techniques and their use in field work. *Clemmons.*

508 *Seminar in Nutrition.* (1) I, II, S
Investigations of recent research in nutrition. Prereq: Senior or graduate standing. May be repeated to a maximum of three credits.

510 *Advanced Nutrition.* (4) I
Application of biochemistry to understanding of the utilization of nutrients for body processes. Laboratory work includes analysis of digestive juices, blood and urine; balance experiments. Lecture, two hours. Prereq: H.E. 211, CHE 236 or approval of instructor.

511 *Laboratory to Accompany 510.* (0)
Six hours.

512 *Nutrition in Disease.* (2) II
Metabolic processes of the body in normal and diseased conditions, correlating the metabolic changes due to disease with diet therapy. Lecture, one hour. Prereq. or Concur: H.E. 510, 402.

513 *Laboratory to Accompany 512.* (0)
Two hours.

514 *Food Preservation.* (3) I, S
Principles of home food preservation. Canning, dehydration and freezing of fruits, vegetables and meats: pickling of fruits and vegetables; making of jams, jellies and preserves; brining. Lecture, two hours. Prereq: MB 200, H.E. 104. *Brownlie.*

515 *Laboratory to Accompany 514.* (0)
Two hours.

516 *Food for Children.* (3) II, S
Experience in selection, preparation and serving of food to young children. Emphasis is placed on the preschool age and the factors important in establishing good food habits. Prereq: H.E. 106, 211, 255. *Staff.*

517 *Food for Special Occasions.* (3) I, S
Advanced work in culinary arts and skills. Preparation of attractive and appetizing dishes to help the homemaker in planning buffet suppers, receptions, picnics, wedding parties, formal meals. Lab, six hours. Prereq: H.E. 104, 106. *Combs.*

590 *Field Work in Nutrition.* (1) I, II, S
Nutrition problems at different age levels, correlated with surveys and experimental studies to show the relation between diet-selection and its physical and mental effects. Lecture and lab. Prereq: H.E. 503 or approval of instructor. *Clemmons.*

591 *Special Problems in Foods and Nutrition.* (1-3) I, II, S
Intensive work on a specific phase of the field. *Clemmons.*
May be repeated to a maximum of six credits.

603 *Advanced Community Nutrition.* (3) I, II, S
Study of nutrition surveys and of bases for judging community nutrition. Emphasis is placed on economic, geographic, social and educational causes of malnutrition. Experience is given in development of nutrition programs. Prereq: H.E. 503. *Clemmons.*
May be repeated to a maximum of six credits.

771 *Seminar in Nutrition.* (2) II, S
Marlatt.
May be repeated to a maximum of six credits.

781 *Special Problems in Foods and Nutrition.* (1-3) I, II, S
Independent advanced work on a specific problem. *Clemmons.*
May be repeated to a maximum of six credits.

COURSES IN CLOTHING, TEXTILES, COSTUME DESIGN, AND INTERIOR DESIGN

520 *Advanced Textiles.* (2) I, S
Individual semester reports with emphasis on new developments in textile industry. Class project to determine color fastness, tensile strength, and other quality factors, of various types of textiles. Lecture, one hour. Prereq: H.E. 120, 561. *Botsford.*

521 *Laboratory to Accompany 520.* (0)
Two hours.

522 *Economics of Clothing.* (2) I, S
The clothing industry, its influence and economy. Field trips to study mass production, class project and individual semester reports. Lecture, one hour; lab, two hours. *Prereqs H. E.* 227, 561 or approval of instructor. *Botsford.*

523 *Fashion.* (2) II, S
How the fashion world works. Study of French, Italian and American designers who have greatest influence on current trends. Field trips to augment lectures. Lecture, two hours. Prereq: H.E. 227 or approval of instructor. *Botsford.*

524 *Costume Design.* (3) I, S
The arts of costume today and throughout the past. Costumes are designed to meet today's needs. Lecture, one hour. Prereq: H.E. 227, ART 105.

525 *Laboratory to Accompany 524.* (0)
Four hours.

526 *Advanced Clothing.* (3) II, S
The making of foundation and creative pattern designs; also creative design through draping, with emphasis on accurate fittings. Lecture, one hour. Prereq: H.E. 227. *Botsford.*

527 *Laboratory to Accompany 526.* (0)
Four hours.

528 *Tailoring.* (2) I, S
Analysis of tailoring technique in the shop and in the home. Tailored garments are planned and constructed. Lab, four hours. Prereq: H.E. 328. *Botsford.*

529 *The Child and His Clothing.* (3) I, S
A detailed study of the selection, cost and care of the preschool child's clothing in relation to his needs. Lectures and occasional field trips. Prereq: H.E. 255. *Staff.*

530 *Advanced Interior Design.* (2) II, S
The art of interior decoration throughout the past and today. Interiors are planned to meet today's needs. Lecture, one hour. Prereq: H.E. 330.

531 *Laboratory to Accompany 530.* (0)
Two hours.

534 *Decorative Textiles.* (2) II, S
Survey of techniques used in applying color and design to fabrics. Individual problems, demonstrating techniques, developed. Lecture, one hour. Prereq: H.E. 120, ART 105. *Botsford.*

535 *Laboratory to Accompany 534.* (0)
Two hours.

536 *Interior Design Projects.* (2) I, II
Selected projects in furnishing the home, including furniture refinishing, upholstering and slip cover making. Cost in terms of time and money are considered. Lab, four hours. Prereq: H.E. 330 or approval of instructor.

537 *History of Furniture.* (3) I
Furniture design from antiquity to the present, including effects upon design of social and economic conditions, and uses of historic furnishings in contemporary interiors. Lecture, 3 hours. Prereq: H.E. 330 or approval of instructor.

592 *Special Problems in Clothing and Costume Design.* (1-3) I, II, S
Intensive work on specific phases of the field. *Botsford.*
May be repeated to a maximum of six credits.

593 *Special Problems in Interior Design.* (1-3) I, II, S
Intensive work on specific phases of the field.
May be repeated to a maximum of six credits.

597 *Special Problems in Textiles.* (1-3) I, II, S
Intensive work on specific phases of the field. *Botsford.*
May be repeated to a maximum of six credits.

772 *Seminar in Textiles, Clothing, Costume Design and Interior Design.* (2) I, II, S
Investigation of special textile, clothing, costume design or interior design problems. Lecture, two hours. *Botsford.*
May be repeated to a maximum of six credits.

782 *Special Problems in Clothing and Costume Design.* (1-3) I, II, S
Independent advanced work on a specific problem. *Botsford.*
May be repeated to a maximum of six credits.

783 *Special Problems in Interior Design.* (1-3) I, II, S
Independent, advanced work on a specific problem.
May be repeated to a maximum of six credits.

787 *Special Problems in Textiles.* (1-3) I, II, S
Independent advanced work on a specific problem. *Botsford.*
May be repeated to a maximum of six credits.

COURSES IN INSTITUTION MANAGEMENT

540 *The School Lunch.* (3) II
Designed for teachers who manage the lunchroom. Consideration will be given to equipment, menus, purchase, storage, preparation and service of food. Lecture, two hours. Prereq: H.E. 104 and Econ. 251. *Brownlie.*

541 *Laboratory to Accompany 540.* (0)
Two hours.

542 *Institution Equipment.* (3) I
Selection arrangement, cost and care of equipment; problems of lighting, heating, ventilation and refrigeration. Two field trips taken to neighboring cities to see equipment in institutions. Lecture, two hours. Prereq: H.E. 242. *Brownlie.*

543 *Laboratory to Accompany 542.* (0)
Two hours.

546 *Institution Organization and Management.* (3) II

Principles of institution organization, types of institution service, personnel and financial management. Legal aspects of institution management. Personal and professional qualifications of an institution manager. Prereq: H.E. 240, 242. *Brownlie.*

548 *Institution Administration.* (3) S

Application of scientific principles of institution management. Practical principles are developed in various aspects of food service management. Prereq: Approval of instructor. *Brownlie.*
May be repeated to a maximum of nine credits.

594 *Special Problems in Institution Management.* (1-3) I, II, S

Intensive work on specific problems. *Brownlie.*
May be repeated to a maximum of six credits.

784 *Special Problems in Institution Management.* (1-3) I, II, S

Independent, advanced work. *Brownlie.*
May be repeated to a maximum of six credits.

COURSES IN CHILD DEVELOPMENT AND FAMILY LIVING

552 *Nursery School Organization.* (3) I, S

Organization and administration, including housing, equipment, program, records, parent cooperation. Field trips to nursery schools. Lecture, three hours. Prereq: H.E. 350.

553 *The Child in His Family.* (3) II, S

Preparation and presentation of reports of studies of family influences on the personality and development of children. Lecture, three hours. Prereq: H.E. 153, 350 or consent of instructor. *Ringo.*

555 *Play and Play Materials.* (2) II, S

Play activities of young children, relation of play equipment to development, and characteristics of good play materials. Construction of toys suitable for the preschool child. Lecture, one hour. Prereq: H.E. 255. *Staff.*

556 *Laboratory to Accompany 555.* (0)

Two hours.

557 *Infant Development.* (2) I, S

Study of development, care and guidance of the child during prenatal, natal, and infant periods. Lecture, two hours. Prereq: Pgy. 206. *Ringo.*

595 *Special Problems in Child Development and Family Living.* (1-3) I, II, S

Intensive work on specific problems. *Ringo.*
May be repeated to a maximum of six credits.

775 *Seminar in Child Development.* (2) I, II, S

Preparation and presentation of reports of current investigations in child development.
May be repeated to a maximum of six credits.

785 *Special Problems in Child Development and Family Living.* (1-3) I, II, S

Independent advanced work.
May be repeated to a maximum of six credits.

COURSES IN HOME MANAGEMENT

561 *Consumer Problems.* (3) I, II, S

Consumer buying, its social and economic aspects. Analysis of problems of the manufacturer, merchant and consumer in order to understand the needs and responsibilities of each group. Lecture, three hours. Prereq: Econ. 251, HE 261. *Magruder, Wilmore.*

562 *Home Management and Family Relationships.* (2) I, II
Philosophy and principles of home management. Study of the mechanics of time, energy and money management; personal development and social and family relationships. Lecture, two hours. Prereq: Econ. 251, HE 261. *Wilmore.*

563 *Home Management and Family Relationships.* (3) I, II, S
A residence period in the Home Management House is required of seniors in home economics. Experience in the application of principles presented in other courses. Prereq: HE 562. Prereq. or concur: HE 402. *Wilmore, Combs.*

564 *Laboratory to Accompany 563.* (0)

568 *Household Equipment.* (3) I, II, S
Electric and gas household equipment and small appliances; their selection, maintenance, operation and cost. Lecture, two hours. Prereq. or concur: PHY 151, 152, or 281; HE 261. *Combs.*

569 *Laboratory to Accompany 568.* (0)
Two hours.

596 *Special Problems in Home Management.* (1-3) I, II, S
Intensive work on specified phases of home management. *Wilmore.*
May be repeated to a maximum of six credits.

662 *Advanced Home Management and Family Relationships.* (3) II, S
A course affording opportunity for special study of social and economic problems affecting family life. Lecture, three hours. Prereq: HE 563. *Wilmore.*

786 *Special Problems in Home Management.* (1-3) I, II, S
Independent advanced work. *Wilmore.*
May be repeated to a maximum of six credits.

GENERAL COURSES

575 *Rural Community Analysis.* (3) I
The nature of the town-country community, with special emphasis on the function of institutional and agency programs and their leaders in relation to the community. Same course as R.S. 513.

768 *Residence Credit for Master's Degree.* (1 to 9 wks. residence)
Staff.
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis.

HORTICULTURE

500 *Principles of Spray Practice.* (2) I
A study of the principles and practice of spraying for the control of pests of horticultural crops. Lecture, one hour. Prereq: Hort. 100, Chem. 102, Ag. Ent. 100. *Waltman.*

501 *Laboratory to Accompany 500.* (0)
Two hours.

502 *Pomology: Deciduous Tree Fruits.* (3) I
A course dealing with the theory and practice of commercial tree fruit production, with major emphasis on apple and peach growing. Lecture, two hours. Prereq: Hort. 100. *Waltman.*

503 *Laboratory to Accompany 502.* (0)
Two hours.

504 *Pomology: Small Fruits.* (2) II
A detailed study of the care and management of commercial plantings of strawberries, raspberries, and other bush fruits and grapes. Lecture, one hour, first half; lectures, two hours, last half. Prereq: Hort. 100. *Waltman.*

505 *Laboratory to Accompany 504.* (0)
Two hours.

510 *The Principles of Vegetable Gardening.* (3) I
A study of the fundamental principles underlying commercial production of vegetables. Lectures, two hours. Prereq: Hort. 100, Agron. 266. *Knavel.*

511 *Laboratory to Accompany 510.* (0)
Two hours.

512 *Growing Vegetable Crops in Plastic and Glass Greenhouses.* (3) II
Production of commercial vegetables and plants grown for transplanting; types of plastic and glass structures will be studied. Lectures, two hours. *Knavel.*

513 *Laboratory to Accompany 512.* (0)
Two hours.

520 *Landscape Gardening.* (3) II, S
The adaptation of principles of landscape architecture; coordination of buildings with surroundings; identification and uses of decorative materials and their requirements. Lectures, two hours. Prereq: Hort. 100, Bot. 103. Offered 1966-67 and alternate years. *Abernathie.*

521 *Laboratory to Accompany 520.* (0)
Two hours.

522 *Advanced Landscape.* (3) II
A continuation of Horticulture 520, 521, with special emphasis on design and the use of materials. Lectures, two hours. Prereq: Hort. 520, 521. Offered 1966-67 and alternate years. *Abernathie.*

523 *Laboratory to Accompany 522.* (0)
Two hours.

524 *Floriculture.* (2) II
A detailed study of specific groups of flowers such as bulbs, iris, and roses. Lectures, two hours. Prereq: Hort. 102. *Abernathie.*

525 *Plant Propagation.* (3) I
A detailed study of the methods of propagating certain horticultural plants. Includes cuttings, grafting, and budding. Lecture, two hours. Prereq: Hort. 100, 520; Bot. 101, 103. Offered 1967-68 and alternate years. *Kelley.*

526 *Laboratory to Accompany 525.* (0)
Two hours.

527 *Plants and Planting Materials.* (2) II
A study of woody and herbaceous plants and their identification, suitability for landscape uses and the effects produced. Lecture, one hour. Prereq: Hort. 520, 521 or approval of instructor. Offered 1966-67 and alternate years. *Kelley.*

528 *Laboratory to Accompany 527.* (0)
Two hours.

768 *Residence Credit for Master's Degree.* (1 to 9 wks. residence)
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis.

770 *Seminar.* (1) I, II, S
Mohr.
May be repeated to a maximum of three credits.

780 *Special Problems in Pomology.* (1 to 3) I, II, S
This course is designed to meet the need for advanced work. Prereq: Hort. 100 and one of the following: 502, 503; or 504, 505; and approval of instructor. *Waltman, Chaplin.*
May be repeated to a maximum of nine credits.

781 *Special Problems in Vegetable Crops.* (3) I, II, S
This course is designed to meet the need for advanced work. Prereq: Hort. 100, 510, 511; and approval of instructor. *Mohr, Knavel, Cotter.*
May be repeated to a maximum of nine credits.

782 *Special Problems in Ornamental Horticulture.* (1 to 3) I, II, S
This course is designed to meet the need for advanced work. Prereq: Hort. 100, 520, 521, 522, 523; Bot. 100, 103; and approval of instructor. *Kelley, Stoltz, Abernathie.*
May be repeated to a maximum of twelve credits.

790 *Research in Horticulture.* (1 to 3) I, II, S
Prereq: approval of instructors.
May be repeated to a maximum of nine credits. *Staff.*

PLANT PATHOLOGY

541 *Plant Pathology.* (3) I, II
Significance, nature, causes, and methods of control of plant diseases. Lecture and discussion, 2 hours. Same as Bot. 541, *Plant Pathology.* Prereq: Bot. 101 or consent of instructor. *Chapman, Diachun.*

542 *Laboratory to Accompany 541.* (0)
Two hours.

543 *Diseases of Plants.* (3) II
Symptoms, causes, and control of some of the more common representative plant diseases. Students may select disease problems in their major field of interest. Discussion, 1 hour. Prereq: PPA 541 or Bot. 541 or consent of instructor. *Staff.*

544 *Laboratory to Accompany 543.* (0)
Four hours.

656 *Virus Diseases of Plants.* (4) II
Characteristics and properties of viruses that cause plant diseases; host-virus relationships; identification and control of some important virus diseases; consideration of research methods. Lecture and discussion, 2 hours. Prereq: PPA 541 or Bot. 541 or consent of instructor. *Diachun.*

657 *Laboratory to Accompany 656.* (0)
Four hours.

658 *Nematode Diseases of Plants.* (odd no. years) (3) I
The importance, effects, recognition and control of nematodes that cause plant diseases; physiology of plant parasitic nematodes and their relations with other nematodes and plant pathogens. Lecture, 1 hour. Prereq: Agron. 541 or Bot. 541 or Zool. 534 or consent of instructor. *Chapman.*

659 *Laboratory to Accompany 658.* (0)
Four hours.

660 *Physiology of Plant Diseases.* (even no. years) (3) I
Physiological aspects of plant diseases including effects of pathogenic organisms on plant metabolism; host parasite interactions; and mechanisms of disease resistance. Laboratory work emphasizes methods used in investigating the physiological effects of diseases on plants. Discussion, 2 hours. Prereq: Agron. 541 or Bot. 501 or consent of instructor. *Hampton.*

661 *Laboratory to Accompany 660.* (0)
Two hours.

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
Staff.
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis.

769 *Residence Credit for the Doctor's Degree.* (1 to 18 wks. residence)
Staff.
May be repeated indefinitely.

784 *Special Problems in Plant Pathology.* (1 to 3) I, II, S
Directed study of selected plant pathology problems. Prereq: PPA 541 or Bot. 541 or consent of instructor. *Staff.*
May be repeated to a maximum of six credits.

794 *Research in Plant Pathology.* (1 to 4) I, II, S
Prereq: PPA 541 or Bot. 541 or consent of instructor. *Staff.*
May be repeated to a maximum of twelve credits.

RURAL SOCIOLOGY

(For description of degrees and activities, see Sociology, p. 143)

513 *Rural Community Analysis.* (3) I
The nature of the town-country community, with special emphasis on the function of institutional and agency programs and their leaders in relation to the community. Prereq: SOC 151 or consent of instructor. *Ford.*

514 *Rural Movements and Social Policy.* (3)
Social factors in selected rural movements, their organization and development, influence upon governmental policy, and the social needs met. Prereq: an introductory course or consent of instructor. *Brown.*

515 *Diffusion of Technology in Modern Society.* (3) I
A study of the personality, social structure, and change agent factors in the spread of new techniques among groups and individuals in modern society. Prereq: SOC 151 or consent of instructor. *Coughenour.*

517 *Advanced Rural Sociology.* (3) II
Systematic study of the structure and function of family, informal and locality groups, social strata, religious, educational, political and occupational groups in rural society. Prereq: SOC 151 or consent of instructor. *Schwarzweller.*

541 *Group Organization and Leadership.* (3) II
The study of the structure and dynamics of organized groups; leadership, membership participation, and the processes of problem-solving and group development. Two hours lecture and two hours lab. Prereq: SOC 151 or consent of instructor. *Coughenour.*

565 *Special Problems in Rural Life.* (1-3) I, II, S
Supervised individual study in selected sub-fields of rural sociology. Population, standards of living, neighborhood and community change, and rural institutions are among the available fields for investigation. *Staff.*
May be repeated to a maximum of six credits.

615 *Rural Urban Relations.* (3)
Interdependence of city and country; solidary and antagonistic relationships of city and country; the process of urbanization, and problems of rural adjustment to urban influences. *Brown.*

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
Staff.
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis.

773 *Topical Seminar.* (3) I, II, S
Analysis of topics of scientific interest in rural sociology, selected from such fields as the following: criticism of research; sociological factors in land use; migration; rural social ecology of the South; highland societies. *Staff.*
May be repeated to a maximum of six credits.

776 *Seminar in Rural Organization.* (3)
Basic theories of social organization, comparative study of selected systems of rural social organization, examples of purposeful organization. *Staff.*

778 *Seminar in Rural Attitudes.* (3)
The nature and genesis of rural attitudes and their relation to rural social control; analysis of contemporary rural attitudes and opinion. *Staff.*

790 *Research in Rural Sociology.* (1-3) I, II, S
Individual graduate research with correlated study of rural social research types and methods. *Staff.*
May be repeated to a maximum of six credits.

SOCIOLOGY *(See page 143)*

VETERINARY SCIENCE

501 *Anatomy and Physiology of Domestic Animals.* (3) I
A study of anatomy and physiology as related to courses in livestock judging, nutrition, butchering, breeding, and infectious diseases. Lecture, 3 hours. *Staff.*

502 *Infectious Diseases of Domestic Animals.* (3) II
Distribution, general nature, manner of dissemination, method of control, prevention and eradication of infectious and parasitic diseases of animals. Lecture, 3 hours. *Staff.*

780 *Investigations in Animal Diseases.* (3) I, II
Special problem course for graduate veterinarians, may be repeated once for a total of 6 credit hours. *Staff.*



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II. ARTS AND SCIENCES

ANTHROPOLOGY

402 *Human Identification.* (2)
A systematic and detailed study of human morphology (bones and soft parts) for purposes of identification. Two hours laboratory, one hour lecture.

500 *Physical Anthropology.* (4)
Lecture-laboratory course on the biological nature of man; the primates, fossil man, races, race mixture, constitutional anthropology and human growth. Prereq: Anthro. 100 or three hours in any other Bio. Science.

501 *Human Ancestry.* (4)
A lecture-laboratory course on human origins and the fossil remains of Pleistocene man throughout the world; the lineage, formation and inter-breeding of modern races. Prereq: 500 or special permission.

510 *History of Anthropological Theory.* (3)
Description and analysis of significant anthropological ideas in their historical context; the growth of the theoretical concepts in physical anthropology, archaeology, and ethnology. *Schwartz.*

514 *Descriptive Linguistics: Phonetics.* (3)
Articulatory description of speech sounds; practice in recognition and control. (Same as English 514.) Prereq: consent of instructor. *Faust.*

515 *Descriptive Linguistics: Phonemics.* (3)
An investigation of speech-sounds and systems of speech-sounds. Also attention to both speech and writing as communication systems. (Same as English 515). Prereq: consent of instructor. *Faust.*

516 *Descriptive Linguistics: Morphemics.* (3)
An explanation of some of the ways speech-sounds are put together in patterns so as to form languages. (Same as English 516). Prereq: Anthro. 515. *Faust.*

521 *Ethnology of the New World.* (3)
Cultures and physical types of the American Indians during and after white settlement. (Northwestern North America is not included.) *Essene.*

522 *North Pacific Coast Cultures.* (3)
Ethnology of the Maritime peoples of western North America and Northeast Asia. Cultural connections between America and Asia will be stressed. *Essene.*

523 *Ethnology of Oceania.* (3)
A survey of the various cultures on the islands of the Pacific. Both aboriginal and modern acculturated societies will be considered. *Essene.*

524 *Mythology.* (3)
The unwritten literature of primitive peoples: themes, diffusion, style, literary devices, and function of myths. *Essene.*

525 *Applied Anthropology.* (3)
Application of anthropological methods to contemporary practical problems such as acculturation, colonial administration, intercultural education, and race relations. *Dobyns.*

526 *Culture and Personality.* (3)
The cultural basis of personality. Personal character considered as the result of culturally fostered patterns. The ideal personality in several selected societies. (Same as Sociology 526) *Essene.*

527 *Culture Change.* (3) I
Internal change and contact change in cultures; agents and conditions promoting change; an analysis of innovation, dissemination, integration, diffusion, acculturation, and related concepts. Prereq: Anthropology 121. *Gallaher.*

530 *Contemporary Latin American Cultures.* (3) I
Detailed survey of societies and cultures of contemporary Latin America, utilizing contributions from anthropological research. Prereq: Consent of instructor. *Weaver.*

533 *Social Anthropology.* (3) II
History and theory of social anthropology with special emphasis on the comparative approach to analysis of structure, function, and change in social and cultural systems. Prereq: Consent of instructor. (Same as Sociology 533) *Weaver.*

541 *Archaeological Theory and Methods.* (3)
The concepts and aims of archaeology, its history as a scientific discipline, and its present role in the social sciences. *Schwartz.*

542 *North American Archaeology.* (3)
A study of the origin and growth of prehistoric American Indian cultures north of Mexico as revealed by archaeological data. *Schwartz.*

543 *Beginnings of Civilization.* (3)
Prehistory of the Near East, the earliest evidences of agriculture, pottery, smelting, writing, law codes, kingship, priesthood, and science. *Adams.*

544 *Diffusion of Civilization.* (3)
Prehistory, ethnology of primitive tribes, and spread of Near Eastern civilization in Europe, the Far East, and Negro Africa. Prereq: Anthro. 543 or equivalent courses on the Near East. *Adams.*

545 *Archaeology of Kentucky.* (3)
A rapid survey of the more important prehistoric cultures in North America and the sequence of cultures in Kentucky to the time of the white settlers. *Schwartz.*

546 *Prehistoric Mesoamerica and Peru.* (3)
An intensive study of the native American civilizations: their origins, development and achievements. *Schwartz.*

547 *Cultures of the Southwestern United States.* (3)
Development of sedentary and nomadic Indian peoples, from earliest times to the present. Emphasis on Puebloan, Mogollon, and Hohokam Archaeology and continuity with modern Indians. *Schwartz.*

561 *Anthropology: Man and His Works.* (3)
Survey of the major fields of anthropology: physical, prehistory, and ethnology and a guide to source material. Designed for students not contemplating further work in anthropology. *Staff.*

581 *Independent Work in Anthropology.* (3)
Individual research problems in archaeology, ethnology, or physical anthropology. *Staff.*
May be repeated to a maximum of twelve credits.

582 *Tutorial Seminar.* (2)
Anthropological methods and theory. *Staff.*
May be repeated to a maximum of eight credits.

614 *Field Methods in Linguistics.* (3)
Analysis of a language by working directly with a native informant. Prereq: Anthro. (Eng.) 514 or 515 and Anthro (Eng.) 516. *Faust.*

731 *Seminar in Comparative Social Organization.* (2) II
A seminar for advanced students. Emphasizes principles in the comparative study of social systems; the role of kinship, age, sex, locality, and voluntary associations in determining relationships between individuals and between groups in non-literate and literate societies. (Same as Sociology 731). *Gallaher.*
May be repeated once.

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis. *Staff.*

770 *Seminar.* (2)
Intensive work in particular fields of anthropology. All students during a given semester will be assigned related phases of the same problem. Designed primarily for students working toward a master's degree in Anthropology. *Staff.*
May be repeated to a maximum of four credits.

790 *Research Problems in Anthropology.* (3)
Intensive study in the fields of Physical Anthropology, Archaeology, and Ethnology with qualified staff members. Research papers required. *Staff.*
May be repeated to a maximum of twelve credits.

ART

As prerequisite to graduate work in art, the Department requires that the student shall have had preliminary work in art equivalent to that required of its majors in art. In general this means the completion of an undergraduate sequence of six to eight full semester courses in drawing, design and painting, balanced by four to six courses in the history of art, and a reading knowledge of either French or German. The graduate program in art permits emphasis in any one of three fields: (1) creative work in painting, sculpture and design, (2) study and research in history and criticism of art, and (3) research and planning in art education. In each case a written thesis is required.

The department is housed in a modern building with special equipment. Studios for practical work are designed to meet professional standards. An art library adjoins the classrooms. There are extensive collections of photographs, color reproductions, and related art reference materials. An exhibition gallery provides for the study of original works of art. The Department itself has a working collection of paintings, prints and drawings.

500 *Criticism of Art.* (3) I
History and theory of criticism in the visual arts. Contemporary problems in criticism. Analyses, interpretations, evaluations. *Amyx.*

509 *Seminar in Art.* (1) I, II
Current problems in Art; correlations of theory and practice; discussions and reports. For Seniors and Graduates majoring in Art. Two credits in seminar is prerequisite to comprehensive examination. *Staff.*
May be repeated to a maximum of four credits.

510 *Advanced Painting.* (3) I, II, S
Individual development in creative painting. Prereq: 311. *Staff.*
May be repeated to a maximum of nine credits.

554 *Ancient Art.* (3) I
The art of the ancient cultures of the Mediterranean and West-Asian world through Greek and Roman times. Emphasis on classical art. *Milkovich.*

556 *Medieval Art.* (3) II
The art of Byzantium and the Near East and of the Latin and Germanic cultures in the West; Romanesque and Gothic Art in Northern Europe. Emphasis on Christian Art.

558 *Renaissance Art in Italy.* (3) I
The arts of the Renaissance in Italy from the late middle ages through the sixteenth century. Italian humanism; analyses of style; study of individual masters. *Amyx, Milkovich.*

559 *Renaissance Art in Northern Europe.* (2) II
The arts of the Renaissance and Reformation outside Italy from the late middle ages through the sixteenth century. Northern humanism; analyses of style; study of individual masters. *Milkovich.*

560 *Baroque Art.* (3) II
The arts of the twentieth century in Europe and the Americas. Consideration of social and century in Italy through the eighteenth century in France and Germany. The Baroque and Rococo styles; study of individual masters. *Amyx, Milkovich.*

562 *Nineteenth Century Art.* (3) I
The arts in Europe and America from the mid-eighteenth century through the nineteenth century. Consideration of social and economic changes in relation to art; study of individual artists. *Amyx.*

563 *Art in America.* (2) II
A survey of American architecture, sculpture, painting, illustration, handicrafts, industrial design, etc., from Colonial times to the present. *Amyx, Bryant.*

564 *Twentieth Century Art.* (3) II
The arts of the twentieth century in Europe and the Americas. Consideration of social and technological changes in relation to art; study of individual artists. *Bryant, Thurz.*

575 *Art in Elementary Schools.* (2) I, S
An advanced course for in-service teachers in elementary schools. Programs of instruction related to the development levels of vision and expression in the child. Lectures, conferences and reports.

577 *Art in Secondary Schools.* (3) II, S
Art for teachers in secondary schools. The literature of art education. Courses of study. Teaching materials. Lectures, conferences and reports.

592 *Aesthetics.* (3) II
Problems of method in aesthetics; major types of aesthetic theory. Aesthetic materials of the arts, in literature, music and the space arts. Form and types of form. Meaning in the arts. Interrelations of the arts. *Amyx.*

615 *Traditional and Experimental Media in Painting.* (3) II, S
A survey of historical and contemporary procedures and materials with sustained problems in mural and easel painting. Preparation of grounds and consideration of permanency in pigments, vehicles and supports. Prereq: 3 credits in advanced painting and consent of the instructor. *Barnhart, Thursz.*

664 *Studies in Contemporary Art.* (3) I, II, S
Intensive study of the content of selected 19th and 20th century works. Emphasis, according to works chosen, upon parallels with contemporary theory and procedure in the sciences, psychology and philosophy; consideration of psychology, mathematical and social theory. Prereq: Art 564, and 500 or 592. *Amyx.*

670 *School and Community Art.* (3) S
Analyses of the social function of art; organization of school and community programs in art; case studies of existing programs. Emphasis on relation of school programs to community needs. Prereq: Art 564, 575 or 577; Sociology 220; Education 732 or 661; or consent of the instructor. *Staff.*

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
Staff.
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis.

780 *Problems in Sculpture, Ceramics and Design.* (3) I, II, S
Sustained individual problems and experimental work in the technical and theoretical problems of design. Prereq: 12 credits in upper division studio work and consent of the instructor. *Staff.*
May be repeated to a maximum of nine credits.

781 *Problems in Art History and Criticism.* (3) I, II, S
Sustained individual research and interpretation in history, criticism, aesthetics. Prereq: 12 hours in art history and criticism and the consent of the instructor. *Amyx.*
May be repeated to a maximum of nine credits.

783 *Problems in Painting and Printmaking.* (3) I, II, S
Sustained individual problems in drawing, painting and printmaking. Prereq: 12 credits in upper division studio work and consent of the instructor. *Staff.*
May be repeated to a maximum of nine credits.

THE BIOLOGICAL SCIENCES

The Departments of Physiology and Biophysics, Botany, Plant Pathology, and Zoology jointly provide a program in *biology* leading to the degree Doctor of Philosophy. Besides courses offered in these four departments, the program draws upon various curricula and faculty members in several of the other biological sciences, such as Microbiology, Animal Science, Agronomy, Entomology, Psychology, and Pharmacy. The purpose of this graduate program is to train well-rounded biologists who will be familiar with the main branches of the biological sciences and who will have adequate training in mathematics, physics, chemistry and statistical methods. A student who receives his degree under this program would be sufficiently well-trained in one of the major branches of biology that he would be prepared to teach and carry out research in that field. He should also have a broad enough training in the entire field of the biological sciences that he would be familiar with the important principles underlying plant and animal life and would be able to teach in a unified department of biology. Students would be expected to have courses in general botany, general zoology, elementary physiology, comparative anatomy and general chemistry as prerequisites before starting their doctoral work and all students under this program would be required to have elementary courses in genetics and cellular physiology. Major work within the biological sciences would be in cytogenetics and evolution, in zoology with emphasis in ecology and genetics, vertebrate zoology or embryology and histology, in plant pathology, and in botany with emphasis on plant physiology, plant morphology, systematic botany or mycology. Other curricula such as cellular biology and radiation biology can be arranged to suit the preparation, needs and interests of individual students. Laboratory facilities and equipment are adequate for doctoral work in all these branches of biology. An excellent biological library containing over 10,000 volumes and including many of the important and less important American and foreign periodicals is available and is supplemented by over 200,000 volumes concerned with biology in the libraries of the experiment station, the medical center and departments of chemistry, physics and geology.

For appropriate courses see Departments of Botany, Plant Pathology, and Zoology.

BOTANY

400 *Fundamentals of Biology for Secondary School Teachers.* (4) S
A course designed to aid the teacher in the selection of subject matter and in the presentation of modern biology to high school students. Lectures, discussions, 3 hrs. per wk. Prereq: Employment as a high school teacher. (Same as Zoology 400) *Carpenter and others.*

401 *Laboratory to Accompany 400.* (0)
Seven hours.

402 *Advanced Topics in Biology for Secondary School Teachers.* (4) S
A treatment of selected topics from the point of view of modern developments designed to aid the high school teacher to keep abreast of changes in theory and practice, to increase his knowledge of subject matter, and to provide better motivation for his students. Lectures, discussions, and demonstrations, 7 hrs. per wk. Prereq: Employment as high school teacher and consent of instructor. (Same as Zoology 402)

501 *Plant Physiology.* (3) I, S
Basic principles of plant physiology; the physiological processes of green plants and the effect of the environment on these processes. Lecture, two hours; discussion-demonstration, 2 hours. Prereq: Botany 101-102 or 125, Chemistry 112-113 or 104-105 or equivalent. *Henrickson.*

506 *Special Problems.* (3) I, II
Independent work in some phase of advanced Botany. Prereq: consent of instructor. *Staff.* May be repeated to a maximum of twelve credits.

507 *Morphology of Algae.* (3) I
A study of the structure, life histories, genetics and relationships of the various groups comprising the algae, with the main emphasis upon the green algae. Prereq: Botany 103-104. *Warden.*

513 *Ecology.* (4) I
The relationships which exist between plants and their environment, including a study of the past and present distribution of vegetation. Lectures, three hours. Prereq: 6 credits of botany. *Warden.*

514 *Laboratory to Accompany 513.* (0)
Two hours.

515 *Seminar.* (1) I, II
Readings and reports of special topics. *Staff.*
May be repeated to a maximum of two credits.

521 *Anatomy of Vascular Plants.* (4) II
The nature and origin of primary and secondary tissues and their distribution in plant organs; the use of anatomical information in phylogeny, pathology, ecology and other research areas. Lectures, two hours. Prereq: 6 credits of botany. *Warden.*

522 *Laboratory to Accompany 521.* (0)
Four hours.

524 *Mycology.* (4) I
The structure and classification of the fungi with emphasis on their relationships and their effects on plants and animals. Two lecture-discussions. Prereq: Botany 101 or equivalent. Botany 103-104 recommended. *Garner.*

525 *Laboratory to Accompany 524.* (0)
Four hours.

526 *Advanced Mycology.* (4) II
Detailed examination of the structure, classification and physiology of specific groups of fungi. Two lecture-discussions. Prereq: Botany 524-525 or equivalent. *Garner.*

527 *Laboratory to Accompany 526.* (0)
Four hours.

528 *Plant Cytology.* (4) I
The structure of plant cells; mitosis and meiosis. Lectures, two hours. Prereq: 3 credits in the biological sciences. *Riley.*

529 *Laboratory to Accompany 528.* (0)
Four hours.

530 *Introduction to Heredity.* (3) II
The principles of heredity and their physical basis; three lectures per week. Prereq: 3 credits of biological sciences. *Riley.*

532 *Genes and Their Action.* (3) II
The nature and action of genes; physiological genetics. Three lectures per week. Prereq: Botany 530 or equivalent. *Riley.*

534 *Cytogenetics.* (3) II
Cytological and genetic evidence for the chromosome theory; chromosome aberrations and their importance in heredity and evolution. Three lectures per week. Prereq: Botany 528-529, 530 or equivalent. *Riley.*

541 *Plant Pathology.* (3) II
Significance, nature, causes, and methods of control of plant diseases. Lectures and discussion, two hours. Prereq: Botany 101-102. *Diachun or Chapman.*

542 *Laboratory to Accompany 541.* (0)
Two hours.

551 *Taxonomy of Vascular Plants.* (4) I
A study of the principles and practices of taxonomy and a detailed consideration of the families of vascular plants. Lectures, two hours. Prereq: Botany 101-102 and 103-104. *Browne.*

552 *Laboratory to Accompany 551.* (0)
Four hours, including field trips.

560 *Plant Microtechnique.* (3) I
The principal methods used in the preservation and preparation of plant materials for microscopic examination; basic microscopy; techniques for measurement and illustration. Six hours of laboratory per week. Prereq: Botany 101-102 or 125. *Browne.*

575 *Botanical Problems of Southern and Central Africa.* (3) II
Vegetative regions, significant plant families, plant migration, and climatic factors affecting the distribution of plants in South Africa, Central Africa, and adjacent territories. Prereq: 6 credits in Botany. *Riley.*

634 *Cytogenetics.* (3) I
Cytological and genetic evidence for the chromosome theory; chromosome aberrations and their importance in heredity and evolution. The effect of ionizing radiation on chromosomes. Three lectures and two hours lab per week. Given in alternate years. Prereq: Botany 528-529, 530 or equivalent. *Riley.*

701 *Plant Metabolism.* (3) II
Various aspects of plant metabolism including photosynthesis, respiration, nitrogen and protein metabolism; enzyme kinetics; and relation of molecular structure of cell components to function. Lecture, two hours; lab, two hours. Prereq: CHE 236 or 432, BOT 501, or consent of instructor. *Henrickson.*

702 *Laboratory to Accompany 701.* (0)
Two hours.

735 *Biosystematics.* (3) II
Principles in the application of data from the fields of ecology, genetics, cytology, morphology, phytogeography, and physiology to the solution of taxonomic problems. Lectures, three hours. Prereq: Botany 551-552 and 530; Botany 634 suggested. *Riley.*

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis. *Staff.*

769 *Residence Credit for the Doctor's Degree.* (1 to 18 wks. residence)
(In Biological Sciences) *Staff.*
May be repeated indefinitely.

770 *Seminar.* (1)
Reports and discussions on various topics in botany. *Staff.*
May be repeated to a maximum of six credits.

790 *Research in Botany.* (1-6) I, II, S
Independent research work under direction in the field (Genetics), (Taxonomy), (Morphology), (Mycology), (Ecology) of the graduate student's choice preparatory to writing a thesis. Progress reports required at intervals. May be repeated to a maximum of twelve credits.

CHEMISTRY

Work leading to the master's degree and to the doctor's degree with a major in chemistry must conform to the general rules and regulations of the Graduate School.

All new graduate students must take proficiency examinations in analytical, inorganic, organic and physical chemistry. The results of these examinations are used to guide the student's adviser in establishing the student's schedule of courses.

For the degree of Master of Science, twenty-four semester hours in graduate courses exclusive of the thesis, one academic year (36 weeks) in residence, and an acceptable thesis are required. A good reading knowledge of scientific German is required. It is strongly recommended that the candidate be able to read scientific French or Russian also.

A maximum of one-third of the work may be taken outside of the department in courses which are approved by the student's committee.

The degree of Doctor of Philosophy is conferred upon a candidate who, after completing not less than three years of graduate work in chemistry and allied fields, presents sufficient evidence of scholarly

attainments. Evidence is based on course work, research, examinations, and the dissertation.

402,404 *Orientation in Modern Chemistry for Teachers.* (3 ea.) S
A review of the fundamentals of chemistry and a study of recent developments. The relation of chemistry to various aspects of modern life is considered. Lectures and discussions in the classroom or by Continental Classroom television broadcasts. Prereq: Employment as high school science teacher.

406 *Fundamentals of Chemistry for High School Teachers.* (4) S
A course to aid the teacher in the selection of subject matter and in the presentation of modern chemistry to high school students. Lectures, discussions, six hours. Lab, six hours. Prereq: Employment as high school teacher.

430,432 *Organic Chemistry.* (3 ea.) I, II, S
A systematic study of organic compounds. Lectures, three hours. Prereq: CHE 112 or 104. *Smith, W. T., Jr.*

431,433 *Organic Chemistry Laboratory.* (1 or 2) I, II, S
Laboratory studies in organic chemistry to accompany CHE 430, 432. Three or six hours.

440,442 *Physical Chemistry.* (3 ea.) I, II
The fundamental principles of physical chemistry are studied with emphasis on the application of these in the correlation of natural phenomena. Lectures and recitations, three hours. Prereq: MA 212, PHY 242, or consent of instructor. *Sands.*

441,443 *Physical Chemistry Laboratory.* (2 ea.) I, II
Laboratory studies in physical chemistry to accompany CHE 440, 442. Six hours. *Sands.*

444 *Physical Chemistry.* (5) II
For students in Agriculture and in the Biological Sciences. Lectures and recitations, three hours. Lab, six hours. Prereq: CHE 112 or 104, and 236; PHY 213 and MA 113.

446,448 *Physical Chemistry for Engineers.* (4 ea.) I, II
The principles of physical chemistry are studied with applications of these in mining and metallurgical engineering. Lectures and recitations, three hours. Prereq: CHE 226, MA 212, and PHY 242.

506 *Advanced Topics in Chemistry for High School Teachers.* (4) S
A course in selected topics and modern developments to enhance the competence of the high school teacher. Lectures and discussion, twelve hours; lab, six hours. Prereq: Employment as a high school teacher and consent of instructor.

510 *Advanced Inorganic Chemistry.* (3) I
A course dealing with the concepts of inorganic chemistry with emphasis on atomic structure, periodicity, nomenclature, bonding, chemistry of the non-transition elements and acid-base theories. Lectures and recitations, three hours. Prereq: CHE 432 or consent of the instructor. *Sears.*

520 *Elementary Radiochemistry.* (3) I
An introduction to the use of radionuclides in chemistry. Topics include principles of radioactive decay, interaction of radiations with matter, detection, hot-atom chemistry and specific applications. Lectures and lab, five hours. Prereq: CHE 226 or equiv. *Ehmann.*

522 *Instrumental Analysis.* (4) I, II, S
The theory and application of instrumental methods of analysis. Lectures, two hours; lab, six hours. Prereq: CHE 442. *Wagner.*

528 *Principles of Analytical Chemistry.* (2) II
An intermediate study of the theory and practice of quantitative analysis. Lectures and discussion, two hours. Prereq: CHE 548 or consent of instructor. *Hammaker.*

532 *Qualitative Organic Analysis.* (3) I, S
A systematic study of the separation and identification of organic compounds. Lecture, one hour; lab, six hours. Prereq: CHE 432 or 232.

535 *Synthetic Organic Chemistry.* (3)
A critical comparison of preparation methods accompanied by laboratory work and reports. Lab, nine hours. Prereq: CHE 432 or 232.

538 *Principles of Organic Chemistry.* (3) II
A general survey of the field of organic chemistry. Lectures, three hours. Prereq: CHE 432 and consent of instructor. *Brown.*

542 *Chemical Thermodynamics.* (3) I
Principles and applications of chemical thermodynamics. Lectures, three hours. Prereq: CHE 442, 443. *Eckstrom.*

544 *Colloid Chemistry.* (2)
Lectures, recitations and assigned readings on the chemistry of colloids. Lectures and recitations, two hours. Prereq: CHE 442.

548 *Principles of Physical Chemistry.* (3) I
An intermediate course dealing with the fundamental principles of physical chemistry. Prereq: CHE 442 or equiv. *Eckstrom.*

550,552 *Physiological Chemistry.* (4 ea.) I, II
A study of the chemistry of living processes. Lectures and recitations, three hours; lab, three hours. Prereq: CHE 112 or 104, 226 or equiv. and 432. *Smith, W. T., Jr.*

572 *Seminar.* (1) II
Reports and discussions on recent research and current chemical literature.

582 *Chemical Literature.* (1)
Training in the use of chemical literature. One hour per week. Black.

583 *Laboratory Arts.* (2)
The fabrication of chemical apparatus of glass, metal and plastics. Prereq: Major in the Department.

610 *Chemistry of the Transition Metals.* (3) II
A detailed treatment of the chemistry of the transition elements, the lanthanides and actinides, including the structure of coordination complexes, bonding, reaction mechanisms and preparations. Lectures, three hours. Prereq: CHE 510 or equivalent. *Williams.*

616 *Radiochemistry.* (2) II
An advanced study of nuclear chemistry and radiochemistry. Lectures, two hours. Prereq: CHE 442, 443, 520. *Ehmann.*

622 *Quantitative Organic Analysis.* (3)
A study of the determination of elements and functional groups in organic compounds. Lecture, one hour; lab, six hours. Prereq: CHE 522 and 442.

625 *Optical Methods of Analysis.* (3) II
An intensive study of the theory and applications of the following methods: emission spectroscopy, x-ray diffraction, and absorption spectrophotometry. Lectures and laboratory, seven hours. Prereq: CHE 522 and 442. *Wagner.*

626 *Advanced Analytical Chemistry.* (3) I
An advanced study of the theory and practice of quantitative analysis. Lectures and discussions, three hours. Prereq: CHE 528 or equiv. *Hammaker.*

630,632 *Synthesis of Organic Compounds.* (2 ea.) I, II
A thorough study of the types of reactions used in organic synthesis with emphasis on the conditions and reagents that can be used. Lectures, two hours. Prereq: CHE 432. *Smith, W. T., Jr.*

633,635 *Advanced Organic Chemistry.* (3 ea.) I, II
Fundamental organic chemistry as interpreted by modern theory. Prereq: CHE 538 or consent of instructor.

642 *Advanced Physical Chemistry.* (3) II
An advanced course dealing with kinetic-molecular theory, thermodynamics, quantum theory, molecular structure, surface chemistry, chemical equilibria and kinetics of reaction. Lectures, three hours. Prereq: CHE 548 or equiv. *Eckstrom.*

643 *Chemical Crystallography.* (2) I
An introduction to crystallography for chemists. Topics include the physical and chemical properties of crystals, crystal geometry, symmetry, x-ray diffraction, and crystal structure analysis. Prereq: CHE 442. *Sands.*

644 *Phase Rule.* (2)
Lectures and assigned readings on the theory and applications of the phase rule. Lectures, two hours. Prereq: CHE 542.

646 *Chemical Kinetics.* (2) I
Studies of chemical reactions from the standpoint of velocity and mechanism. Lectures, two hours. Prereq: CHE 542. *Plucknett.*

710 *Topics in Inorganic Chemistry.* (2) I
Discussion of topics of recent interest in inorganic chemistry, including physical methods, syntheses, and structural theories. Lectures, two hours. Prereq: CHE 610 or equivalent. *Williams.*

714 *Non-Aqueous Solutions.* (2) II
A study of the properties of non-aqueous solutions and reactions in non-aqueous media. Lectures, two hours. Prereq: CHE 442 and 443. *Dawson.*

720 *Advanced Instrumental Analysis.* (3) I
The theory and applications of the following methods to chemical analysis: chromatography, solvent extraction, ion-exchange, infra-red spectroscopy, coulometry and non-aqueous titrimetry. Lectures and laboratory, seven hours. Prereq: CHE 522.

726 *Topics in Analytical Chemistry.* (3)
Selected topics which may include nuclear magnetic resonance, mass spectrometry, x-ray diffraction and spectroscopy, microscopy, and recent advances in analytical chemistry. Lectures, three hours. Prereq: CHE 522.

730 *Theoretical Organic Chemistry.* (3) I
The application of the principles of kinetics, thermodynamics and quantum mechanics to the problems of organic chemistry. Prereq: CHE 635 and MA 431.

733 *Stereochemistry of Organic Compounds.* (3) I
The steric aspects of fundamental organic processes; the application of optical rotatory dispersion to the problems of stereochemistry. Prereq: CHE 635.

736,738 *Topics in Organic Chemistry.* (2 ea.) I, II
Selected topics which may include heterocyclic organic compounds, natural and synthetic dyes, carbohydrates, nitrogen compounds, and recent advances in the field of organic chemistry. Lectures, two hours. Prereq: CHE 432.

740 *Electrochemistry.* (2)
Modern theories of solutions. Applications of electrochemical methods in determining the properties of solutions. Polarization. Electrolysis. Equilibrium in solutions of electrolytes. Lectures, two hours. Prereq: CHE 542.

742 *Quantum Chemistry.* (3) I
An introduction to quantum mechanics with emphasis on the aspects closely related to chemistry. Lectures, three hours. Prereq: MA 431 and consent of instructor. *Plucknett.*

743 *Molecular Structure.* (2) II
Applications of quantum theory to chemical problems, theories of the chemical bond, structure and spectra of molecules. Lectures, two hours. Prereq: CHE 742.

744 *Statistical Thermodynamics.* (2) II
The study of chemical thermodynamics from the viewpoint of the statistical treatment of systems rather than from the empirical classical approach. Lectures, two hours. Prereq: CHE 542 and MA 431. *Plucknett.*

746,748 *Topics in Physical Chemistry.* (2 ea.)
Selected topics which may include photochemistry, structure of crystals, molecular spectra, nature of the chemical bond, and other recent advances in the field of physical chemistry. Lectures, two hours. Prereq: CHE 642 or consent of instructor.

768 *Residence Credit for the Master's Degree.* (0)
1 to 9 weeks residence. May be repeated. Maximum of six weeks can be applied toward master's degree with thesis.

769 *Residence Credit for the Doctor's Degree.* (0)
1 to 18 weeks residence. May be repeated indefinitely.

776,778 *Graduate Seminar.* (1 ea.) I, II
Reports and discussions on recent research and current literature. Required of all graduate students.

780 *Individual Work in Chemistry.* (1-5) I, II, S
Selected library and laboratory problems in conformance with the student's interest will be attacked and pursued under the direction of a suitable staff member who is proficient in the area under investigation. May be repeated to a maximum of six credits.

790 *Research in Chemistry.* (1-5) I, II, S
Work may be taken in the following fields, subject to the approval of the Departmental Graduate Committee: Analytical Chemistry, Inorganic Chemistry, Organic Chemistry, or Physical Chemistry. May be repeated indefinitely.

COMPUTER SCIENCE

420 *Algorithmic Languages and Compilers.* (3)
This course acquaints the student with the formal description of procedure-oriented languages and techniques useful in the translation of these languages into computer programs. Prereq: CS 320.

440 *Information Processing Systems.* (3)
An introduction to structures of information sets covering syntectic or semantic relations. The generation, development and processing of structures and their interrelationships, machine instructions and storage hierarchies. Prereq: CS 220 or equivalent.

472 *Seminar.* (2)
Weekly report on current research papers. Discussion of new advances in computer science. (May be repeated to a maximum of 6 hours.) Prereq: CS 320 or CS 440, or consent of instructor.

525 *Analog and Hybrid Computer Techniques.* (3)
Application of analog and hybrid computers in the solution of systems of integro-differential-difference equations. Prereq: Math. 331 or 441 (or equivalent).

540 *System Simulation.* (3)
Computer simulation techniques including building and utilizing deterministic and stochastic models for digital and analog computers. Prereq: CS 220 or equivalent.

560 *Non-numerical Applications of Computers.* (3)
Introduction to and training in non-numerical techniques by digital computers. Prereq: CS 220 or equivalent.

570 *Computers and Programming Systems.* (3)
Advanced concepts in software design, development, and implementation including priority, executive, and real time computer systems. Prereq: CS 420.

DIPLOMACY AND INTERNATIONAL COMMERCE

The Patterson School is a graduate department, offering training in the following interrelated fields:

1. International Relations
2. Foreign Policy
3. Comparative Politics
4. International Economics and Economic Development
5. Area Studies

Admission to candidacy for advanced degrees in the Patterson School is governed by the regulation of the Graduate School.

The Patterson School offers both the master's and doctor's degrees. All students seeking an advanced degree must indicate at the start of their first semester whether they intend to take the main portion of their work in the fields of economics, history, or political science. They should then enroll in the designated introductory methodology course in the discipline in question. This requirement may be waived if the student has taken comparable graduate level work previously.

The student must take 30 semester hours for the master's degree, 24 of which represent courses and six the thesis. At least 18 of these 24 hours must be taken from the lists below and, normally, should be equally distributed among three of the five fields. Under exceptional circumstances up to six hours may be taken in a related field. A reading knowledge of a modern foreign language, an acceptable thesis, and a final oral examination on the course work and the thesis are further requirements. A student may be allowed to take an additional six hours of course work in place of the thesis under exceptional circumstances.

Candidates for the doctor's degree ordinarily take 60 hours of course work (including the master's thesis). Thirty to forty of these should ordinarily be in a single discipline. These requirements may be modified, however, depending on the previous preparation of the student. The student's courses should otherwise be equally distributed among the five fields listed below. In the case of the field of area studies, the student should select his courses from one of the areas listed. Half of the courses taken for both master's and doctor's degrees must be open to graduate students only.

Candidates for the doctor's degree must also pass qualifying examinations upon completion of the course work. A written examination is given in each of

the five fields, and these are followed by an oral examination in the same five fields. A minor in a related field may be substituted for two of the fields with approval. A reading knowledge of two modern languages, a dissertation, and an oral examination on the dissertation complete the requirements for the doctor's degree.

Students with a master's degree from another accredited institution shall ordinarily be considered to have taken 30 of the required hours of course work for the Ph.D. Such students may still be required to pass a preliminary examination for admission to candidacy for the Ph.D. Students seeking the Ph.D. without taking the master's may also be required to take such an examination at a comparable point in their work.

I. International Relations

Political Science 550—International Law (3)
Political Science 566—The United Nations (3)
Political Science 774—International Relations and Organization (3)
Political Science 501—Latin American Relations (3)
Geography 542—Geographical Foundations of World Power (2)
Geography 543—Special Problems (1) (Special-problem study related to, and to be taken in conjunction with, Geography 542)
History 542—German History 1815-1914 (3)
History 543—German History Since 1914 (3)
History 592—Diplomatic History of the Far East Since 1787 (3)
History 593—Far Eastern History Since World War II (3)

II. Foreign Policy

Political Science 530—The Conduct of American Foreign Relations (3)
Political Science 541—The Foreign Policy of the Soviet Union (3)
Political Science 600—Problems of Soviet Foreign Policy (3)
Political Science 775—Contemporary American Diplomatic Problems (3)
History 565—The British Empire to 1860 (3)
History 566—The British Empire and Commonwealth (3)
History 569—British History Since 1815 (3)
History 574—Diplomacy and Foreign Policy of the United States to 1919(3)
History 575—The Diplomacy and Foreign Policy of the United States Since 1919 (3)
History 625, 626—Readings in British and British Empire History (3 ea.)

III. Comparative Politics

Political Science 520—Governments and Politics of South Asia (3)
Political Science 555—Comparative Government—Parliamentary Democracies (3)
Political Science 556—Comparative Government—Contemporary Dictatorships (3) (emphasis on the Soviet Union)
Political Science 568—Governments and Politics of Eastern Asia (3)
Political Science 757—Seminar in Comparative Democratic Political Systems (3)
Political Science 776—Political Development of Southeast Asia (3)

Sociology 561—Comparative Sociology (3)
Sociology 727—Seminar on Socio-Cultural Change (3)
History 587—Twentieth Century Latin American Revolutions (3)

IV. International Economics and Economic Development

Economics 514—Microeconomic Analysis (3)
Economics 515—Intermediate Economic Analysis (3)
Economics 520—International Investments (3)
Economics 522—Underdeveloped Areas and Economic Policy (3)
Economics 525—Economic Development (3)
Economics 527—International Economics (3)
Economics 542—Soviet Area Economics (3)
Economics 565—Comparative Economic Systems (3)
Economics 590—Introduction to Mathematical Economics (3)
Economics 601—Theory of International Trade (3)
Economics 602—Analysis of International Trade (3)
Economics 611—Advanced Money and Banking (3)
Economics 618—Economic Theory (micro) (3)
Economics 619—Economic Theory (macro) (3)
Economics 650—Research Statistics I (3)
Economics 651—Research Statistics II (3)
Economics 690—Mathematical Economics (3)
Economics 691—Econometrics (3)
Economics 770—Seminar, I, II (1 to 6)
Economics 780—Research Problems in Economics I, II (1 to 6)
Agricultural Economics 545—Land Economics (3)
Agricultural Economics 626—Agriculture in Economic Development (3)
Agricultural Economics 640—Advanced Agricultural Policy (3)
Rural Sociology 515—Diffussion of Technology in Modern Society (3)
Sociology 522—Social Determinants of Economic Behavior (3)
Business Administration 523—International Commercial Policy (3)

V. Area Studies

ASIA

Political Science 520—Governments and Politics of South Asia (3)
Political Science 568—Governments and Politics of Eastern Asia (3)
Political Science 776—Political Development of Southeast Asia (3)
History 590—Japanese History to 1600 (3)
History 591—Japanese History Since 1600 (3)
History 592—Diplomatic History of the Far East Since 1787 (3)
History 593—Far Eastern History Since World War II (3)
Geography 528—Regional Geography of Asia (3)
Geography 529—Special Problems (1) (Special-problem study related to, and to be taken in conjunction with, Geography 528)
Geography 534—Regional Geography of Australia and the Pacific Islands (2)

Geography 535—Special Problems (1) (Special-problem study related to, and to be taken in conjunction with, Geography 524)
Geography 550—Regional Geography of South Asia (2)
Geography 551—Special Problems (1) (Special-problem study related to, and to be taken in conjunction with, Geography 550)
Geography 552—Regional Geography of Southeast Asia (3)
Geography 553—Special Problems (1) (Special-problem study related to, and to be taken in conjunction with, Geography 552)
Philosophy 540—Great Religions (3)

LATIN AMERICA

Geography 524—Regional Geography of Latin America (2)
Geography 525—Special Problems (1) (Special-problem study related to, and to be taken in conjunction with, Geography 524)
Geography 560—Regional Geography of the Caribbean (3)
Geography 561—Special Problems (1) (Special-problem study related to, and to be taken in conjunction with, Geography 560)
Anthropology 530—Contemporary Latin American Cultures (3)
Political Science 501—Latin American Relations (3)
History 584—Economic History of Latin America Since Independence (3)
History 587—Twentieth Century Latin American Revolutions (3)
History 637, 638—Readings in Latin American History (3 ea.)
History 715—Seminar in Latin American History (3)
Sociology 561—Comparative Sociology (3) (This course frequently treats the Latin American countries)

EUROPE

Geography 526—Regional Geography of Europe (3)
Geography 527—Special Problems (1) (Special-problem study related to, and to be taken in conjunction with, Geography 526)
History 542—German History 1815-1914 (3)
History 543—German History Since 1914 (3)
History 554—British History Since 1815 (3)
History 581—Europe, 1814-1870 (3)
History 582—Europe, 1870-1918 (3)
History 583—Europe Since 1918 (3)
History 600—European Historiography (3)
History 623, 624—Readings in European History Since 1815 (3 ea.)
History 625, 626—Readings in British and British Empire History (3 ea.)
History 720—Seminar in Modern European History (3)
History 730—Seminar in Modern British History (3)

SOVIET UNION—EASTERN EUROPE

Political Science 541—The Foreign Policy of the Soviet Union (3)
Political Science 556—Comparative Government—Contemporary Dictatorships (3) (emphasis on the Soviet Union)

Political Science 600—Problems of Soviet Foreign Policy (3)
Economics 542—Soviet Area Economics (3)
Sociology 561—Comparative Sociology (3) (This course frequently treats Soviet society)
History 584—Russian Revolutions and the Soviet System, I (3)
History 585—Russian Revolutions and the Soviet System, II (3)
History 589—History of Russian Social and Political Thought, 1789-1914 (3)
History 591—Political and Diplomatic History of East Central Europe from the French Revolution to the End of World War I (2)
History 595—Political and Diplomatic History of East Central Europe Since World War I (3)

Regardless of the area specialization chosen, the student may also take three to six hours of Geography 650 (Regional Study of Special Areas), a seminar for persons who have had appropriate previous work.

768 *Residence Credit for the Master's Degree.* (1 to 9 weeks residing)
Maximum of nine weeks can be applied toward Master's Degree with thesis. May be repeated. *Staff.*

769 *Residence Credit for the Doctor's Degree.* (1 to 18 weeks residence)
May be repeated indefinitely. *Staff.*

DRAMATIC ARTS *(See English)*

ENGLISH, SPEECH, AND DRAMATIC ARTS

The Department of English, Speech, and Dramatic Arts requires as a prerequisite for the master's degree attainment in English equivalent to that required of an undergraduate English major at the University of Kentucky. For the master's degree, a minimum of twenty-four semester hours of English and closely allied subjects must be offered, including the introductory Bibliographical Studies. A maximum of six of these twenty-four semester hours may be taken in other subjects, provided these courses have the approval of the Graduate Committee of the Department of English. All candidates for the master's degree in English will be required to attain a reading knowledge of one modern foreign language (ordinarily, French or German) before receiving the degree.

The Department offers the master's degree according to both Plan A and Plan B. (See pages 18-20.)

Applicants for the doctor's degree are required to complete at least two years of residence work beyond the M.A. The applicant's program must include, among other courses, a minimum of six hours in American literature and a total of six hours in Old English and Linguistics. A knowledge of French and German is required of all applicants. For requirements concerning the qualifying examinations, the final examination, and the dissertation, see the discussion of these elsewhere in this bulletin or consult the Department.

412 *History of the English Language.* (3)
A survey emphasizing the characteristics of English from the times of Alfred, Chaucer, Shakespeare, and Johnson to the present. *Cutler.*

472 *Studies in English for High School Teachers.* (1 to 3)
Specialized topics in language, literature, and composition designed to increase the high school teacher's knowledge of subject matter, to aid him in meeting major problems in the curriculum, and to enlarge his understanding of new developments and approaches to the teaching of high school English. Prereq: Employment as a high school teacher. May be repeated to a maximum of six credits.

501 *Fiction Workshop.* (2)
Chief attention is directed to the short story, but time is also given to the novel. Manuscripts are analyzed, but primary attention is given to the theory and convention of fiction writing. Prereq: consent of instructor. *Berry.*

502 *Fiction Workshop.* (2)
Emphasis on application of fictional techniques in student writing. Designed to bring about a fuller understanding of the conventions set forth in 501 and to bring practice closer to theory. Prereq: consent of instructor. *Berry.*

504 *Writing the One-Act Play.* (3)
This course is designed for those students interested in creative drama. The completion of at least one one-act play is required during the semester.

505 *Writing the Full-Length Play.* (3)
The writing of a full-length play is required during the semester.

509 *Composition for Teachers.* (3)
The basic studies helpful to high school teachers of composition. The teaching of grammar, punctuation, usage, etc., and of theme planning, correction, and revision. Students are required to do quite a bit of writing. *Crabb, Hatch, Van Gelder.*

510 *Modern British and American English.* (3)
A survey of modern British and American English with respect to pronounciation, syntax, spelling, and usage. Historical developments will be examined insofar as doing so sheds light on modern practice. *Cutler.*

512 *Grammar of Structure and Usage.* (3)
Descriptive grammar for advanced students. Analysis of sentence structure; consideration of standards of usage; investigation of current practice. *Faust.*

514 *Descriptive Linguistics: Phonetics.* (3)
Articulatory description of speech sounds; practice in recognition and control. (Same as Anthropology 514.) Prereq: Consent of instructor. *Faust.*

515 *Descriptive Linguistics: Phonemics.* (3)
An investigation of speech-sounds and systems of speech-sounds. Also attention to both speech and writing as communication systems. (Same as Anthropology 515.) Prereq: Consent of instructor. *Faust.*

516 *Descriptive Linguistics: Morphemics.* (3)
An explanation of some of the ways speech sounds are put together in patterns so as to form languages. (Same as Anthropology 516.) Prereq: English 515. *Faust.*

520 *Chaucer.* (3)
Extensive readings in the principal works of Chaucer, with particular attention to *The Canterbury Tales and Troilus and Criseyde. Moore, Cutler.*

522 *English Literature: 1500-1600.* (3)
Literature of the Elizabethan period exclusive of the drama. Foreign sources of the English Renaissance. Major writers such as More, Ascham, Wyatt, Sidney, Spenser, Raleigh, and Marlowe. *Stroup, Evans.*

523 *English Literature: 1600-1660.* (3)
Selected non-dramatic works of such writers as Bacon, Donne, Ben Jonson, George Herbert, Izaak Walton, Herrick, Sir Thomas Browne, Vaughan, Traherne, and Milton. *Stroup, Rickey.*

524 *Pre-Shakespearean Drama.* (2)
A course in English origins, beginning with the Quem Quaeritis Trope and extending through the works of the early Elizabethans. *Stroup.*

525 *Elizabethan Drama, Exclusive of Shakespeare.* (3)
A survey of English drama from the early Elizabethans until the closing of the theatres. *Stroup.*

526 *Shakespeare: the Comedies.* (3)
Shakespeare's comedies will be studied in detail. *Black, Evans, Rickey.*

527 *Shakespeare: the Tragedies.* (3)
Shakespeare's tragedies will be studied in detail. *Black, Evans.*

528 *Milton.* (3)
A study of all of Milton's poetry and of his more important prose; readings from contemporary thinkers; studies in thought currents of the time and Milton's relation to them. *Stroup.*

530 *Age of Pope.* (3)
Addison and Steele, Swift, Pope, Defoe, and other contemporary figures. *Cooke.*

531 *Age of Johnson.* (2)
Johnson and his circle; Burke, Goldsmith, Gray, Walpole, Cowper. The Pre-Romantic movement. *Cooke.*

532 *Restoration and Eighteenth-Century Drama.* (3)
A study of the dramatic types that arose between the closing of the theatres in 1642 and the death of Sheridan. *Cooke.*

533 *Eighteenth-Century British Novel.* (3)
Study of the novel from its beginnings in English literature through the eighteenth century. *Cooke.*

536 *English Romantic Prose.* (2)
The philosophical, critical, social, and political backgrounds of romanticism are examined. The emphasis is on Wordsworth, Coleridge, Byron, Shelley, and Keats. *Ward.*

538 *Victorian Literature: 1830-1860.* (3)
Poets and essayists—Macaulay, Mill, Carlyle, Newman, Tennyson, Mrs. Browning, Browning, Ruskin, and Arnold—in their historical setting. *Axton.*

539 *Victorian Literature: 1860-1900.* (3)
Poets and essayists—Rossetti, Swinburne, Meredith, Huxley, Pater, Wilde, Davidson, Henley, Stevenson, Housman, Hardy, Kipling, and some others—in their historical setting. *Axton.*

540 *Nineteenth-Century British Novel.* (3)
Study of the novel in English literature from Jane Austen through Thomas Hardy. *Axton.*

541 *Twentieth-Century British Novel.* (3)
A study of the content and technique of the best twentieth-century British novels, with some consideration of these in relation to significant social, philosophical, and literary trends. *Evans.*

542 *Twentieth-Century British Poetry.* (3)
Close study of major British poetry of the twentieth-century, with attention to literary movements and critical theory. *Moore.*

551 *American Literature before 1860.* (3)
A survey of the development of American life, thought, and letters from the beginnings to 1860. *Ringe, Jacobs, White.*

552 *American Literature after 1860.* (3)
A survey of the development of American life, thought, and letters from 1860 to the present. *Ringe, Jacobs, White.*

554 *American Novel before 1900.* (3)
Study of the American novel from the beginnings to Henry James. *White.*

555 *Modern American Novel.* (3)
Novels chosen for their enduring value rather than historical importance. Attention to shifting techniques of fiction and to contrasting interpretation of the American scene. *Jacobs.*

556 *Modern American Poetry.* (3)
Examination of the forces which brought about the revolutionary changes in technique and idea in twentieth-century poetry; study of the major American poets from 1890 to the present. *Jacobs.*

560 *Comparative Literature I.* (3)
A study of Western World literature. From Homer to Montaigne.

561 *Comparative Literature II.* (3)
A study of Western World literature. From Montaigne to Anatole France. *Evans.*

562 *Comparative Literature III.* (3)
Masterpieces and examples of twentieth-century Western World literature, with emphasis on the emergence of new forms and techniques invented to express the complexity of modern life. The course will study novels, poems and plays in their traditional development and in experimental and divergent forms. *Davenport.*

563 *Modern Drama.* (3)
Continental, British, and American dramatic literature from Ibsen to the present. *Adler.*

565 *The Lyric in English.* (2)
A critical examination of selected lyrics from the Middle Ages to the present. *Moore.*

568 *History of Literary Criticism I.* (3)
Literary criticism in the Western World from Plato through the eighteenth century. Application of critical principles to literary works. *Adler.*

569 *History of Literary Criticism II.* (3)
Literary criticism in Europe and America from Wordsworth to the present. Application of critical principles to literary works. *Adler.*

570 *Literature of the Old Testament.* (3)
Critical analysis of the canonical and apocryphal Old Testament in English, with particular attention to Biblical ideas and symbols helpful to students of literature. *Rickey.*

571 *Literature of the New Testament.* (3)
Critical analysis of the canonical and apocryphal New Testament in English, with particular attention to Biblical ideas and symbols helpful to students of literature. *Rickey.*

573 *General Introduction to Folklore.* (3)
An introduction—on a world-wide scope—to the types of folklore. Emphasis upon folklore as a cultural phenomenon in its own right and upon its relations to literary types. The development of the science of folklore. *Jansen.*

574 *American Folklore.* (2)
A study of the major materials in American folklore. The use of this material in other forms. Experience in actual collecting and in the cataloging of materials. *Jansen.*

580 *Discussion.* (3)
The essentials of discussion, with emphasis upon the thinking process as it operates in group situations. Participation in the various forms of discussion. *Blyton, Patterson.*

581 *Advanced Discussion.* (3)
An intensive study of discussion as democracy in action. Ample time devoted to practice discussions. *Blyton.*

582 *Persuasion.* (3)
The principles and methods of persuasion. Of particular benefit to teachers, lawyers, business majors, and other persons whose work is concerned with motivating human conduct. *Blyton, Patterson.*

583 *Advanced Argumentation and Debate.* (3)
The function of argumentation and debate in a democracy, plus a much more detailed and critical examination of logic and argument than in English 283. *Blyton.*

584 *Teaching of Speech.* (3)
An analysis of the field of speech education as related to the teacher of speech. *Blyton, Patterson.*

585 *American Public Address to 1865.* (3)
An historical and critical study of public discussion in the United States, from the Colonial Period to 1865, through the analysis of major speakers, speeches, and debates. *McCants, Patterson.*

586 *American Public Address since 1865.* (3)
An historical and critical study of public address in the United States from 1865 to the present. *McCants, Patterson.*

588 *Oral Interpretation of Drama.* (3)
The cutting and adapting of the three-act play for oral presentation. *Sterrett.*

590 *History of the Theatre I.* (3)
A study of the theatre from primitive times through the sixteenth century. Theatre and stage architecture, scene design, costuming and acting styles are discussed and their relation to dramatic literature analyzed. *Dickens.*

591 *History of the Theatre II.* (3)
A continuation of English 590, a study of the theatre from the sixteenth century to the present. *Dickens.*

592 *Scene Design I.* (3)
Study of theory, principles, and techniques of scene and lighting design for the contemporary theatre. Comprehensive analysis of a play and the development of a design through the media of floor plans, lighting plot, and perspective line drawings. *Smith.*

593 *Scene Design II.* (3)
Intensified and expanded application of English 592. Advanced theory and practice in scene and lighting design for the theatre. Prereq: English 592 or consent of the instructor. *Smith.*

594 *Acting I.* (3)
Study of acting styles from antiquity to the present, with emphasis on important acting periods. Lecture and weekly demonstrations for the development of skill in the use of body and for projection of voice and total characterization. Two hours lecture and two hours laboratory weekly. *Briggs.*

595 *Acting II.* (3)
Study and acting of scenes from classical and modern dramatic literature. Intensive application of techniques studied in 594. Two hours lecture and two hours of laboratory weekly. *Briggs.*

597 *Survey of Theatre Principles.* (3)
A course designed to introduce teachers and community theatre workers to the problems of staging under circumscribed conditions; minimum essentials of play production and the means of supplying these needs. *Briggs.*

598 *Theatre Directing I.* (3)
Study of movement, interpretation of lines, creation of atmosphere, use of stage areas, use of levels, methods of achieving a climax, handling of groups, planning of mob scenes. *Briggs.*

599 *Theatre Directing II.* (3)
The analyses and direction of the characteristics of tragedy, comedy, melodrama, farce, and their variants comprise the major portion of the work. Intensive application of the techniques studied in 598. Prereq: English 598 or consent of the instructor. *Briggs.*

600 *Bibliographical Studies.* (3)
An introduction to graduate work, with particular attention to the monuments of literary scholarship, reference works, and use of the library. The preparation of an extensive bibliography is required. Must be taken by all candidates for the M.A. in English. *Ward.*

610 *Old English.* (3)
Introduction to Old English language and literature. *Moore.*

611 *Beowulf.* (3)
Chiefly a study of *Beowulf*, though with some reference to allied literature and the Germanic background. *Moore.*

612 *History of the English Language.* (3)
A survey tracing in the development of modern standard English from its Indo-European origin. Emphasis will be placed on the history of sounds, inflections, and vocabulary and on varying concepts of "correctness." *Cutler.*

620 *Middle English Literature.* (3)
Survey of Middle English literature, exclusive of Chaucer, with collateral reading of non-English monuments in English translation. *Moore.*

622 *Studies in English Literatures: 1500-1600.* (4)
Comprehensive study of broad topics, normally limited to an intensive survey of the literature and scholarship of the period as a whole. *Stroup.*

623 *Studies in English Literature: 1600-1660.* (4)
Comprehensive study of broad topics, normally limited to an intensive survey of the literature and scholarship of the period as a whole. *Stroup.*

630 *Studies in English Literature: 1660-1720.* (4)
Comprehensive study of broad topics, normally limited to an intensive survey of the literature and scholarship of the period as a whole. *Cooke.*

631 *Studies in English Literature: 1720-1780.* (4)
Comprehensive study of broad topics, normally limited to an intensive survey of the literature and scholarship of the period as a whole. *Cooke.*

635 *Studies in English Literature: 1780-1830.* (4)
Comprehensive study of broad topics, normally limited to an intensive survey of the literature and scholarship of the period as a whole. *Ward.*
May be repeated to a maximum of eight credits.

638 *Studies in English Literature: 1830-1860.* (4)
Comprehensive study of broad topics, normally limited to an intensive survey of the literature and scholarship of the period as a whole.

639 *Studies in English Literature: 1860-1900.* (4)
Comprehensive study of broad topics, normally limited to an intensive survey of the literature and scholarship of the period as a whole.

651 *Studies in American Literature before 1860.* (4)
Comprehensive study of broad topics, normally limited to an intensive survey of the literature and scholarship of the period as a whole. *Ringe, Jacobs.*

652 *Studies in American Literature since 1860.* (4)
Comprehensive study of broad topics, normally limited to an intensive survey of the literature and scholarship of the period as a whole. *Jacobs.*

687 *Studies in Ancient and Medieval Rhetoric.* (3)
A comparative and critical study of the major treatises on the art of speaking, from the time of Aristotle to the Renaissance, with attention to the rhetorical practice, criticism, and pedagogy of the succeeding periods. *Patterson, McCants.*

688 *Studies in Renaissance and Modern Rhetoric.* (3)
A comparative and critical study of the major contributions to the body of rhetorical theory from the Renaissance to the present. *Patterson, McCants.*

690 *Studies in Technical Theatre: Production.* (3)
Problems in advanced sceno-graphic techniques including drafting for the theatre, period composition and design, translation of the design into actuality, planning and laying out the technical schedule. *Smith.*

691 *Studies in Technical Theatre: Lighting.* (3)
Investigation and critical evaluation of lighting practice and artistry in the contemporary theatre. *Smith.*

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
Staff.
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis.

769 *Residence Credit for the Doctor's Degree.* (1 to 18 wks. residence)
Staff.
May be repeated indefinitely.

770 *Seminar in English Literature.* (3)
Intensive study and research centering upon such subjects as the following: a particular author or group of authors, a literary *genre,* a literary movement, a restricted period of time. *Graduate Staff.*
May be repeated to a maximum of twelve credits.

772 *Seminar in American Literature.* (3)
Intensive study and research centering upon such subjects as the following: a particular author or group of authors, a literary *genre,* a literary movement, a restricted period of time. *Graduate Staff.*
May be repeated to a maximum of six credits.

774 *Seminar in Comparative Literature.* (3)
Intensive study and research centering upon the relationship between English or American literature and that of some other country. *Graduate Staff.*
May be repeated to a maximum of six credits.

780 *Directed Studies.* (3)
Independent work devoted to study and research on specific subjects and problems according to the interests and needs of individual students. *Graduate Staff.*
May be repeated to a maximum of nine credits.

782 *Special Topics in Speech.* (3)
Study and research on specific topics and problems according to the interests and needs of individual students. Normally offered as an independent work course. *Staff.*

784 *Special Topics in Dramatic Arts.* (3)
Study and research on specific topics and problems according to the interests and needs of individual students. Normally offered as an independent work course. *Staff.*

FRENCH LANGUAGE AND LITERATURE

The Department of French Language and Literature requires, as a prerequisite to candidacy for the master's degree, attainment in French equivalent to that required for an undergraduate major in that field. The number of language courses required for the M.A. degree varies, depending in part upon the advanced courses which the student may be asked, or permitted, to take in related departments. Usually, a minimum of 24 semester hours of French and allied subjects must be offered, including French 553 and French 606, and all candidates will be required to demonstrate a reading knowledge of another modern foreign language before receiving the degree.

The Department offers the master's degree according to both Plan A and Plan B. (See pages 18-20)

Applicants for the doctor's degree are required to complete at least two years of residence work beyond the M.A. The applicant's program must include, among other courses, French 553 and French 606. A knowledge of one other Romance language and German is required of all applicants. For information concerning the qualifying examinations, the final examination, and the dissertation, see the discussion of these elsewhere in this bulletin, or consult the Department.

Students should note that courses in literature are usually given in French.

450 *La Civilization Française au XX Siècle.* (3)
A survey of French culture in the XX century with emphasis on the period following World War II. Conducted in French. Prereq: MFL 202. (Alternate years). *Staff.*

502 *French Literature of the Nineteenth Century.* (3) I, II, S
A study of French Romanticism. Lectures and reading. *Duncan.*

503 *French Literature of the Nineteenth Century.* (3) I, II, S
A study of Realism and Naturalism in France. Lectures and reading. *Duncan.*

504 *French Literature of the Seventeenth Century.* (3) I, II, S
A study of the literature of this period, not including Molière, Corneille and Racine. *Charron.*

505 *French Literature of the Seventeenth Century.* (3) I, II, S
The plays of Molière, Corneille and Racine. *Charron.*

506,507 *Advanced French Grammar.* (3 ea.) I, II, S
A study of the finer points of French grammar. *Staff.*

508,509 *French Literature of the Eighteenth Century.* (3 ea.) I, II, S
A study of the representative writers of the XVIII century, with special attention given to Montesquieu, Voltaire, Diderot and Rousseau. *Staff.*

510,511 *French Literature of the Twentieth Century.* (3 ea.) I, II, S
A study of the modern writers starting with the Symbolist Group and continuing up to Camus. *Langlois.*

512 *Advanced French Conversation.* (2) I, II, S
A study of intonation and elocution in French. Three minute speeches in French will be prepared for each recitation. Some reading in French poetry will also be practiced. *Staff.*
May be repeated to a maximum of four credits.

513 *Tutorial Seminar for Majors in the Romance Languages.* (1) I, II
A survey of French literature from 1600 to the present. Required of all majors in French during the senior year. *Walker.*
May be repeated to a maximum of two credits.

516 *Introduction to Old French.* (3) I
An introduction to the study of early French, especially of the eleventh through the thirteenth centuries. Emphasis will be on understanding the language, with readings from selected literary works and discussion of Old French phonology and grammar. Prereq: 204-5. *Rea.*

517 *Introduction to the Linguistic Structure of French.* (3) I, II, S
An outline of the structure of spoken French along with an introduction to the pertinent concepts of descriptive and contrastive linguistics. *Rea.*

553 *The Teaching of Modern Foreign Languages.* (3) I, II, S
A course for teachers and prospective teachers of Spanish, French, or German. *Staff.*

601,602 *French Literature of the Renaissance.* (3 ea.) I, II, S
A course starting with François Villon and including such writers as Marot, Rabelais, Calvin, Montaigne, Ronsard, DuBellay, Belleau and Regnier. *Keating.*

603 *The Development of the French Language.* (3)
A history of the Phonology and Grammar of French from the origins to the present, with analysis and study of appropriate documents, literary and otherwise, to illustrate these developments, along with some introduction to the basic concepts of historical linguistics. Prereq: French 516.

604 *Medieval French Literature.* (3)
A thorough survey of the main genres and chief works of the Middle Ages in France, with a considerable amount of reading in Old French. Prereq: French 516.

606 *Studies in Bibliography and Research Methods.* (2) I, II
A course designed to serve the needs of students beginning graduate work in French by acquainting them with the tools of research. *Charron.*

610 *Romance Philology.* (3) I, II, S
Study of the historical development of the various Romance languages with reading of texts chiefly from the medieval period. Special attention will be given to historical phonology and morphology. *Rea.*
May be repeated to a maximum of six credits.

701 *Studies in French Literature of the Middle Ages.* (3) I, II, S
A general survey of the major literary genres in French Literature during the twelfth and thirteenth centuries, with special attention to one major type, work or author, and involving extensive reading in the texts of the period. *Hicks.*

702 *Seminar in the History of the French Language.* (3) I, II, S
A thorough presentation of the development of the French language with special attention to morphology and syntax and to developments since the middle ages. *Rea.*

704 *Seminar in The Classical Drama of France.* (3) I, II, S
Intensive study of one or more authors representative of this area of French literature. *Charron.*

705 *Seminar in The Classical Prose and Poetry of France.* (3) I, II, S
Intensive study of one or more authors representative of this area of French literature. *Charron.*

708 *Seminar in The Eighteenth Century Philosophical Movement in France.* (3) I, II, S
Intensive study of one or more authors representative of this area of French literature. *Staff.*

709. *Seminar in The Eighteenth Century Novel and Drama in France.* (3) I, II, S
Intensive study of one or more authors representative of this area of French literature. *Staff.*

710 *Seminar in French Romanticism.* (3) I, II, S
Intensive study of one or more authors representative of this area of French literature. *Staff.*

711 *Seminar in The French Realist Novel.* (3) I, II, S
Intensive study of one or more authors representative of this area of French literature. *Duncan.*

712 *Seminar in French Post-Romantic Poetry of the Nineteenth Century.* (2) I, II, S
Intensive study of one or more authors representative of this area of French literature. *Luszczynski.*

713 *Seminar in the French Naturalist Novel.* (2) I, II, S
Intensive study of one or more authors representative of this area of French literature. *Duncan.*

716 *Seminar in Contemporary French Drama.* (3) I, II, S
Intensive study of one or more authors representative of this area of French literature. *Staff.*

717 *Seminar in Contemporary French Poetry.* (3) I, II, S
Intensive study of one or more authors representative of this area of French literature. *Luszczynski.*

718 *Seminar in The Contemporary French Novel.* (3) I, II, S
Intensive study of one or more authors representative of this area of French literature. *Langlois.*

719 *La Littérature engagée: Malraux, Sartre, Camus, etc.* (3) I, II, S.
Intensive study of one or more authors representative of this area of French literature. *Langlois.*

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
May be repeated. *Staff.*

769 *Residence Credit for the Doctor's Degree.* (1 to 18 wks. residence)
May be repeated indefinitely. *Staff.*

778 *Seminar—Main Currents of Romance and German Literatures.* (3) II

A survey course which will attempt to give the student a comprehensive picture of the literary contributions that have been made through French, German, and Spanish cultures. (A reading knowledge of one foreign language required). *Duncan, Server, Whitaker.*

780 *Special Studies in French.* (3) I, II, S

Selected studies and investigations in the French language and literature, permitting the student to work in areas of special interest, and providing opportunity for original endeavor. Prereq: consent of dept. *Staff.*
May be repeated to a maximum of six credits.

GEOGRAPHY

520 *Regional Geography of Anglo-America.* (2) I, S

A regional study of the physical, economic, and cultural characteristics of the various areas of the United States, Canada, and Alaska. Prereq: one geography course. *Withington.*

522 *Geography of Kentucky.* (2) II, S

A study of how the people of Kentucky adjust themselves to the location, surface, climate, and other natural resources of their state. Prereq: one geography course. *Schwendeman.*

524 *Regional Geography of Latin America.* (2) I

Study of the countries and geographic regions of Mexico, Central America, and South America. Prereq: one geography course or permission of instructor. *Schwendeman.*

526 *Regional Geography of Europe.* (2) II

A study of Western Europe's major geographic regions, climate, soil, terrain, mineral, and biotic factors. Population problems, economic adjustments, and political significance of resources. Prereq: one geography course or permission of instructor. *Karan.*

528 *Regional Geography of Asia.* (2) I

A regional study of the countries of Asia including European U.S.S.R., China, Japan, and India. Role of the Orient in the international landscape. Prereq: one geography course or permission of instructor. *Karan, Withington.*

530 *Intermediate Field Studies.* (3) S

An intensive study of a particular geographic area with emphasis on such specific skills as recording data for map composition and report, and filling in a base map. Prereq: Geography 151 and 547 or 548 for Geography students, or permission of instructor for students offering field experience in allied subjects such as Geology. *Staff.*
May be repeated to a maximum of six credits.

534 *Regional Geography of Australia and the Pacific Islands.* (2) I

A study made of the geographic problems and adjustments of the peoples and countries of the Pacific area. Prereq: one geography course or permission of instructor. *Field.*

536 *Regional Geography of Africa.* (2) II

A study of Africa as a complete continent and not as an example of European imperialist policy; as a series of geographic regions. Prereq: one geography course or permission of instructor. *Field.*

538 *Conservation of Natural Resources.* (2) II

A general study of the needs for and problems of conserving the natural resources including the development of the conservation movement and resource use. Prereq: Geography 155 or permission of instructor. *McElhoe, Withington.*

540 *Geography of Urban Areas.* (2) II

A study of the location and growth of cities and urban communities in relation to environmental factors. Prereq: Geography 155 or permission of instructor. *McElhoe, Withington.*

542 *Geographical Foundation of World Power.* (2) I
The influence of such factors as location, size, form, surface, climate, and natural resources, on the rise and fall of nations. Consideration given to geopolitics. Prereq: one geography course or permission of instructor. *Schwendeman.*

521, 523, 525, 527, 529, 535, 537, 539, 541, 543. *Special Problems.* (1 ea.) I, II, S
Students registered in any two-credit upper division course in geography may earn a third credit in this course by registering for the special problems course related to the two-credit course. (A Special Problems course can be elected only by students regularly or previously enrolled in an upper division two-credit course.) *Staff.*

544 *Climatology.* (3) II
A study of the elements and controls of climate and of world climatic patterns. Prereq: Geography 151, Elements, or permission of instructor. *Karan.*

545 *Independent Work in Geography.* (3) I, II, S
Individual research involving such problems as: (a) materials and methods in teaching geography; (b) the historical evolution of geography; (c) map reading and interpretation; (d) special areas studies; (e) other topics may be elected by consent of instructor. Prereq: Major and a standing of 3.0 in the department. *Staff.*
May be repeated to a maximum of six credits.

547 *Cartography.* (3) I
A course in the construction and interpretation of maps. *Field.*

548 *Applied Cartography.* (3) II
Map compilation techniques as directed by Army Map Service specifications. Enrollment by permission. *Field.*

550 *Regional Geography of South Asia.* (3) II
A regional study of India, Pakistan, and the Himalayan Kingdoms with emphasis on politico-geographic, and socio-economic problems of the countries in the region. Prereq: One geography course or permission of instructor. *Karan.*

551 *Special Problems in Regional Geography of South Asia.* (1)
Designed for advanced students in Geography 550 who wish to undertake research problems on the geography of South Asia to be conducted in regular consultation with the instructor. Prereq: Can be taken only concurrently with Geography 550.

552 *Regional Geography of Southeast Asia.* (3) I
A study of the Southeast Asia region (between India-Pakistan to the west; China to the north; and Australia to the south) focusing on the politico-geographic, socio-economic, and resource potential problems of its countries. Prereq: One geography course or permission of instructor. *Withington.*

553 *Special Problems in Regional Geography of Southeast Asia.* (1)
Designed for advanced students in Geography 552 who wish to undertake research problems on the geography of Southeast Asia under the direction of the instructor through regular consultations. Prereq: Can only be taken concurrently with or after taking Geography 552.

560 *Regional Geography of the Caribbean.* (3) II
A regional study of Central America and the West Indies. Prereq: One Geography course or permission of instructor. *McElhoe.*

561 *Special Problems in Regional Geography of the Caribbean.* (1)
A regional study of Central America and the West Indies. Prereq: Independent reading in this field of geography. One geography course or permission of instructor.

650 *Regional Study of Special Areas.* (3) I, II, S

The application of the methods of regional interpretation to special areas such as the U.S.S.R., Mediterranean Basin, Caribbean Region, Mexico, Central Europe, etc. Prereq: A prior major or minor in Geography. *Staff.*
May be repeated to a maximum of six credits.

660 *Advanced Field Studies.* (3) S

Advanced field study and preparation of a report which shall include both manuscript and graphic material. Prereq: Geography 151, 547, or 548, and 530 for Geography students, or permission of instructor for students offering field experience in allied subjects such as Geology. *Staff.*
May be repeated to a maximum of six credits.

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)

Staff.
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis.

770 *Seminar—Development of Geographic Thought.* (3) II

This course will consist of a series of topics selected in order to acquaint the graduate students of geography or related subjects with the basic literature and evolution of the broad field of geography. *Staff.*

GEOLOGY

400 *Geology of Kentucky.* (3)

A study of the geological features of the state. These include the major events in its geological history, the development of regional characteristics, an explanation of its scenic and natural wonders, and its mineral resources. *McFarlan.*

500 *Paleontology.* (3) I

A study of fossil invertebrates, their nature, classification, and geological distribution. One lecture, four hours laboratory per week. Prereq: Geology 210, 211; and general zoology, or background in zoology. *Campbell.*

501 *Paleontology.* (3) II

The study of geological faunas. Practice in determining stratigraphic horizons. One lecture, four hours laboratory per week. Prereq: Geology 500. *McFarlan.*

502 *Economic Geology.* (4)

Mineral deposits other than petroleum and natural gas. Distribution, mode of occurrence, origin, methods of search for, and uses. Prereq: Geology 210, 211, 212, 213. *Brown.*

503 *Petroleum Geology.* (2)

The origin and accumulation of petroleum and natural gas. A study of geological methods used in exploratory work. Geology of the principal producing fields. Prereq: Geology 210, 11; and general elementary physics. *Roberts.*

504 *Elementary Petrology.* (3)

A megascopic study of the common rocks with emphasi: on the sedimentary rocks. *Fisher.*

505 *Elementary Structural Geology.* (3)

An introduction to earth structures. Advanced geological map interpretation. *Nelson.*

506 *Advanced Principles of Geology.* (4)

A general study of geological processes. Lecture, three hours; lab, one hour conference. Prereq: Restricted to senior major students in geology or by permission of the instructor. *Fisher.*

520,521,522,523 *Advanced Field Geology.* (2 ea.) I, II

A field course in geological mapping involving problems of local structure and stratigraphy. Six hours a week in the field. Prereq: Geology 220. *McFarlan.*

524,525 *Field Work in Regional Geology.* (7 ea.) S
Eight weeks in the field in Colorado. The course is an effort to bring the student into contact with diverse geological phenomena and problems. Geological field methods. See special announcement. Required of major students. Prereq: Geology 210, 211. *Lyons.*

526,527 *Report on Field Work in Regional Geology, 524.* (1 ea.)
Lyons.

530,531 *Seminar.* (1 ea.)

532 *Independent Work in Geology.* (3)
Directed work in independent investigations. Thesis required.
May be repeated to a maximum of twelve credits.

540 *Geochemistry.* (3)
An introduction to element distribution and chemical reactions in geologic systems. Prereq: GLY 213, MA 113, or consent of instructor.

541 *Geochemistry.* (3)
An introduction to chemical reactions and equilibria in geologic systems. Prereq: GLY 540.

550 *Hydrogeology.* (3)
An introduction to hydrologic processes in geology. Prereq: GLY 104 or 200, MA 113, or consent of instructor.

600 *Structural Geology.* (3)
A study of the structural features of the earth's crust with an analysis of the mechanics involved. Three lectures and recitations, or two lectures and one laboratory per week. Prereq: Physics 211, 213, Geology 505 and 506. *Nelson.*

601 *Stratigraphy.* (3) I
Regional stratigraphy and problems of correlation. Succession of faunas and the use of fossils for stratigraphic correlation. Lecture, two hours; laboratory, two hours. *McFarlan.*

602 *Stratigraphy.* (3) II
A continuation of 601. Lecture, two hours; laboratory, two hours. *McFarlan.*

603 *Optical Mineralogy.* (3)
A study of the optical properties of minerals, in thin sections by means of the petrographic microscope. One lecture, four hours laboratory per week. Prereq: Geology 212, 213 and Physics 211, 213. *Brown.*

604 *Sedimentary Petrology.* (3)
The classification and interpretation of sedimentary rocks with emphasis on those aspects which relate to the occurrence of petroleum. *Roberts.*

605 *Petrology of the Igneous Rocks.* (3)
The occurrence, origin and classification of igneous rocks. An introduction to the metamorphic rocks. One lecture, four hours laboratory per week. Prereq: Geology 603. *Brown.*

606 *Advanced Economic Geology.* (3)
Lecture, two hours; laboratory, two hours. Prereq: Geology 502. *Nelson.*

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
Staff.
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis.

770 *Seminar.* (1)
May be repeated to a maximum of four credits.

GERMANIC AND CLASSICAL LANGUAGES AND LITERATURES

CLASSICS

The program in Classics requires as a prerequisite for the master's degree 18 semester credits (or the equivalent) in the area of Greek, Latin, or ancient civilization. Students having a deficiency will consult the Director of Graduate Study for a program that will make up this deficiency.

The master's degree is offered in three areas: (1) Latin, (2) Greek, and (3) ancient languages and civilizations. Both Plan A and Plan B are available.

LATIN

509,510 *Latin Literature.* (3 ea.) I, II, S
Courses in various authors, periods, or types to suit the needs of the class. Prereq: 12 semester hours of Latin.

511,512 *Studies in Latin Philology.* (3 ea.) I, II, S
Courses to meet the needs of students in various areas of Roman philology, *e.g.*, in Latin literature, in Roman civilization, in Latin linguistics, etc. Prereq: permission of instructor.

514,515 *Latin Composition.* (1 ea.) I, II, S
The writing of Latin prose of moderate difficulty. Prereq: permission of instructor.

521 *Roman Civilization.* (2) II, S
Topics in the political, social, economic, and cultural life of ancient Rome down to Justinian, with special reference to the relation to modern life. No knowledge of Latin necessary.

530 *The Teaching of Latin.* (3) II, S
The place of Latin in general education. Developments in the teaching of Latin. The reading approach to learning Latin. Evaluation of textbook and other teaching materials.

Note: See also "Classics in General" below.

GREEK

520 *Greek Civilization.* (2) II, S
Topics in the political, social, economic, and cultural life of ancient Greece, with special reference to the relation to modern life. No knowledge of Greek necessary.

556 *Greek Tragedy.* (3) I
Selected plays from Aeschylus, Sophocles, and Euripides. Lectures on Greek tragedy and its effect on the Western World. Prereq: 12 semester hours of Greek.

559 *Greek Comedy.* (3) II
Selected plays of Aristophanes. Lectures on Greek comedy and its effect on the Western World. Prereq: 12 semester hours of Greek.

561,562 *Studies in Greek Philology.* (3 ea.) I, II, S
Courses to meet the needs of students in various areas of Greek philology, e.g., in Greek literature, in Greek civilization, in Greek linguistics, etc. Prereq: permission of instructor.

652 *The Greek of the New Testament.* (3) I, II, S
Class and/or individual work to suit the needs of the students. Reading and research to suit the needs of the student. Prereq: 12 semester hours of College Greek.

Note: See also "Classics in General" below.

SEMITICS

574 *Isaiah.* (3) I
Selections with attention to the literary, historical, and general cultural background. Prereq: 12 semester hours of Hebrew or permission of instructor.

575 *The Psalms.* (3) II
Selections with attention to the literary, historical, and general cultural background. Prereq: 12 semester hours of Hebrew or permission of instructor.

576,577 *Studies in Semitics.* (3 ea.) I, II
Courses to meet the needs of students in various areas of Semitics, *e.g.*, in literature, in civilization, in linguistics, etc.

Note: See also 580 under "Classics in General" below.

CLASSICS IN GENERAL

524 *Greek Literature in Translation.* (3) I
Extensive reading in the most important works. Discussion of the significance of the works in their own and later times to the present. No knowledge of Greek necessary. *Thompson.*

525 *Latin Literature in Translation.* (3) II
Extensive reading in the most important works. Discussion of the significance of the works in their own and later times to the present. No knowledge of Greek necessary. *Thompson.*

580 *Independent Work in Ancient Languages.* (3) I, II, S
Courses to meet the needs of the student will be arranged in various areas. Prereq: Permission of instructor.
May be repeated to a maximum of twelve credits.

632 *Comparative Greek and Latin Grammar.* (3) I, II, S
Studies and research in comparative linguistics, historical syntax, semantics, and other aspects of linguistics in the Greek and Latin area. Prereq: Necessary command of languages involved.

633 *Intensive Study of an Author.* (3) I, II, S
Studies and research in the work of an author (*e.g.*, Plato, Aristotle, Lucretius, Caesar, Ovid, or Horace): sources, milieu, purposes, language, and his influence on later periods. Prereq: Necessary command of languages involved.

636 *Intensive Study of a Period.* (3) I, II, S
Studies and research in a period (Age of Pericles, Hellenistic Age, Ciceronian Age, Augustan Age, Silver Age, Christian Latin, or Medieval Latin): literary, social, and linguistic trends, sources, and influence on later periods. Prereq: Necessary command of languages involved.

637 *Intensive Study of a Literary Genre.* (3) I, II, S
Studies and research in a genre (lyric, epic, tragedy, comedy, satire, history, or the novel) in the ancient world, with some attention to its effect on later periods. Prereq: Necessary command of languages involved.

638 *The Transmission of Classical Texts.* (3) I, S
Preservation and transmission of Greek and Latin texts. Introduction to epigraphy and palaeography. Introduction to the history of Classical scholarship. Prereq: Reading knowledge of Greek and Latin. *Thompson.*

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
Staff.
May be repeated. Maximum of nine weeks can be applied toward master's degree with the

790 *Research in the Teaching of Classical Languages.* (3) I, II, S
Research may be done (with reference to secondary and/or higher education) in methods, in preparation of materials, in curricula, or in the place and history of classical study in education. Prereq: CL 150.

GERMAN

522,523 *Advanced Scientific German.* (3 ea.) I, II, S
This course is designed for students of the Physical and Biological Sciences. Reading is done in recent German scientific journals and books, the material being selected in line with the student's special interest. *Whitaker.*

Proseminars in German Literature.
A balanced selection of works from one representative author of a century will be studied in each course, and written reports will be assigned on various subjects related to his writing.
The purpose of the proseminar course is threefold: (1) Study of a representative author and certain of his works in their relation to his period; (2) Acquaintance with basic works of the author; (3) Training in simple research projects and proper form in the writing of papers.

524 *Proseminar in Kleist.* (3) I
Whitaker.

525 *Proseminar in Hauptmann.* (3) II
Binger.

526 *Proseminar in Schiller.* (3) I
Staff.

527 *Proseminar in Grillparzer.* (3) II
Whitaker.

528 *Proseminar in 20th Cent. German Prose.* (3) I
Staff.

529 *Proseminar in Lessing.* (3) II
Staff.

530 *Proseminar in Hebbel.* (3) I
Whitaker.

531 *Proseminar in 20th Cent. German Drama.* (3) II
Goff.

532 *The German Lyric.* (3) II
An intensive study of the German lyrical poem from the Age of the Baroque to the present. *Goff.*

534,535 *Life and Works of Goethe.* (3 ea.) I, II, S
This course follows the unfolding of Goethe's genius from his first lyrics through Faust. His principal literary works will be read and attention devoted to autobiographical material, letters and diaries. *Staff.*

536 *Origin and Development of the German Language.* (3) I, II
This course in Germanic Philology acquaints the student with the position of German in the European language group and traces the development of the language to the present. Special emphasis is given to the relationship of German and English words. *Binger.*

537 *Introduction to Middle High German.* (3) I, II
This is a literary course with a necessary minimum of Middle High German grammar. Selections will be read from epic and lyric poetry of the period and reports will be given on assigned topics. *Binger.*

538 *Advanced German Conversation and Composition.* (3) I, II
This course is primarily for German majors. It involves intensive practice in speaking and writing German prose, with some review of German grammar.

539 *Structure of the German Language.* (3) II
An introduction to the phonology, morphology and syntax of modern German by means of concepts and methods of linguistic science. *Staff.*

553 *The Teaching of Modern Foreign Languages.* (3) S
A course for teachers and prospective teachers of Spanish, French, or German. *Staff.*

621 *Introduction to German Bibliographical Studies.* (2) I
An introduction to bibliography, original research, and textual criticism. *Stapf.*

622 *Theories of Literature in German.* (2) II
An introduction to theories of literature with emphasis upon those of Germany and continental Europe. *Stapf.*

623 *Medieval German Literature.* (3) I, II
A survey of the literature of the Middle High German period, with special attention to one major genre or author, and involving extensive readings in the texts of the period. *Staff.*

624 *German Literature of the 16th and 17th Centuries.* (3) I, II
A survey of the major literary documents of the German Reformation, Renaissance, and Baroque, with extensive readings in the texts of the period. *Staff.*

625 *German Enlightenment and Pre-Romanticism.* (3) I
A survey of the literary themes and forms of the *Aufklärung* and *Sturm und Drang*, with special emphasis on selected aspects of German letters of the period 1700-1775. *Staff.*

626 *The Age of Goethe.* (3) II
An intensive study of the literature and cultural development of Germany during the Classical and Romantic periods (1780-1832). *Stapf.*

627 *German Drama of the 19th Century.* (3) I
This course is a study of the German Drama from Schiller's "Die Braut von Messina" to 1870. *Whitaker.*

628 *The German Novelle.* (3) II
This course traces the origin and development of the German Novelle from Goethe to Thomas Mann. *Whitaker.*

630,631 *20th Century German Literature.* (3 ea.) I, II
Extensive readings, discussions and comprehensive reports on the leading literary minds and movements of this century. *Goff.*

635 *Gothic.* (3) I
Readings; phonology and morphology of Gothic. *Staff.*

636 *Old High German.* (3) II
Readings; phonology, morphology, and dialects of Old High German. *Staff.*

770 *Seminar in Earlier German Literature.* (2) I
Intensive study of a single topic from German literature (1100-1700). *Staff.*
May be repeated once for credit.

771 *Seminar in 18th Century German Literature.* (2) I
Intensive study of a single topic from German literature of the 18th century. *Staff.*
May be repeated once for credit.

773 *Seminar in 19th Century German Literature.* (2) II
Intensive study of a single topic from German literature of the 19th century. *Staff.*
May be repeated once for credit.

774 *Seminar in 20th Century German Literature.* (2) II
Intensive study of a single topic from German literature of the 20th century. *Staff.*
May be repeated once for credit.

775 *Seminar in Germanic Philology and Linguistics.* (2) I, II
Intensive study of a single area in the field of Germanic philology and linguistics. *Staff.*
May be repeated once for credit.

778 *Seminar—Main Currents of Romance and German Literatures.* (3) II
A survey course which will attempt to give the students a comprehensive picture of the literary contributions that have been made through French, German, and Spanish cultures. (A reading knowledge of one foreign language required.) *Whitaker, Duncan, Server.*

781 *Special Studies in German.* (3) I, II, S
Selected studies and investigations in the German language and literature, permitting the student to work in areas of special interest, and providing opportunity for original endeavor. *Staff.*
May be repeated to a maximum of six credits.

HISTORY

THE MASTER'S DEGREE WITH A MAJOR IN HISTORY

Students should submit evidence of good undergraduate preparation in history. In general, an undergraduate major or the equivalent is recommended.

Unity of purpose and coherence in planning the program are essential. At least one course should be of the seminar type, with some training in methods of graduate study.

Of the total number of graduate hours, two-thirds will be required in history when a minor is offered in addition to the thesis.

An acceptable thesis which conforms to sound rules of historical research is required of every candidate. This thesis should indicate knowledge of sources, synthesis and bibliography. An examination will include courses, thesis topic, and generally related materials.

THE DOCTORATE WITH A MAJOR IN HISTORY

Those who seek the doctorate in history should follow carefully the general directions governing the subjects of residence and courses as stated in the first part of this Bulletin.

The *applicant* does not become a candidate until he has satisfied the language requirements, passed the qualifying examinations and has been approved by the Graduate School.

All further work for the doctorate in history is under the direction of a committee composed of members of the staffs of the candidate's major and minor departments appointed by the Dean of the Graduate School. The chairman will be the major professor under whose direction the candidate expects to write his dissertation. The student should consult this person at his earliest conven-

ience. This committee with the student will outline his course of study, advise with him throughout his residence, conduct the comprehensive examination, and generally supervise the writing of his dissertation.

The candidate must submit to examination in four fields in at least three areas of history and in one minor field.

Area I. Ancient and Medieval
- a. Ancient History
- b. Medieval History to 1500

Area II. Modern Europe
- a. Europe from 1500 to 1815
- b. Europe since 1789

Area III. Regional Fields
- a. British and British Empire History since 1485
- b. Russia
- c. Latin America
- d. Far East
- e. Near East*

Area IV. American History
- a. United States History to 1865
- b. United States History since 1865

Area V. Minor Field

I. EUROPEAN HISTORY

490 *Modern Europe.* (3)
This course is offered to meet a demand for a broader course which will equip students who are going out to teach European history in the present high school curriculum. Prereq: History 104 and 105.

500 *Pre-Classical and Classical Greece.* (3)
A history of Greece from earliest times to the end of the Peloponnesian War.

501 *Fourth Century Greece and the Hellenistic World.* (3)
A history of Greece and the Greek world from the end of the Peloponnesian War to the Roman conquest of Egypt.

502 *A History of the Roman Republic.* I (3)
A history of Rome from earliest times to the fall of the Republic. Emphasis will be placed upon the territorial expansion of Rome and the effects of this expansion on republican institutions.

503 *A History of the Roman Empire II.* (3)
A study of the foundation of the Roman Empire, the development of Imperial institutions, social and intellectual developments of the Graeco-Roman world, the decline of Rome and the barbarian invasions of the fourth century.

510 *Medieval Civilization to 1100.* I (3)
The formation of a new civilization—our own—in Western Europe between the decline of the Roman Empire and the First Crusade is the central stress in this study of the cultural interests and achievements of the period 300-1100. Prereq: History 270 or consent of instructor.

511 *Medieval Civilization since 1100.* II (3)
Medieval culture at its height (1100-1350), with emphasis upon Latin and vernacular literatures, the fine arts, philosophy, and science. Prereq: History 271 or consent of instructor.

513 *Medieval Institutions.* II (3)
A study of the legal and political institutions and ideas of continental medieval Europe, exclusive of the Church. Prereq: History 270-271 or consent of instructor.

520 *The Renaissance and Reformation.* (3) I
This course is designed for a study of the birth of modern spirit and institutions.

521 *The Age of Absolutism.* I (3)
A study of the development of absolute monarchies from Louis XIV; the European rivalries at home and abroad; benevolent despotism, and the Age of Enlightment. Prereq: History 104 or equivalent.

522 *The French Revolution and Napoleon.* (3)
A study of the period 1789-1815 in Europe, treating of the appearance and manifestation of the spirit of revolt. Conditions in France and adjoining nations, the evolution of France from 1774 to 1795, and changes under Napoleon.

523 *Europe 1814-1870.* (3)
This course treats the successive political changes in 1823, 1830, 1848, and 1870, together with the outstanding commercial, cultural, and scientific developments of European life after 1815.

524 *Europe, 1870-1918.* (3)
A balanced treatment of the political, social, cultural, economic, and intellectual life of Europe in the period indicated. Special emphasis placed on diplomatic and military developments leading to the first World War.

525 *Europe since 1919.* (3)
A study of the origins and consequences of the two World Wars together with the revolutionary movements of fascism and communism and their challenge to liberal democracy.

528 *Cultural History of Seventeenth Century Europe.* (3)
A history of the development of culture in Western and Southern Europe in various fields.

529 *Cultural History of 18th Century Europe.* (3)
This course is designed to give a survey of European culture during the 1700's treating the sciences, literature, history, philosophy, the fine arts, and the industrial arts.

530 *Social History of Europe in the 18th Century.* (3)
A study of the life and manners of the people of Europe in the 1700's. Special attention will be given to Western and Southern Europe.

534 *Russian Revolutions and the Soviet System.* I (3)
Study of the fundamental factors leading to the collapse of the monarchy, with emphasis upon the reforms and the governmental policies, their short-comings, and the pressures of discontent that generated revolutionary movements. Prereq: History 104, 105 or 285, 286.

535 *Russian Revolutions and the Soviet System.* II (3)
A continuation of 534, this course examines the ideological bases and *raison d'etre* of the Soviet state, before undertaking analyses of those conditions and policies which have molded the totalitarian system during the past four decades. Prereq: History 104, 105 or 285, 286.

536 *History of Russian Social and Political Thought, 1879-1914.* (3)
A study of the significant trends and concepts which evolved among the Russian intelligentisa is undertaken, with particular attention given to those ideas and doctrines which gave direction to revolutionary movements in Russia. Prereq: History 534 and 535 or consent of the instructor.

538 *Political and Diplomatic History of East Central Europe from the French Revolution to the End of World War I.* (3)
A survey of the major factors and events which conditioned the political life and identity of the predominantly Slavic peoples inhabiting the region from Poland south to the Balkans, excluding the Eastern Slavs. Prereq: History 104, 105 or consent of the instructor.

539 *Political and Diplomatic History of East Central Europe since World War I.* (3)
A comparative study is made of the political institutions and policies of these states located in the north-south corridor stretching from the Baltic to the Aegean-Adriatic Seas, their intra-regional relations and roles in European diplomacy. Prereq: History 104, 105 or consent of the instructor.

542 *German History, 1815-1914.* (3)
This course is designed as a study of domestic development in Germany. While political history is emphasized, due consideration is given to social, economic and intellectual trends. Prereq: History 104-105 or consent of instructor.

543 *German History since 1914.* (3)
Examines the fall of Imperial Germany, the Weimar Republic, Hitlerian period, and the post 1945 era. The course is primarily concerned with internal affairs, but attention is directed to the international scene when crucial. Prereq: History 104-105 or consent of instructor.

II. ENGLAND AND THE BRITISH EMPIRE

550 *English Constitutional History to 1603.* (3)
A study of the backgrounds of the English constitution. Prereq: History 202 or equivalent.

551 *English Constitutional History since 1603.* (3)
A continuation of History 550. The constitutional struggle between the Stuart kings and Parliament; triumph of constitutional monarchy; rise of the Cabinet; effect of democracy in recent times. Prereq: History 203 or equivalent.

552 *British Social History During the Tudor Period, 1485-1603.* (3)
A study of British life, manners, and customs in town and country. Particular emphasis will be placed upon the age of Elizabeth, with political events subordinated to social changes. Prereq: History 202.

554 *British History since 1870.* (3)
A detailed study of Britain's political, social, diplomatic and industrial development during the recent period. Special consideration will be given the part played by Britain in World War I and World War II and to her position in the contemporary world.

556 *The British Empire to 1860.* (3)
Origin of the British Empire, 1783 to 1860; development of British sea power; the early growth and development of Canada, Australia, New Zealand, South Africa, and India.

557 *The British Empire and Commonwealth.* (3)
A continuation of 556. Great Britain and the growth of the Dominions and the Commonwealth since 1860.

558 *History of Canada.* (3)
A brief survey of Canada under the French; the development under British control; evolution of the Dominion; relation with the United States and British Commonwealth of Nations. Prereq: One year of college history.

III. AMERICAN HISTORY

560 *Colonial America to 1748.* (3)
A study of the origins and development of the English colonies; their relations with England and European states. Emphasis on imperial policies and colonial autonomy. Prereq. One year of American or European History.

561 *Colonial America and Independence, 1748-1789.* (3)
This course deals with America's triumph over France in the New World, the drastic change in her colonial policy, and the rise of opposition to it, the war for American independence, and the establishment of the United States under the Constitution.

562 *The New Nation, 1789-1828.* (3)
An intensive study of the most significant men, events, and trends in the first generation of American national growth. Prereq: History 108.

563 *Expansion and Conflict, 1828-1865.* (3)
A study of the territorial expansion of the United States and the growth of sectional controversy over expansion and slavery, culminating in the Civil War.

564 *Emergence of Modern America, 1865-1912.* (3)
A study of the transformation of America from a rural society "isolated" from world affairs into a highly industrialized power. Prereq: History 108 and 109 or equivalent.

565 *Recent History of the United States, 1912-1939.* (3)
An intensive study of the problems of maturing America from the election of 1912, through World War I, depression, and the New Deal to our involvement in World War II.

566 *Recent History of the United States since 1939.* (3)
An intensive study of the development and maturation of the United States from World War II to the present synthesizing military, diplomatic, social, economic, political and cultural changes.

568 *Cultural and Intellectual History of the United States to 1865.* (3)
An interpretive analysis of the growth of ideas in the United States within their cultural setting before 1865. Prereq: History 108 or consent of instructor.

569 *Cultural and Intellectual History of the United States since 1865.* (3)
An interpretive analysis of the growth of ideas in the U. S. within their cultural setting since 1865. Prereq: History 109 or consent of instructor.

574 *The Diplomacy and Foreign Policy of the United States to 1919.* (3)
A survey designed to acquaint the student with the principles of American foreign policy and its historical evolution. Prereq: History 108 or equivalent.

575 *The Diplomacy and Foreign Policy of the United States since 1919.* (3)
A continuation of 574. Foreign policy after the United States became a world power. Prereq: History 109 or equivalent.

576 *The American Frontier.* (3)
A course dealing specifically with American westward expansion. Prereq: History 108 and 109 or equivalent.

577 *The American Frontier.* (3)
A continuation of 576. It will consider the Trans-Mississippi West.

578 *History of the Old South.* (3)
A study of the colonial beginnings and expansion of southern life, economics, and society. The growth of slavery, staple agriculture, and sectional politics will constitute the major interest. Prereq: History 108.

579 *History of the New South.* (3)
The evolution of southern life and society, agrarian politics, relationships with other sections, industrial growth, and new leadership.

584 *Economic History of Latin America since Independence.* (3)
Course emphasizes Latin American efforts in the 19th and 20th centuries to promote economic and social development, the problems encountered, the role of foreign investments and diplomatic pressures, and more recently, the economic factors in Latin American social revolutions. Prereq: 208 and 209; or ECO 102 or 103, or approval of instructor.

587 *Twentieth Century Latin American Revolutions.* (3)
An historical and comparative approach to Latin American social revolutions that have greatly influenced political movements in other Latin American countries. Prereq: History 208, or 209, or Political Science 265 or 501 or consent of instructor.

IV. THE FAR EAST

590 *Japanese History to 1600.* (3)
A broad survey of the political, social, economic, and intellectual history of Japan from earliest times to the "unification" of Japan under Hideyoshi. Prereq: History 104 or equivalent.

591 *Japanese History since 1600.* (3)
A continuation of History 590 from 1600 to the present. Prereq: History 105 or equivalent.

592 *Diplomatic History of the Far East since 1787.* (3)
A study of the international relations between China, Japan, and Korea and their relations with the major Western Powers. Prereq: History 105 or consent of instructor.

593 *Far Eastern History since World War II.* (3)
A study of the revolutionary, political, economic, and social changes occurring in China, Japan, and Korea in the aftermath of World War II. Important political and institutional developments and their relation to pre-war trends will be emphasized. Prereq: History 105 or consent of instructor.

INDEPENDENT WORK

549 *Independent Work.* (1 to 3)
Under special conditions selected students may investigate problems, with weekly reports to the instructor. Prereq: major and standing of 3.0 in history and consent of instructor. May be repeated for a maximum of 6 credits.

COURSES IN THE 600 GROUP

These seminars emphasize method and bibliography. Two class hours and one conference hour.

600 *European Historiography.* (3)

603 *American Historiography.* (3)

606 *Historical Criticism.* (3)
Required of every entering graduate student who has not had an equivalent course.

611,612 *Readings in Ancient History.* (3 each)
An intensive study of the bibliography of Greek and Roman History, primary (in translation) and secondary, criticism and analysis of selected books, and of recent articles in professional journals. Prereq: consent of instructor.

613,614 *Readings in Medieval History.* (3 each)
A course designed to provide systematic and extensive reading over broad areas of the period indicated, to acquaint the student with the standard source materials and literature of the field, and to provide opportunity for critical discussion of outstanding issues. Prereq: an undergraduate course in Medieval History.

621,622 *Readings in European History 1500-1815.* (3 each)
Courses designed to provide systematic and extensive reading over broad areas of the period indicated, to acquaint the student with the standard source materials and literature of the field, and to provide opportunity for critical discussion of outstanding issues. Prereq: an undergraduate course in European History.

623,624 *Readings in European History since 1815.* (3 each)
Courses designed to provide systematic and extensive reading over broad areas of the period indicated, to acquaint the student with the standard source materials and literature of the field, and to provide opportunity for critical discussion of outstanding issues. Prereq: an undergraduate course in European History.

625,626 *Readings in British and British Empire History.* (3 each)
An intensive study of the bibliography of British and British Empire History, primary and secondary, with readings, analyses and criticisms of selected titles in the literature of the field and of recent published research in the professional journals. Prereq: an undergraduate course in British History.

631,632 *Readings in United States History to 1865.* (3 each)
Courses designed to provide systematic and extensive reading over broad areas of American History in the period indicated, to acquaint students with source materials and the secondary literature of the field, and to provide opportunity for critical discussion of books and issues. Prereq: an undergraduate course in American History.

633,634 *Readings in United States History since 1865.* (3 each)
Courses designed to provide systematic and extensive reading over broad areas of American History in the period indicated, to acquaint students with source materials and the secondary literature of the field, and to provide opportunity for critical discussion of books and issues. Prereq: an undergraduate course in American History.

637,638 *Readings in Latin American History.* (3 each)
Supervised reading at the graduate level of a select topical bibliography covering the main themes of colonial Latin American history or the modern period. Prereq: History 208 and 209 or consent of instructor.

COURSES IN THE 700 GROUP

Seminars—basically research in character. These are not content courses. They provide special training in historical research (collection and critical analysis of bibliography, note-taking and organization of materials, and the presentation of a properly documented research paper). Topics will be chosen in keeping with the interests of the professors in charge. Two class hours and one conference hour. Any of these seminars may be repeated for a maximum of nine credits.

700 *Special Problems in History.* (3)
Visiting professors will conduct research seminars in topics or problems in which they have special research interests. Prereq: at least one year of graduate study in History.

705 *Seminar in Ancient History.* (3)
Select topics in Greek and Roman history, with an intensive study of a particular area or aspect of the ancient world. Prereq: reading knowledge of at least one ancient language and one modern foreign language, or consent of instructor.

706 *Seminar in Medieval History.* (3)
Directed research on a common problem. Prereq: Latin and one modern European language.

710 *Seminar in American History.* (3)

715 *Seminar in Latin American History.* (3)
This seminar course will consider special problems encountered in the study of Latin American History. Prereq: History 208, 209, 584 or consent of instructor.

720 *Seminar in Modern European History.* (3)

730 *Seminar in Modern British History.* (3)

740 *Seminar in Kentucky History.* (3)
The development of Kentucky as a Western commonwealth, with emphasis on economic and political phases from the 18th century to the present, with writing of papers based upon research among documents and other source materials.

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis.

769 *Residence Credit for the Doctor's Degree.* (1 to 18 wks. residence)
May be repeated indefinitely.

HISTORY OF EDUCATION (*See Education—Foundations of*)

HYGIENE AND PUBLIC HEALTH

Requirements for the Degree of Master of Science in Public Health

(See also pages 18-20.)

Students holding a bachelor's degree from a fully accredited institution or the M.D. degree from a recognized Medical School may obtain the degree of Master of Science in Public Health by satisfying the following requirements:

1. Twenty-four semester hours in graduate courses with an average standing of 3.0 or better.
2. No grade below C may be counted.
3. Thirty-six weeks in residence.
4. An acceptable thesis.
5. There is no language requirement for this degree.

500 *Public Health.* (3) I, S
A consideration of environmental sanitation and its relationship to the control of preventable diseases. *Hamilton.*

501 *Public Health.* (3) II, S
A survey of the various fields of public health; introduction to administration and organization of public health agencies. *Heinz.*

510 *Health Education.* (3) II, S
A course dealing primarily with principles of health education, health service, and health protection. *Heinz.*

511 *Independent Work in Hygiene and Public Health.* (3) I, II, S
May be repeated to a maximum of twelve credits. *Staff.*

515 *Communicable Diseases.* (3) I, S
A study of communicable diseases with reference to causal agents, transmission, and methods of control and prevention. Prereq: Microbiology 200 or equivalent. *Hamilton.*

520 *Mental Hygiene.* (3) I, II, S
An introduction to mental hygiene including a consideration of the cause, treatment, and prevention of mental disorders. *Staff.*

522 *School and Community Health.* (2) I, S
A study of the cooperative nature of school health service with regard to the community resources that may be utilized in health care. *Heinz.*

550 *Problems in Health Education.* (2) I, S
An individual problems course for majors in Public Health, teachers, and public health workers. *Staff.*

552 *Problems in Health Education.* (2) II, S
Individual problems of public health importance not covered or assigned in Hygiene 550. *Staff.*

600 *Epidemiology.* (3) I, II, S
A survey of the principles and methods of epidemiology. *Hamilton.*

603 *Public Health Records.* (2) I, II, S
A survey of the systems used in the registration, compilation, and preservation of public health records. *Heinz.*

604 *Maternal and Child Health.* (2) I, S
A study of the principles of maternal, prenatal, infant and child care. *Staff.*

612 *Public Health Administration.* (3) I, S
A consideration of the current organization and administrative practices of official and voluntary public health agencies. *Heinz.*

613 *Public Health Administration.* (2) II, S
A continuation of Hygiene 612. *Heinz.*

618 *Vital Statistics.* (3) I, S
Sources of statistical data; application of the statistics of population, births, deaths, etc. in Public Health. *Staff.*

619 *Vital Statistics.* (2) II, S
A continuation of Hygiene 618. *Staff.*

625 *County Health Practice.* (3) I, II, S
Staff.

626 *County Health Practice.* (2) I, II, S
Staff.

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
Staff.
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis.

770 *Seminar* (1) I, II, S
Staff.

JOURNALISM

The School of Journalism offers a graduate program leading to the Master of Arts degree in Communications. It is designed to serve the needs of students with varied goals and backgrounds. Goals may include professional work in journalism and related communications areas, teaching, research, or a combination of these. It is open to students with undergraduate degrees in journalism and other academic areas. Students with no previous work in journalism will be required to take from 5 to 10 hours in undergraduate work without graduate credit.

From 15 to 24 of the required hours of graduate credit will be taken in communications courses. Students will take the rest of their work in other divisions of the University.

Students can elect, with the approval of their adviser, to work under Plan A or Plan B as described in this bulletin. Students primarily interested in communications research would normally follow Plan A which consists of 24 hours of course work plus a thesis. The course work will include 12 hours of communications core work and related courses in communications and other areas of the University. Students electing to follow Plan B will take 30 hours of course work consisting of 12 hours of communications core work, plus 3 to 12 hours of communications options and 6 to 15 hours of options in some other area of the University.

501 *News Reporting.* (3) I, II
A reporting course which emphasizes special fields of information, news gathering, and news evaluation. *Thorp.*

503 *Copyreading and Editing.* (3) I, II
Instruction and practice in newspaper deskwork. Preparation of local, state, telegraph, and features; picture editing, and page makeup. Lecture, one hour. Prereq: Journalism 501. *McCauley.*

504 *Laboratory to Accompany 503.* (0)
Four hours.

507 *Feature Writing.* (3) I, II
Instruction and practice in writing features. Lectures, readings, and reports directed toward discovering, gathering, organizing, writing, and marketing feature articles. Prereq: permission of School. *Moore.*

509 *Magazine Article Writing.* (3) II, S
Lectures, personal conferences and practice in writing and submitting material for publication in magazines; study of the markets for this material; free-lance article writing. Prereq: permission of School. *Moore.*

511 *Editorial Writing.* (2) I, II
A study of editorials, editorial columns, and editorial pages. Publication of copy encouraged. Prereq: Journalism 203. *McCauley.*

513 *Supervision of High School Publications.* (1-3) S
A study of the problems that confront the adviser of the high school newspaper or magazine. Open to advisers or prospective advisers with consent of the instructor. *Ashley, McCauley.*

531 *Law of the Press.* (2) II
A study of the special laws of libel, copyright, and regulatory provisions that pertain to the press. *Plummer.*

533 *Influence of the Newspaper.* (3) I, II, S
A course devoted to the examination of criticism of the modern press and an evaluation of the influence of the press in the twentieth century. Prereq: permission of School. *Moore, Donohew.*

535 *History of Journalism.* (3) II
A study of the rise and development of American journalism and newspaper. Prereq: permission of School. *Thorp.*

537 *Seminar in Public Opinion.* (3)
A detailed examination of techniques developed and used by the press in influencing public opinion. Specific cases studied. Prereq: permission of School. *Moore.*

539 *Reporting Public Affairs.* (3) II
Instruction and practice in reporting the news originating in courts and other public institutions. Prereq: Journalism 501 and permission of School. *McCauley.*

541 *Public Relations.* (3) II, S
Lectures and practice dealing with the aims and methods of writing news and special articles for public relations programs of business, schools, colleges, libraries, and of the social service organizations. *McCauley.*

551 *Process and Effects of Mass Communications.* (3) II
Considers the communications process and effects of mass communications on the individual. Draws upon research in these areas from the fields of political science, psychology, sociology, journalism, and mass communications. *Donohew.*

561 *Newspaper and Magazine Advertising.* (3) I, II
Relation of newspapers and magazines with advertisers, with emphasis upon the preparation of local display and national advertising. *Wild.*

563 *Advertising Typography and Layout.* (3) II
A study of the principles of typographic families and illustrations and decorations that pertain to layout in modern advertising. Practical work with merchants included in the latter part of the course. Lecture, two hours.

564 *Laboratory to Accompany 563.* (0)
Four hours.

571 *Community Journalism.* (3) I, S
A study of the problems which confront the community weekly and the small city daily. *Ashley.*

573 *Newspaper Administration.* (3) II
A study of the business, circulation, advertising, and accounting divisions of the newspaper with special emphasis on the community newspapers. *Ashley.*

575 *Typography.* (2) I, II
Instruction and practice in typographic composition. Use of type faces in news editing. Study of typography in the make-up of American newspapers. Laboratory, four hours. *Ashley.*

581 *Introduction to Press Photography.* (3) I, II, S

Use of cameras, printers, enlargers and laboratory equipment in modern press photography, and a study of selected readings on photographic methods and skills. *Ware.*

591 *Radio News Scripts.* (2) I, II

Instruction and practice in writing news and features material for radio presentation. Prereq: Journalism 203. *Moore.*

COURSES IN COMMUNICATIONS

607 *Evaluating and Communicating Information.* (3) I, S

A study of the communications systems with which students will work, of the effect of the communications systems on public decisions, and of the means by which students work efficiently with communications systems.

608 *Mass Communications and Society.* (3) I, S

A study of the ways in which the communications media play their roles in contemporary society with special attention to the major functions, rights, and responsibilities of media and individuals.

651 *Communications Theory.* (3) II

Major theories of the communications process and review of experiments and field studies on communications. Readings, discussion, and student experiments testing theoretical propositions about communications. Prereq: Course in statistics or in design of social research.

665 *Communications Research Methods.* (3) II

The scientific method. Communications research as a part of social science research. Study and practice of advanced behavioral research techniques which apply to communications. Prereq: A behavioral research course and permission of instructor.

LIBRARY SCIENCE

The Department offers the master's degree according to Plan A and the professional degree of Master of Science in Library Science. (See pages 18-20.) Nine hours of library science at the 500 level are prerequisite to courses counted toward the 24 and 30 hours required in the master's degree programs. With the consent of the Chairman of the Department these prerequisite hours may be taken concurrently with graduate course wor.

Requirements for the Degree of Master of Science in Library Science

(See also pages 18-20.)

Students holding a bachelor's degree from a fully accredited institution may obtain the degree of Master of Science in Library Science by satisfying the following requirements:

1. Nine hours of prerequisite work in library science.
2. Thirty semester hours in graduate courses (15 in courses numbered 600 or above).
3. An average standing of 3.0 or better on all work taken as a graduate student.
4. Thirty-six weeks in residence.

5. Two years of college credit (twelve semester hours with a grade of C or better) in a modern foreign language or a reading knowledge as demonstrated by the usual graduate examination.

513 *Organization and Administration of the School Library.* (3) I, II, S
Philosophy, objectives and administration of the library in elementary and secondary schools.

521 *Libraries and Librarianship.* (3) I, S
An orientation course designed to give students a general understanding of libraries and librarianship. *Leach.*

529 *Cataloging and Classification.* (3) I, S
A study of the fundamental principles and methods of classification and cataloging books and related materials.

533 *Reference and Bibliography.* (3) I, S
A study of the esential reference works, including dictionaries, encyclopedias, atlases, yearbooks, and periodical indexes. *Katz.*

536 *Literature and Related Materials for Young People.* (3) I, II, S
Covers types of materials of especial interest to readers of grades 7-12. Consideration given to materials for curricular and recreational reading. Some attention also paid to types of adult materials suitable for more mature students, and to problems of selection for the high school level.

537 *Children's Literature and Related Materials.* (3) I, II, S
Covers various types of materials for use by and with children of grades 1-6. A study of materials in the fields of recreational nature and those most nearly related to the elementary curriculum.

539 *Library Practice.* (3) I, II, S
Observation and supervised practice in a school library. This course fulfills a requirement for school librarians. Prereq: L.S. 513, 529 and two of the following courses: 533, 536, 537. *Martin.*

545 *Organization of Library Materials.* (3) I, S
Introduces the beginning librarian to the technical processes involved in the organization of library materials. *Cazden.*

552 *Book Selection.* (3) I, S
A general study of book selection principles and methods, with emphasis on printed materials as they interpret modern problems. *Katz.*

586 *Visual Teaching.* (3) I, II, S
A course in methods and techniques of visual instruction with emphasis on the effective use of films, film strips, pictures, maps, graphs, slides, and field trips. *Staff.*

612 *The Public Library.* (3) I, S
A study of the public library as a functioning institution. *Leach.*

613 *Problems in School Library Service.* (3) II, S
For experienced school librarians and administrators concerned with improving the program of library services in elementary and junior and senior high schools. Prereq: Library science courses leading to provisional certification (18 hours). *Cole.*

614 *The College and University Library.* (3) II, S
A study of the college and university library as a functioning institution. *Clarke.*

627 *Problems in Reading for Children and Young People.* (3) II, S
Considers reading interests and needs of younger readers, especially the retarded and superior, and studies in the field. Prereq: L.S. 536 and 537 or equivalent. *Cole.*

629 *Advanced Cataloging and Classification.* (3) II, S
Expansion of the principles and methods of classification and cataloging books and related materials. Prereq: L.S. 529 or equivalent.

632 *Library Work with Children.* (3) I, S
A study of the origin and present status of library work with children in school and public libraries. *Martin.*

633 *Subject Bibliography.* (3) II
A comprehensive study of basic reference materials in the humanities and social and natural sciences, with emphasis on reference services in large libraries. Prereq: L.S. 533 or equivalent. *Cazden, Katz.*

635 *Government Publications.* (3) II, S
A study of the problems of acquisition, preparation, and use of international, federal, state, and local government publications. Prereq: L.S. 533 or equivalent.

642 *History of Books.* (3) I, S
This course considers the records of early man, invention of the alphabet, early writing materials, manuscript books, the invention of printing, and book production in modern times. *Katz.*

650 *Adult Reading Guidance.* (3) II, S
Survey of the significant published studies of adult reading, as a guide to book selection through knowledge of adult needs and interest. *Katz.*

652 *Advanced Book Selection.* (3) II, S
Emphasis on the more imaginative and creative forms of literature and their place in libraries. Prereq: L.S. 552 or equivalent. *Martin.*

687 *Non-Book Materials.* (3) II, S
The function, evaluation, selection, acquisition, preparation for use, and preservation of non-book materials in a library program. Prereq: L.S. 529, 533, 545 or equivalent. *Cazden.*

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
Staff.
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis.

771 *Seminar.* (3) II, S
Discussions and reports on current problems and trends in library service, with consideration of methods of investigating library problems and assistance in the initial stages of thesis preparation. *Katz and Leach.*

781 *Individual Study in Library Science.* (1) I, II, S
Individual conferences, assigned readings, reports, etc. *Staff.*
May be repeated for a total of four credits.

786 *Problems in Library Science.* (1-4) I, II, S
Individual conferences, assigned readings, and reports on the investigation of chosen problems and areas in library science. Prereq: 9 hours of library science at the 600 level. *Staff.*
May not be repeated.

MATHEMATICS

Graduate students will be able to obtain sufficient work to qualify for the doctor's degree. Twelve semester hours beyond calculus are required before counting work toward an advanced degree.

Courses numbered from 400-499 do not carry graduate credit for students seeking an advanced degree in mathematics.

401 *A Historical Development of Mathematics.* (3)
A historical development of mathematics contrasting early solutions and approximations to modern techniques. Treats a vast number of mathematical problems from the process of elementary counting to the calculus and number theory. Prereq: MA 261, 341 or consent of instructor.

421 *Elementary Computational Methods.* (3)
Study of number systems, matrices, determinants, and Boolean Algebra with applications to electrical networks, machine computation, automatic electronic digital computors, and other engineering problems. Prereq: MA 212.

431 *Differential Equations.* (3)
First-order equations, special second-order equations, series solutions, higher order equations and systems. Prereq: MA 212.

432 *Methods of Applied Calculus I.* (3)
Limits; continuity; infinite series and sequences; differentiable functions; implicit functions; line, surface, and space integrals; Fourier series and integrals; vector analysis; matrices; partial differential equations; complex variables and conformal mapping. Prereq: MA 431 or consent of instructor.

433 *Methods of Applied Calculus II.* (3)
A continuation of MA 432.

462 *Matrix Analysis.* (3)
Vectors, matrices, vector-valued and matric-valued functions, differentiation, integration, Jacobians, Wronskians, inversion of matrices, eigenvalues, vectors, matrices of special forms, innerproduct spaces and tensors. (This course is a prerequisite for 500-level courses in Differential Equations.)

473 *Introduction to Complex Variables and Applications I.* (3)
This is an introductory course in complex variable theory with applications. Complex numbers, elementary properties of analytic functions, Cauchy theorems, power series, residue theory and conformal mapping. Prereq: MA 432 or equivalent.

485 *Fourier Series and Boundary Value Problems.* (3)
This is an introductory treatment of Fourier series and its application to the solution of boundary value problems in the partial differential equations of physics and engineering. Orthogonal sets of functions, Fourier series and integrals, solution of boundary value problems, theory and application of Bessel functions and Legendre polynomials. Prereq: MA 431 and MA 432 or equivalent.

501 *Summer Seminar in Selected Topics.* (3)
This course is designed for those students who do not usually attend our regular semester courses but who wish to take several of the courses in summer school. The topics covered here will be selected from our present courses. Prereq: Teaching experience in the field of mathematics and consent of the instructor.

502 *Summer Seminar in Selected Topics.* (3)
A continuation of MA 501.

503 *Summer Seminar in Selected Topics.* (3)
A continuation of MA 502.

504 *Summer Seminar in Selected Topics.* (3)
A continuation of MA 503.

521 *Mathematical Statistics.* (3)
Topics considered: averages, coefficients of dispersion and skewness, correlation and regression lines, curve fitting, Bernouli Theorem, DeMoivre-Laplace Theorem, generating functions, sampling. Prereq: MA 212.

523 *Probability.* (3)
Theorems of total compound probability. Bernoulli's Theorem, Bayes' Theorem, Poisson Law, Expected value, Law of large numbers. Distribution functions and characteristics functions. Prereq: MA 212.

525 *The Calculus of Finite Differences.* (3)
A study of the methods of differencing, interpolation, finite integration and difference equations. Prereq: MA 212.

532 *Ordinary Differential Equations.* (3)
Use of matrix formalism, stability and oscillation theory for linear equations with constant and with variable coefficients, singular points, existence theorems, non-linear oscillations. Prereq: MA 431, MA 462.

533 *Partial Differential Equations.* (3)
Existence theorems and methods of solution for first order equations. Linear second order equations. Prereq: MA 431, MA 462 or consent of instructor.

535 *Vector and Tensor Analysis.* (3)
The algebra and calculus of vectors; theory of tensors; quadratic differentiable forms; Riemannian geometry. Emphasis on tensor analysis. Prereq: MA 431 or consent of instructor.

536 *The Operational Calculus.* (3)
The introductory theory and properties of the Laplace Transformation. Applications in differential equations, difference equations and boundary value problems of mechanics, electricity and heat. Prereq: MA 431. *Staff.*

537 *The Operational Calculus.* (3)
The theory of the inverse Laplace Transformation. Applications in advanced boundary value problems. Fourier Transforms and applications. Prereq: MA 536.

538 *Numerical Analysis I.* (3)
Approximate computation, approximate roots of equations, numerical curve fitting, interpolation formulas, numerical differentiation and integration, solutions of systems of linear equations, introduction to numerical solutions of ordinary differential equations. Prereq: M&A 431, or consent of instructor.

541 *Projective Geometry.* (3)
Contents: harmonic forms, projectively related primitive forms, curves and pencils of rays of second order, ruled surfaces of second order, theory of poles and polars, involution, inversion. Prereq: consent of instructor.

542 *Curve Tracing.* (3)
A study of various methods for sketching algabraic curves. Emphasis on the analytic polygon in finding approximations to the forms of the curve in the finite portion of the plane and at infinity. Prereq: consent of instructor.

543 *Introduction to Higher Geometry.* (3)
Emphasis on fundamentals common to all geometry. Geometries associated with the projective group and the group of circular-transformations. Prereq: M&A 301, or its equivalent.

544 *Introduction to Higher Geometry.* (3)
A continuation of M&A 543.

545 *Algebraic Curves.* (3)
Topics include general properties of algebraic curves, the theory of residuation, singular points covariant curves, unicursal curves, systems of curves. Prereq: M&A 544.

546 *Algebraic Curves.* (3)
A continuation of M&A 545.

551 *Topology.* (3)
General topology, Hausdorf spaces, normal spaces, connectedness and compactness.

561 *Introduction to Modern Algebra.* (3)
Integral domains, Rational numbers and Fields, Polynomials, Real and Complex numbers, groups, vector spaces, Canonical Forms, Algebra of classes, rings and ideals, algebraic number theory, Galois Theory.

565 *Introduction to Matrices.* (3)
The algebra of matrices, linear transformations, determinants of matrices, systems of equations, applications. Prereq: M&A 211. *Staff.*

566 *Introduction to Theory of Numbers.* (3)
Divisibility, prime numbers, congruences and residues, Diophantine equations. Prereq: consent of instructor.

571 *Introduction to Analysis.* (3)
Point sets on the line and in Euclidean spaces, metric spaces, continuous functions, sequences, series.

572 *Introduction to Analysis.* (3)
A continuation of M&A 571.
Functions of bounded variation, Riemann-Stieltjes integration, sequences of continuous functions, Fourier Series, functions of several variables.

573 *Introduction to Complex Variables and Applications.* (3)
Continuation of MA 473; boundary value problems, analytic continuation, contour integration, special functions. Prereq: MA 473.

601 *Summer Seminar in Selected Topics.* (3) S
Continued fractions, Peano's axioms, matrices and the solutions of systems of equations, machine computation, space curves, groups, rings, and fields. Prereq: Teaching experience in the field of mathematics and consent of instructor.

602 *Summer Seminar in Selected Topics.* (3) S
A continuation of M&A 601.

603 *Summer Seminar in Selected Topics.* (3) S
A continuation of M&A 602.

604 *Summer Seminar in Selected Topics.* (3) S
A continuation of M&A 603.

611 *Independent Work in Mathematics.* (3)
Reading courses in the 600 group for graduate students.

612 *Independent Work in Mathematics.* (3)
A continuation of M&A 611.

613 *Independent Work in Mathematics.* (3)
A continuation of M&A 612.

614 *Independent Work in Mathematics.* (3)
A continuation of M&A 613.

621 *Mathematical Statistics.* (3)
Theory of sampling, the Chi-square distribution, testing statistical hypotheses. Prereq: M&A 521.

632 *Advanced Differential Equations.* (3)
Existence theorems, linear systems, systems with periodic coefficients, eigenvalue problems, non-linear equations, partial differential equations. Prereq: MA 531, MA 532 or consent of instructor.

638 *Advanced Numerical Analysis.* (3)
Advanced methods of solutions of systems of equations, approximation of functions, numerical solution of ordinary and partial differential equations, convergence of iterative processes, error analysis, ligenvalues of matrices. Prereq: M&A 421 or 538 or equivalent with consent of instructor.

641 *Differential Geometry II.* (3)
Tensor products, exterior algebra, differentiable maps, manifolds, geodesics, metric properties of curves in EN, fundamental forms, surfaces.

642 *Differential Geometry II.* (3)
A continuation of MA 641.

651 *General Topology.* (3)
Embedding and metrization, compact spaces, and combinatorial topology. Prereq: M&A 551.

661 *Linear Algebra.* (3)
Fields, vector spaces, linear transformations, dual spaces, matrices associated with linear transformations, eigen vectors, tensor products, canonical forms, arjoint matrices. Prereq: MA 561 or consent of instructor.

662 *Modern Algebra II.* (3)
Operator groups, Jordan-Holder theorem, direct products, decompositions of operator groups, Krull-Schmidt theorem, modules, chain conditions on submodules, Hilbert basis theorem, semisimple modules, Euclidean rings and principal ideal rings. Prereq: MA 661 or consent of instructor.

665 *Theory of Matrices.* (3)
Study of matric algebra and canonical forms. Prereq: M&A 561 or consent of instructor.

671 *Functions of a Complex Variable.* (3)
Differentiation and integration, contour integration, poles and residues, Taylor and Laurent series, conformal mapping, Riemann mapping, Dirichlet problem, multiple-valued functions, Riemann surfaces, and applications. Prereq: M&A 571.

672 *Functions of a Complex Variable.* (3)
A continuation of M&A 671.

678 *Calculus of Variations.* (3)
The ordinary problem for the plane and space cases; the necessary conditions of Euler, Weierstrass, Legendre, and Jacobi. The parametric problem; the isoperimetric problem. Sufficiency conditions. Prereq: M&A 531.

679 *Calculus of Variations.* (3)
A continuation of M&A 678.

681 *Measure and Integration.* (3)
Lebesgue measure and integration on the line, topics from the general theory of measure and integration including the Fubini theorem, absolutely continuous set functions and the Radon-Nikodym theorem. Prereq: MA 572 or consent of instructor.

682 *Function Theory and Linear Spaces.* (3)
Equicontinuous families, the theorems of Arzela and Ascoli, elementary theory of Banach spaces, linear functionals; LP spaces and c(x). Prereq: MA 681.

683 *Convergence and Summability.* (3)
Fundamental limit ideas applied to infinite sequences, infinite series, infinite products, etc. Summability of Cesaro, Holder, Abel, Borel and Leroy. Prereq: M&A 571 or consent of instructor.

685 *Fourier Series.* (3)
Expression of a general periodic function as a Fourier series, sufficient conditions for convergence, Fejer's theorem, applications. Prereq: M&A 571.

687 *Integral Equations.* (3)
Systems of ordinary linear equations, linear operators, orthogonal systems, linear integral equations of the second kind, theorems of Fredholm, Volterra's equation. Prereq: consent of instructor.

711 *Research Work in Mathematics.* (3)
Reading course for graduate students. Prereq: consent of department.
May be repeated to a maximum of 12 credits.

751 *Selected Topics in Topology.* (3)
Topological algebras, algebraic topology, topologies in lattices. Prereq: M&A 651 or consent of instructor.

752 *Selected Topics in Topology.* (3)
A continuation of M&A 751.

753 *Functional Analysis.* (3)
Locally convex linear topological spaces; Banach algebras; function algebras; Fourier transforms; Linear Operators.

754 *Functional Analysis.* (3)
A continuation of MA 753.

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
Staff.
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis.

769 *Residence Credit for the Doctor's Degree.* (1 to 18 wks. residence)
Staff.
May be repeated indefinitely.

771 *Selected Topics in the Theory of Complex Variables.* (3)
Analytic continuation, functions with natural boundaries, gap theorems, over-convergence, entire functions, Dirichlet series, univalent functions, variational methods, Dirichlet principles. Prereq: consent of the instructor.

772 *Selected Topics in the Theory of Complex Variables.* (3)
A continuation of M&A 771.

773 *Selected Topics in Analysis.* (3)
Theory of approximation; Riemann surfaces; Banach algebras; advanced topics in real analysis, generalized functions and distributions.

774 *Selected Topics in Analysis.* (3)
A continuation of MA 773.

777 *Mathematical Seminar.* (3)

778 *Mathematical Seminar.* (3)

MICROBIOLOGY

The Department of Microbiology offers the Master of Science degree in the various fields of Microbiology, and the Doctor of Philosophy degree in the fields of morphology and physiology of microorganisms, immunology and serology, and medical and public health microbiology.

400 *General Bacteriology.* (4) I, II, S

Microorganisms; their morphology, classification, physiology, relation to certain fermentations, to food, to soil fertility, and to disease. Lecture and recitation, two hours. Prereq: CHE 112; Zoology 100 or Botany 101. *Baldwin or Edwards and others.*

401 *Laboratory to Accompany 400.* (0)

Four hours.

410 *Applied Bacteriology.* (2) I, II, S

A course in bacteriological analysis to supplement Courses 200 and 400. Laboratory, four hours. Prereq: MB 400 or 200; or 102 and CHE 112. *Wiseman and others.*

500 *Pathogenic Bacteriology.* (4) I, S

Human and animal pathogenic microorganisms, especially their morphological, cultural and pathogenic properties. Lecture, two hours. Prereq: MB 400 or 200; or 102 and CHE 112. *Humphries and Ruchman.*

501 *Laboratory to Accompany 500.* (0)

Four hours.

510 *Laboratory Diagnosis.* (3) I

Laboratory methods employed in diagnostic and public health laboratories. Designed primarily for medical technology students. Examination of sputum, urine, and blood. Lab, six hours. Prereq (or to be taken concurrently): Micro. 500.

511 *Laboratory Diagnosis.* (3) II, S

Continuation of 510. Examination of blood continued. Laboratory diagnosis of parasitism and infectious diseases. Lab, six hours. Prereq (or to be taken concurrently): Micro. 500.

520 *General Pathology.* (4) I

Effects of disease will be studied at autopsies and by the examination of fresh and museum specimens and histological sections. Lect., two hours. Prereq: PGY 502; Zool. 200, 513, 515, 506; MB 500. *McClellan, Resinger, Stewart.*

521 *Laboratory to Accompany 520.* (0)

Four hours.

550 *Immunology and Serology.* (5) II

The theories and mechanism of infection and immunity; preparation, standardization, and uses of biological products; serology. Lecture, two hours. Prereq: MB 400 or 200; or 102 and CHE 112. *Humphries.*

551 *Laboratory to Accompany 550.* (0)

Six hours.

610 *Bacteriology of Foods.* (4) I

Dairy and miscellaneous food products; food preservation; food poisoning, standard methods for official food and public health laboratories. Lecture, two hours. Prereq: MB 400 or 200; or 102 and CHE 112. *Weaver, Humphries.*

611 *Laboratory to Accompany 610.* (0)

Four hours.

620 *Bacteriology of Water and Sewage.* (4) II
Microbiology of water; methods of purification. Sewage disposal methods. Operation of swimming pools. Standard and other methods for examination. Lecture, two hours. Prereq: MB 400 or 200; or 102 and CHE 112. *Weaver, Humphries.*

621 *Laboratory to Accompany 620.* (0)
Four hours.

630 *Public Health Bacteriology.* (3) I
Public health aspects of bacteriology including the etiology, epidemiology, immunology and lab. diagnosis of infectious diseases. Lecture, one hour. Prereq: open only to physicians and health officers or those with equivalent training.

631 *Laboratory to Accompany 630.* (0)
Four hours.

632 *Public Health Bacteriology.* (3) II
Continuation of 630. Lectures and recitations, one hour. Prereq: MB 630.

633 *Laboratory to Accompany 632.* (0)
Four hours.

635 *Clinical Mycology.* (2) I
Methods and techniques for isolating and propagating pathogenic actinomycetes and fungi. Lab. diagnosis of fungous infections. Lab., four hours a week. Prereq: CHE 432; MB 550.

640 *Disinfectants and Antibiotics.* (3) II
Chemical agents injurious to microorganisms. Practical applications and methods of testing. Conference, one hour. Prereq: MB 102 or 200 and 410; CHE 432. *Baldwin.*

641 *Laboratory to Accompany 640.* (0)
Four hours.

651 *Immunochemistry and Advanced Immunology.* (4) II
Chemistry of antigens and antibodies; of the reaction between them in vitro and in vivo; immune and hypersensitive reactions. Lect. and conferences, two hours. Prereq: MB 550; CHE 432 and 444. *Humphries.*

652 *Laboratory to Accompany 651.* (0)
Four hours.

600 *Electron Microscopy.* (3) I
Theory, operation and uses of the magnetic electron microscope and the vacuum unit for metal shadow casting. Lecture, one hour. Prereq: Physics 232 and 242. *Edwards.*

661 *Laboratory to Accompany 660.* (0)
Four hours.

670 *Viruses and Rickettsiae.* (4) I
Natures, activities, and methods of laboratory cultivation of viruses and rickettsiae; their relation to bacteria, plants, and animals. Lecture, two hours. Prereq: MB 550. *Ruchman.*

671 *Laboratory to Accompany 670.* (0)
Four hours.

700 *History of Bacteriology.* (2) I
Conferences, two hours. Prereq: MB 550. *Weaver.*

712 *Bacterial Anatomy, Taxonomy and Nomenclature.* (3) II
Study of anatomical structure of various groups of bacteria, theories of staining, principles of taxonomy, code of nomenclature of bacteria and viruses. Cytochemical procedures used in laboratory. Lectures and conferences, two hours. Lab, two hours. Prereq: MB 550, CHE 432, recommended MB 660. *Weaver.*

714 *Microbial Genetics.* (4) I
The nature and action of genetic material in microorganisms. Lectures and conferences, two hours; lab, four hours. Prereq: Basic courses in Genetics and Microbiology; CHE 432. *Baldwin.*

720 *Metabolism of Microorganisms.* (4) I
Chemical changes produced by microorganisms; properties of their enzymes; the physiology of their growth. Lectures or conferences, two hours. Prereq: CHE 432. *Wiseman.*

721 *Laboratory to Accompany 720.* (0)
Four hours.

722 *Metabolism of Micoorganisms.* (4) II
Continuation of 720. Lectures or conferences, two hours. Prereq: MB 720. *Wiseman.*

723 *Laboratory to Accompany 722.* (0)
Four hours.

768 *Residence Credit for Master's Degree.* (1 to 9 wks. residence)
Staff.
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis.

769 *Residence Credit for Doctor's Degree.* (1 to 18 wks. residence)
May be repeated indefinitely.

770 *Seminar.* (1) I, II
Review of current literature in MB; presentation of papers on work in progress in the department or on assigned topics; reports on meetings of national and international scientific and professional societies and symposia. Required of all graduate students. Two hours.
Staff.
May be repeated to a maximum of ten credits.

790 *Research in Bacteriology.* (3 to 6) I, II, S
Laboratory, six hours. *Staff.*
May be repeated to a maximum of twelve credits.

795 *Research in Bacteriology.* (3 to 6) I, II, S
Laboratory, six hours. Prereq: Master's Degree or equivalent. *Staff.*
May be repeated to a maximum of twenty-four credits.

MUSIC

The University offers the Master of Arts degree with a major in Music Theory or Music Literature, the Master of Music with a major in Applied Music, Composition, Theory, or Music Education, and the Master of Arts in Education, with emphasis in the field of Music Education. Candidates for these degrees must present the approximate equivalent of the University of Kentucky's undergraduate requirements in music, appropriate to the prospective area of concentration on the master's level. Normally, a candidate should expect to spend a minimum of two semesters and one summer session or the equivalent in residence

as a full-time graduate student to complete the requirements for a master's degree in music.

Graduate Record Examination scores must be presented by the end of the first semester or first summer session the student is enrolled. Candidates failing to comply with this requirement will not be permitted to register for further course work until the Graduate Record Examination has been taken. If the results of the Graduate Record Examination reveal deficiencies in the candidate's background, additional course work may be required as determined by the Director of Graduate Studies in the Department of Music.

Entrance Examinations—All candidates are required to take qualifying examinations in Music Theory, Music Literature, and in Applied Music and Music Education (if their area of concentration is involved). These examinations are given during the first week of each semester; students revealing unusual deficiencies in these areas are required to elect additional course work as determined by the Director of Graduate Study.

Foreign Language Requirements—The undergraduate record of Master of Music candidates must show credit for one year of foreign language study. In the event it does not, the candidate will be required to study one year of a foreign language as a graduate student. This credit will not apply toward the Master of Music degree. Candidates in Applied Music-Voice must have completed one year of study in each of two modern foreign languages. The Master of Arts degree with a major in music requires a reading knowledge of one foreign language, preferably French or German.

Thesis Requirements—The Master of Arts degrees require theses. A public recital acceptable to the faculty is required in lieu of a thesis for the Master of Music degree in Applied Music. A composition of major proportions, acceptable to the faculty, must be submitted in lieu of a thesis by candidates for the Master of Music degree in Composition. A thesis is optional in the Master of Music in Music Education or Theory and Master of Arts in Education curricula.

MASTER OF MUSIC IN APPLIED MUSIC

A minimum of thirty graduate hours distributed as follows: (a) eight to twelve hours in Applied Music, (b) ten to fourteen hours of Music Theory, Music Literature, or Music Education, (c) two to six hours of approved electives.

A public recital of major proportions, approved by the Music faculty.

A final comprehensive examination.

MASTER OF MUSIC IN MUSIC EDUCATION

A minimum of twenty-four hours and an acceptable thesis, or thirty hours without a thesis, distributed as follows: (a) twelve hours in the field of Music Education, (b) six to ten hours in Music Theory or Music Literature, (c) six to twelve hours of approved electives.

A final comprehensive examination.

MASTER OF MUSIC IN THEORY

A minimum of twenty-four hours, and an acceptable thesis distributed as follows: (a) sixteen hours in Music Theory and Music Literature, (b) eight hours

of approved electives, or thirty hours without a thesis (c) six additional hours in theory, music literature, or composition in lieu of thesis.

A final comprehensive examination.

MASTER OF MUSIC IN COMPOSITION

Prerequisite are (1) a Bachelor's degree with major in music or the equivalent and submission of three (3) original compositions.

A minimum of twenty-four hours, and an acceptable thesis composition. The thesis composition must be publicly performed, and the candidate is responsible for the preparation therefore of legible score and parts. Course requirements include (a) eighteen hours in Composition, Music Theory, and Music Literature; (b) six hours of approved electives.

MASTER OF ARTS IN EDUCATION *(See pages 159-161)*

MASTER OF ARTS WITH A MAJOR IN MUSIC

The usual area of concentration for this degree is in the field of Music Theory or Music Literature. The general requirements are shown under Plan A (pages 18-19 of the Graduate Bulletin). Specific requirements may be obtained from the Director of Graduate Studies in Music.

MUSIC PERFORMANCE COURSES

Graduate courses in Music Performance carry credit hours as follows:

Series I, 1 credit hour each semester
Series II, 2 credit hours each semester
Series III, 3 credit hours each semester

All music performance courses may be repeated 3 times for credit.

All music performance courses carry 1 credit hour if taken in the Summer Session.

	Series I Secondary Courses	Series II Major Courses	Series III Major Courses
Piano	501,601	521,621	541,641
Voice	502,602	522,622	542,642
Organ	503,603	523,623	543,643
Violin	504,604	524,624	544,644
Viola	505,605	525,625	545,645
Cello	506,606	526,626	546,646
String Bass	507,607	527,627	547,647
Flute	508,608	528,628	548,648
Oboe	509,609	529,629	549,649
Clarinet	510,610	530,630	550,650
Bassoon	511,611	531,631	551,651
Trumpet	512,612	532,632	552,652
French Horn	513,613	533,633	553,653
Trombone	514,614	534,634	554,654
Baritone	515,615	535,635	555,655

Tuba	516,615	536,636
Saxophone	517,617	537,637
Percussion	518,618	538,638

MUSIC COURSES

560 *Supervision of Music.* (1) II, S

A study of supervision of the school music program through curriculum planning, supervisory techniques, administrative and community relationships, the use of mechanical aids in the improvement of teaching, etc. One lecture and one laboratory each week. Prereq: Music 360 or 362, 361 or 363. *Nash.*

561 *Music Activities in the Elementary School.* (2) I, II, S

The study of music and its contribution to child development. An analysis of instructional materials and the development of criteria for the evaluation of these materials. Advanced studies and activities in rhythms, singing, listening, creativity, and reading music to create a musical environment in the classroom. Open to classroom teachers only. Prereq: Music 260 and 261 or equivalents and consent of the instructor. *Staff.*

562 *Conducting.* (2) I

A study of the technique and practice of the fundamentals of conducting. *Miller.*

563 *Instrumental Conducting.* (2) II

A continuation of 562. Prereq: 562. *Miller.*

564 *Interpretation of Choral Music.* (2) I, II, S

A study of the fundamentals of choral conducting and choral literature, emphasizing materials for the secondary school level. *Kiviniemi.*

565 *Vocal Pedagogy.* (2) I, S

For teachers of voice, supervisors of music and choir directors. The study of physical and psychological problems in the teaching of voice production, the study of breath control, diction, resonance, interpretation and repertoire. *Kiviniemi.*

570 *Orchestration.* (2) I, S

This course includes a study of the individual instruments of the orchestra and band with practice in scoring for these instruments. Prereq: 371. *Kinney.*

571 *Orchestration.* (2) II, S

A continuation of 570. Prereq: 570. *Kinney.*

572 *Counterpoint.* (2) I, S

A study of Counterpoint based on 16th Century and 18th Century contrapuntal techniques, original composition and analysis. Prereq: Music 271, 273. *Wright, Kinney.*

573 *Counterpoint.* (2) II, S

A continuation of 572. Prereq: 572. *Wright, Kinney.*

574 *Composition.* (2) I, S

A basic course in original composition and orchestration. Prereq: Music 371. *Wright.*

575 *Composition.* (2) II, S

A continuation of 574. *Wright.*

577 *Acoustics of Music.* (3) I, S

A study of the musical applications of sound phenomena. Prereq: Completion of 14 hours of music theory. *Lehman.*

579 *Baroque Music.* (3) I, S

The history of vocal and instrumental music in the Baroque style from 1600 to 1750. Prereq: Music 280, 281. *Longyear, Henderson.*

580 *Music in the Eighteenth-Century.* (3) I, II, S
The development of Music in the Classic style from the early 18th century to 1800. *Longyear.*

581 *Nineteenth-Century Music.* (3) I, II, S
A study of masterworks of music composed in the nineteenth century. Prereq: Music 280, 281. *Longyear.*

582 *Piano Literature.* (3) I, S
A historical and analytical study of music written for the piano. Consideration of the emergences of the piano idiom and the development of the instrument. *Patch, Chapman.*

584 *Music for the Solo Voice.* (3) I, S
A stylistic study of vocal music from the Troubadours to the present. *Ivey.*

585 *History and Literature of the Organ.* (2) I, S
A course of study designed to give the organ student a practical knowledge of the development of the organ, its construction, the standard literature, and teaching materials. *Blackburn.*

586 *History and Literature of the Organ.* (2) II, S
A continuation of 585. Prereq: 585. *Blackburn.*

587 *Twentieth-Century Music.* (3) II, S
A stylistic study of representative compositions of the twentieth century. *Kinney, Wright.*

588 *History and Literature of Opera.* (3) I, S
The development of opera as an art form, and analysis of representative operas from various eras. *Longyear.*

589 *History of American Music.* (3) II, S
A study of music in America from colonial times to the present. *Longyear.*

590 *Opera Workshop.* (1) I, II, S
May be repeated to a maximum of three credits. *Jenness.*

591 *Music Education Workshop.* (1) S
Intensive study of advanced methods and materials in one of the following areas of music education: elementary and general music, the school orchestra, the school band, choral music. May be repeated once for a total of two credits. *Staff.*

592 *Music Education Workshop.* (2) S
Intensive study of advanced methods and materials in one of the following areas of music education: elementary and general music, the school orchestra, the school band, choral music. May be repeated once for a total of four credits. *Staff.*

599 *Collegium Musicum.* (2) I, II, S
The study and realization of performance practices in early music. May be repeated once for credit. Two hours class, one hour laboratory. *Kinney.*

660 *Advanced Instrumental Conducting.* (2) II, S
This course is intended to further develop the ability to interpret and conduct the larger forms written for the symphony orchestra and concert band. Prereq: Music 562, 563, or 564. *Miller, Scheer.*

661 *Advanced Choral Conducting.* (2) I, S
The art of choral conducting as applied to various styles and forms of music. Study of unaccompanied works, works with small instrumental combinations, and works for chorus and orchestra. Prereq: Music 562, 564. *Kiviniemi.*

662 *Advanced Band Technique.* (2) II, S
An advanced course in band techniques with concentration on band organization and materials, the technique of band conducting and intensive study in the field of band arranging. *Miller.*

663 *Advanced Instrumental Techniques.* (2) II, S
An advanced technical study of playing string, wind, and percussion instruments, designed for the needs of school music teachers. *Staff.*
May be repeated once for credit.

667 *Current Practices in Elementary School Music.* (2) I, II, S
Contemporary philosophies and objectives of music in the elementary school. The in-service training of the classroom teacher; the music specialist as a resource person. Techniques for developing the child's musical interest and capacity for music. The status of music in America's public schools. Open to music teachers only. Prereq: Music 360 or its equivalent. *Holroyd.*

669 *Analytic Techniques.* (2) I, S
Studies in the stylistic practices in the music of the 18th and 19th centuries. *Kinney.*

670 *Theory Review.* (0) I, S
A review of the fundamentals of music theory. *Wright.*

671 *Advanced Musical Analysis.* (2) I, S
A course designed to show the changing aspects of musical style through analysis of representative compositions from all periods. Prereq: At least 8 hours of upper division theory or consent of instructor. *Kinney, Wright.*

672 *Advanced Musical Analysis.* (2) II, S
A continuation of 671. *Kinney, Wright.*

673 *Advanced Composition.* (2) I, II, S
Prereq: Music 574 and 575. *Wright.*
May be repeated to a maximum of six credits.

674 *Pedagogy of Theory.* (2) I, II, S
The teaching of music theory. *Wright, Kinney.*

675 *Pedagogy of Theory.* (2) I, II, S
The study of music theory from the standpoint of its function in the college and secondary school curriculum. *Wright, Kinney.*

676 *Sixteenth Century Counterpoint.* (2)
The study of sixteenth century contrapuntal techniques through analysis and composition in Renaissance styles. *Kinney, Howell.*
Offered according to demand.

680 *Medieval Music.* (3) I
The development of Western music through the fourteenth century. *Howell.*

682 *Research Methods.* (2) I, S
A course designed to acquaint the student with the basic research techniques and materials in music. *Longyear.*

684 *Renaissance Music.* (3) II
A survey of vocal and instrumental music of the 15th and 16th centuries. *Howell.*

685 *Choral Music.* (3) I, S
The history and literature of vocal ensemble and choral music from 1500 to the present. *Kiviniemi.*

687 *History of Performance Practices.* (3) I, II, S
A survey of practices in the performing of European music from the later Middle Ages to 1800, based on evidence from contemporary sources. Must be taken concurrently with Music 599. *Kinney.*

742 *Administration and Supervision of Public School Music.* (3) II, S
A study of current trends in school music, curricula, testing programs, and other supervisory procedures. *Nash.*

744 *History and Philosophy of Music Education.* (3) I, S
A historical survey of thought concerning the place and significance of music in the education of the individual and the group. *Lehman.*

760 *Psychology of Music.* (3) II, S
A study of the processes of musical thinking and the effects of music on human behavior. *Lehman.*

761 *Seminar in Music Education.* (3) I, II, S
Advanced professional study in the theory and practice of music education. May be repeated once for a total of 6 credits. Prereq: Permission of instructor. *Lehman.*

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
Staff.
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis.

779 *Studies in Music History.* (2) I, II, S
Intensive studies of a musical genre, a composer, or a school of composers. *Longyear, Howell, Kinney.*

780 *Independent Work in Music Education.* (1) I, II, S
Prereq: 4-6 hours of graduate credit in the area of specialization. *Staff.*

781 *Independent Work in Music Education.* (2) I, II, S
Prereq: 4-6 hours of graduate credit in the area of specialization. *Staff.*

782 *Independent Work in Music Education.* (3) I, II, S
Prereq: 4-6 hours of graduate credit in the area of specialization. *Staff.*

783 *Independent Work in Music Theory.* (1) I, II, S
Prereq: 4-6 hours of graduate credit in the area of specialization. *Staff.*

784 *Independent Work in Music Theory.* (2) I, II, S
Prereq: 4-6 hours of graduate credit in the area of specialization. *Staff.*

785 *Independent Work in Music Theory.* (3) I, II, S
Prereq: 4-6 hours of graduate credit in the area of specialization. *Staff.*

786 *Independent Work in Musicology.* (1) I, II, S
Prereq: 4-6 hours of graduate credit in the area of specialization. *Staff.*

787 *Independent Work in Musicology.* (2) I, II, S
Prereq: 4-6 hours of graduate credit in the area of specialization. *Staff.*

788 *Independent Work in Musicology.* (3) I, II, S
Prereq: 4-6 hours of graduate credit in the area of specialization. *Staff.*

PHILOSOPHY

500 *History of Ancient Philosophy.* (3) I

A survey of the philosophical thought of ancient Greece and Rome, up to the rise of Christianity. *DeBoer.*

502 *Plato and Aristotle.* (3)

Plato's development of a theory of the world and of practice, studies in selected dialogues. Analysis of passages in Aristotle's major works on natural philosophy, metaphysics, knowledge, ethics, and politics. *De Boer.*

505 *History of Medieval and Renaissance Philosophy.* (3)

A survey of major developments in philosophy from Augustine to the seventeenth century.

510 *History of Modern Philosophy.* (3) II

A survey of modern philosophy from the seventeenth to the middle of the nineteenth century. *Kuiper.*

515 *Contemporary Philosophy.* (3) I

A study of contemporary philosophical tendencies, notably pragmatism, idealism, the analytic movement (e.g., logical atomism, logical positivism, and philosophical analysis), phenomenology, and existentialism. *Chacon.*

518 *Existentialism.* (3)

A systematic study of the fundamental concepts and problems of existentialism. Selected readings in Kierkegaard, Marcel, Heidegger, Jaspers, and Sartre. *Chacon.*

520 *Introduction to Symbolic Logic.* (3) I

An introductory course in symbolic logic, dealing with truth-functions, the deductive method, quantification theory, the propositional calculus, and the logic of relations and classes. *Chacon.*

530 *Contemporary Ethics.* (3)

A study of the major developments in the field of ethics, notably intuitionism, naturalism, emotivism, and the analysis of the logic and the language of moral statements. *DeBoer.*

535 *Social and Political Philosophy.* (3)

A critical study of social and political philosophy, its subject matter and the nature of its enterprise. Readings will include extensive selections from contemporary European authors with selections out of the American political traditions. *Gregor.*

540 *Great Religions.* (3) I, S

A descriptive survey of several religions as they developed within their culture, for example: Hinduism, Buddhism, Confucianism, Judaism, Christianity. *De Boer.*

545 *Philosophy of Religion.* (3) II

A philosophical examination of religious ideas, including such topics as the origin of religion; the nature of religion; the various concepts of God, the soul, immortality; internal and external criticisms of religion. *De Boer.*

550 *Metaphysics.* (3) II

Study of concepts and problems important for understanding the general or ultimate factors in reality; e.g., space-time, change, causality, substance, matter, life, God. *De Boer.*

555 *Epistemology.* (3) II

A study of the origin, nature, kinds, and validity of knowledge, with a consideration of such topics as faith, intuition, belief, opinion, certainty, and probability. Also some discussion of recent developments in semantics. *Chacon.*

560 *Philosophy of Science.* (3) II
An examination of the logical and epistemological foundations of empirical science, including such topics as the unity and diversity of the sciences, methodology, theory and explanation, and current studies in the language of science. Prereq: Designed especially for undergraduate and graduate majors in the sciences. Permission of instructor to insure that the student will have an adequate background for the course. *Gregor.*

565 *Philosophy of Languages.* (3) I
An investigation of problems current in the philosophy of language such as meaning and reference, the nature of analysis, linguistic relativity, and the relation of linguistics to philosophy. *Birch.*

570 *Philosophy of History.* (3)
A critical survey of philosophies of history including representative readings from the works of philosophers such as Hegel, Marx, Spengler, Niebuhr and Ortega y Gasset. Critical attention will be directed to the problem of "explanation" in history. *Gregor.*

592 *Aesthetics.* (3) I
Problems of method in aesthetics; major types of aesthetic theory. Aesthetic materials of the arts in literature, music, and the space arts. Form and types of form. Meaning in the arts. Interrelations of the arts. Lectures, discussions, reports. (Same as Art 592.) *Amyx.*

620 *Types of Logical Theory.* (3)
An intensive study of recent and contemporary contributions to logical theory: Whitehead and Russell, C. I. Lewis, R. Carnap, John Dewey, and others. *Kuiper.*
May be repeated to a maximum of six credits.

625 *Advanced Symbolic Logic.* (3)
A study of the theory, construction, consistency, and completeness of deductive systems. Prereq: PHI 500 or equivalent.

700 *Seminar in Ancient Philosophy.* (3)
Intensive study of original works of such major classical philosophers as Plato and Aristotle. May be repeated 2 times for a total of 9 hours. Prereq: PHI 500 or equivalent. *Staff.*

710 *Seminar in Modern Philosophy.* (3)
Intensive study in the major works of such prominent philosophers of modern times as Descartes, Locke, Hume, Kant, and Hegel. May be repeated 2 times for a total of 9 hours. Prereq: PHI 510 or equivalent. *Staff.*

715 *Seminar in Contemporary Philosophy.* (3)
Intensive study of current developments in philosophy as found in books and periodicals. May be repeated 2 times for a total of 9 credits. Prereq: PHI 515 or its equivalent. *Staff.*

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis. *Staff.*

790 *Research in Philosophy.* (3)
This course is primarily intended for advanced students who desire and are prepared to do research in philosophy. *Staff.*
May be repeated to a maximum of twelve credits.

PHYSICAL EDUCATION

The Department of Physical Education offers graduate work toward the Master of Arts or the Master of Science with a major in Physical Education. Candidates may select, subject to the approval of the Department of Physical Education, either of two plans in pursuing their graduate program. Students

must submit evidence of good undergraduate preparation in physical education. In general, twenty-hour hours credit in the field will suffice.

Under Plan A the candidate must complete 24 semester hours of graduate courses with a standing of 3.0 (B) or better. A minimum of 12 of these hours must be in Physical Education courses numbered 600 or above. The candidate shall complete at least two-thirds of his course work in the field of Physical Education and the other third may be taken in the second teaching area or in the field of Physical Education. The minimum residence required is one academic year of 36 weeks. A thesis and a reading knowledge of a modern foreign language complete the requirements under Plan A.

The modified Plan B has the same minimum requirements as Plan A except that six or more semester hours of course work may be substituted for a thesis and a reading knowledge of a modern foreign language is not required of candidates in the Department of Physical Education. Of the thirty hours of graduate credit indicated above in the modified Plan B, eight hours must be in a subject-matter area other than Physical Education and Education. At least 15 hours must be in courses numbered 600 or above in Physical Education. The candidate under this plan must also present a major paper approved by his major professor and the director of graduate study as partial fulfillment of his requirements. This major paper may be developed as a part of a particular course requirement, or it may be done as an independent project. A student may follow this plan only with approval of the Department of Physical Education.

Candidates under Plans A and B who are not graduates of the University of Kentucky are required to teach under supervision at least one activity class during their residence. The purpose of this regulation is to provide staff members an opportunity to evaluate their teaching and leadership ability.

In order to meet the needs and interests of graduate students, the Department of Physical Education offers specialization in the following areas:

1. Administration of Physical Education
2. Athletics in Education
3. Physical and Health Education
4. Dance in Education

Each area of emphasis is organized around a central core which contains fundamental and basic knowledge generic and essential to all areas. The following core curriculum is, therefore, recommended for graduate students:

741—Current Studies and Trends ..... 3 hrs.
650—Curriculum and Program Development ..... 3 hrs.
770—Seminar ..... 2 hrs.

RECREATION: Students interested in Recreation may choose one of the following options: Outdoor Recreation, Recreation in Rehabilitation and Mental Retardation programs, Commercial Recreation and general agency administration.

Each area of emphasis is organized around a central core which contains fundamental and basic knowledge generic and essential to all areas, including these courses:

583—Interpretation of Leisure and Recreation

685—Administrative Practices

741—Current Studies and Trends

780—Problems in Recreation

For details on the graduate programs of the various areas of specialization, write the Department of Physical Education, Graduate Division.

COURSES FOR MEN AND WOMEN OPEN TO UPPER DIVISION AND GRADUATE STUDENTS

481 *Camping in Education.* (2) I, S

Purpose, history, organization, and conduct of camps of various types. One hour lecture and two hours laboratory. Prereq: Physical Education 281, or permission of instructor. *Kauffman.*

482 *Intramural Sports.* (2) II, S (even years)

A study of the history and development of intramural sports. Lecture, recitation, and practice in accepted methods of organizing and administering intramural sports. *Johnson.*

491 *Dance in Education.* (4) II

An introduction to the creative approach to dance for elementary, secondary, and college levels. The principle of kinesthetics and rhythmical forms applied to the practice of fundamental movement techniques. Two hours lecture and four hours laboratory. Prereq: Anatomy 204 and Physiology 206, P.E. 572, and a beginning course in dance, or consent of instructor. *Staff.*

520 *Physiology of Exercise.* (3) I, II

A comprehensive survey of the physiological and clinical aspects of exercise. Lectures, demonstrations, three hours. Prereq: ANA 206, and PGY 206, 207; PSY 100; and consent of instructor. *Jokl.*

540 *Organization and Administration of Physical Education.* (3) I, S—odd years

Policies and procedures of administration on the secondary school and collegiate levels. Special emphasis on construction and care of facilities, equipment and supervision of personnel. Three hours per week. *Clay, Carr.*

541 *Coaching Advanced Basketball.* (2) I, S

Lecture and recitation on the theory and practice of team play in basketball. Special emphasis is placed upon systems of offense and defense. Two hours per week. Prereq: P.E. 141, or consent of instructor. *Lancaster, Clay.*

542 *Coaching Advanced Football.* (2) II, S

Lecture and recitation on the theory of football. Special emphasis is placed upon systems of offense and defense. Two hours per week. Prereq: P.E. 142, or consent of instructor. *Bradshaw, Staff.*

545 *Introduction to Tests and Measurements.* (3) II

The construction and grading of essay and objective tests, construction and analysis of achievement tests, and testing and measuring in health and physical education. Two hours lecture and two hours laboratory per week. *Clay.*

572 *Kinesiology and Its Application.* (4) I

A study of basic principles of bodily movement and their application to sports, rhythmical activities and the correction of functional defects. Three hours lecture and two hours laboratory. Prereq: ANA 206 and PGY 206, 207. *Hackensmith.*

580 *Administration and Organization of Recreation.* (3) II, S

This course is designed to equip students and community leaders with workable procedures for developing and operating recreation programs in communities of various sizes and with varying political and social structures. *Kauffman.*

583 *Interpretation of Leisure and Recreation.* (3) I, S

Designed to provide students interested in recreation as a profession, as an adjunct to other work, or as informed citizens with a basic understanding of the significance of leisure and the objectives of recreation. *Kauffman.*

592 *Dance Composition.* (4) I

Dance choreography, program planning, directing, staging and costuming, formal program required of all students. Two hours lecture and recitation, four hours laboratory per week. Prereq: P.E. 491. *Staff.*

595 *Folk Dance Leadership for School and Community.* (2) S

Philosophy, background and methods of folk dance for schools and communities. Leadership, participation and program planning with special emphasis upon field work with community groups. One hour lecture and two hours laboratory. *Karsner.*

COURSES OPEN TO GRADUATE STUDENTS ONLY

644 *Research and Its Application.* (3) I, S

The theory and practice of tests and measurements in the field of health and physical education. Two hours lecture and two hours laboratory. *Hackensmith.*

650 *Curriculum and Program Development.* (3) I, S (even years)

A study of fundamental principles basic to the development of the over-all curriculum in physical education with special emphasis upon the proper selection and organization of physical education activities to meet the education and recreational needs of all students. Three hours per week. Prereq: P.E. 540, 343, 344. *Carr.*

651 *Facilities, Construction, and Equipment.* (2) S

Principles and standards for maintaining facilities, and planning construction; purchase and care of equipment. Prereq: P.E. 540. *Seaton.*

685 *Administrative Practices in Recreation.* (3) I, S

This course deals with such administrative practices as decision making, policy determination, public relations, personnel practices, and routine details that constitute the functions of the chief recreation officer and his staff associates. Three hours per week. Prereq: P.E. 580, or consent of instructor. *Kauffman.*

690 *Organization and Administration of Dance in Education.* (3) II, S (odd years)

Special emphasis will be placed upon the organization and administrative program in dance to meet the needs of students from elementary through college levels. Some attention will be given to dance production, festivals and social dance functions in schools. Three hours per week. Prereq: P.E. 491, 592, 595. *Staff.*

720 *Sports Medicine.* (3) II, S (even years)

A study of the basic areas covered in sports medicine with readings and discussions of current international trends in the research and practice in this field. Three hours per week. Prereq: Twelve semester hours credit in the field of biological science and consent of instructor. *Jokl.*

741 *Current Studies and Trends.* (3) I, S (even years)

A study of modern trends in health and physical education and standards of evaluation in relation to the history of the various systems including a review of the principles and objectives. *Seaton.*

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)

May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis. *Staff.*

770 *Seminar.* (2) I, II, S
Required of all graduate students upon entrance. A review of current literature and problems in the field. Two hours per week. *Carr, Hackensmith.*
May be repeated to a maximum of four credits.

780 *Problems in Recreation.* (2) II, S
Current problems in recreation are identified and analyzed by the application of appropriate research techniques. Designed for recreationists, school people, and community workers. *Kauffman.*

782 *Problems Course in Physical Education.* (3) I, S
For school administrators and directors of physical education. Students work on individual problems applicable to their situation and interests, as well as upon general school problems. *Hackensmith.*

783 *Problems in the Administration of Athletics.* (2) II, S
For athletic directors, supervisors, and athletic coaches. A study of representative athletic administration procedures for colleges and public school systems. Business management is also stressed. Two hours per week. *Clay.*

PHYSICS AND ASTRONOMY

The Department of Physics is well equipped with instruments of precision and has adequate laboratory and library facilities necessary to the proper conduct of the advanced and graduate courses listed below. More detailed information on the Department's facilities will be given upon request.

The Department of Physics permits use of Plan A or Plan B to satisfy the requirements for the M.S. or M.A. degree. For Plan B the additional course work (six additional semester hours) must be in courses open only to graduate students.

401 *Structure of Physical Systems.* (3) S
A lecture course introducing the mechanical and electromagnetic principles upon which the analyses of many physical systems rest, with specific discussions of the properties of the following: the atom, crystal structure, the atomic nucleus, and nucleons. Lectures, five hours. Prereq: Employment as a high school science teacher. *Staff.*

501 *Orientation in Modern Physics for Teachers.* (3)
Review of fundamentals of physics. Discussion of problems associated with high school physics teaching. Recent developments in physics. Prereq: Employment as high school science teacher. *Staff.*

502 *Orientation in Modern Physics for Teachers.* (3)
Review of fundamentals of classical physics; treatment of atomic and nuclear physics, solid state, and other topics of current interest. Prereq: Employment as high school science teacher. *Staff.*

504 *Theoretical Mechanics.* (3)
A lecture and problem course covering the fundamental laws of mechanics. Topics include kinematics of a particle, statics and dynamics of particles and rigid bodies, constrained motion, and oscillatory motion. Prereq: Physics 232, 242; and Mathematics 212. *Knight.*

508 *Optics.* (3)
A lecture and problem course covering the basic phenomena of optics. Topics include thick lenses, apertures, wave motion, interference, diffraction, polarization, and the theory of selected optical instruments. Prereq: Physics 232, 242; and Mathematics 212. *Hanau.*

510 *Spectroscopy.* (3)
A lecture and problem course dealing with the production, recording, measuring, and interpretation of atomic and molecular spectra. Topics include basic principles of atomic structure, spectrographs, photometry, and spectrographic analysis. Prereq: Physics 232, 242; and Mathematics 212. *Hanau.*

512 *Experimental Physics: Electricity and Magnetism.* (2)
An advanced laboratory course in electrical measurements. It includes calibration and use of the quadrant electrometer, the d'Arsonval galvanometer and the Type K Potentiometer; absolute determinations of electrical quantities. Prereq. or coreq: Physics 516 or equivalent. *Gabbard.*

514 *Vacuum Tubes and Circuit Theory.* (3)
A lecture and problem course covering the theory of vacuum tubes and associated circuits. It includes the solution of selected electronic circuits by the method of the Laplace transform. Prereq: Physics 232, 242; and Mathematics 212. *Brandenberger.*

515 *Theory of Measurements.* (3)
A lecture and problem course in the analysis of experimental data. Topics include finding an empirical equation to fit a set of data, approximations, probability distributions, errors and deviations. Prereq: Physics 504 and Mathematics 212. *Hanau.*

516 *Electricity and Magnetism.* (3)
A lecture and problem course covering the theory of electrostatic fields, conductors, dielectrics, and steady currents. Prereq: Physics 232, 242; and Mathematics 212. *Weil.*

517 *Electricity and Magnetism.* (3)
A continuation of Physics 516. A lecture and problem course covering electromagnetic induction, magnetic fields, magnetic materials, alternating currents, and electromagnetic radiation. Prereq: Physics 516. *Weil.*

519 *X-rays and Crystal Structure.* (3)
A lecture and problem course dealing with the production and properties of x-rays. Topics include absorption, scattering, polarization, etc.; wave length measurement; the Compton effect and related quantum phenomena. Prereq: Physics 232, 242; and Mathematics 212. *Staff.*

522 *Heat and Thermodynamics.* (3)
A lecture and problem course stressing some of the fundamental principles of heat phenomena, the laws of thermodynamics, equations of state for ideal and real gases, continuity, derivation of thermodynamic relations. Prereq: Physics 232, 242; and Mathematics 212. *Brandenberger.*

523 *Heat and Thermodynamics.* (3)
A continuation of 522, dealing with thermodynamic functions, thermodynamic equilibrium, the phase equilibria, ionic equilibrium, electromotive force and free energy, surface phenomena, radiation. Prereq: Physics 522 or equivalent. *Brandenberger.*

524 *Solid State Physics.* (3)
Structure of solids; bonding, solid types, lattice energy; thermal, dielectric, and magnetic properties; electrons in metals and semi-conductors; theory of rectifiers, transistors and solid state devices. Prereq: Physics 232, 242; Mathematics 212. *Gildart.*

525 *Experimental Physics: Heat.* (2)
Thermal and electrical conductance in solids, photoelectric effect, photoresistive effect, rectification, transistor action, diffusion, Hayne's experiment. Prereq: Physics 524. *Gildart.*

530 *Experimental Physics: Spectroscopy.* (2)
An advanced laboratory course in the use and properties of various light sources, spectographs, photographic materials, and photometric methods; analysis of unknown materials by spectrographic methods. Prereq: Physics 510 or 508. *Hanau.*

534 *Experimental Physics: Vacuum Tubes.* (2)
An advanced laboratory course dealing with the measurements of circuit and vacuum tube constants, and the experimental study of amplifiers, oscillators, pulse generators, saw-tooth generators, etc. Prereq. or concur: Physics 514 or equivalent. *Staff.*

535 *Experimental Physics: Atomic and Nuclear.* (2)
Measurement of e, e/m, h/e, resonance potentials, X-ray absorption, half-lives, beta-ray and gamma-ray absorption, gamma spectra, specific activity, alpha particle ranges, and radiation dosage. Prereq: Physics 555 or concur. *Gabbard.*

538 *Experimental Physics: Light.* (2)
An advanced laboratory course dealing with the properties of lenses, mirrors, prisms, gratings, and combinations of these elements in optical systems. The important phenomena of optics are studied experimentally. Prereq: Physics 508. *Hanau.*

554 *Fundamental Atomic and Nuclear Physics.* (3)
Atomic models, electromagnetic radiation, special theory of relativity, X-rays and crystal structure. Compton effect, wave nature of matter, atomic spectra, vector model, Zeeman effect. Prereq: Physics 232, 242; Mathematics 212. *Gabbard.*

555 *Fundamental Atomic and Nuclear Physics.* (3)
Nuclear size; concepts of spin, parity, and statistics; alpha, beta, and gamma decay; natural radioactivity; nuclear reactions; systematics of nuclei; nuclear forces, fission and fusion. Prereq: Physics 554. *Gabbard.*

556 *Nuclear Reactor Physics.* (3)
A lecture and problem course covering nuclear fission and neutron diffusion as they enter into reactor theory; physical principles of reactor design; time behavior of reactors. Prereq: Physics 555. *DeMarcus.*

598,599 *Introduction to Quantum Mechanics.* (3 ea.)
A lecture and problem course providing an introduction to quantum mechanics at the undergraduate level. Primary emphasis is on one-dimensional problems so that fundamental ideas can be assimilated without complications of purely mathematical nature. Basic postulates, Schrodinger's wave equation and its applications. Prereq: Physics 232, 242; Mathematics 431. *Kern.*

604 *Classical Mechanics.* (3)
The methods of Lagrange and Hamilton and their application to particles, systems of particles, and continuous media; variational principles; transformation theory. Prereq: Physics 504; Mathematics 431. *Staff.*

605 *Kinetic Theory of Matter.* (3)
A course of lectures covering the classical kinetic theory of gases. Topics include the theorems of Clausius, Joule, Maxwell and Boltzmann; Brownian movements, development of equations of change of state. Prereq: two 500 courses in Physics and Mathematics 431. *DeMarcus.*

608 *Microwaves.* (3)
A lecture and problem course reviewing electromagnetic wave theory with emphasis on solutions of Maxwell's wave equations and their applicatiqns to the modern problems of microwave transmission. Prereq: Physics 516; Mathematics 431. *Staff.*

612 *Conduction of Electricity Through Gases.* (3)
A lecture course covering the basic phenomena of electrical discharge in gases at low pressure. Topics include the formation of ions, their mobility, diffusion, and recombination; representative discharges. Prereq: Physics 516, and either 510 or 554; and Mathematics 431. *Cochran.*

613 *Electromagnetic Theory.* (3)
A lecture course dealing with the application of classical electromagnetic theory to the optical phenomena of reflection, refraction, polarization, and absorption. Prereq: Physics 516 and 508; Mathematics 431. *Staff.*

614 *Transient Electric and Vacuum Tube Phenomena.* (3)
A lecture course dealing with transient currents in circuits containing variable amounts of inductance, capacitance, and resistance. Both the methods of differential equations and of the Laplace transform are used. Prereq: Physics 514 or 516; and Mathematics 431. *Staff.*

616 *Theoretical Physics.* (3)
A lecture and problem course presenting the basic aspects of theoretical physics in a unified way. Representative topics: advanced dynamics, hydrodynamics, elasticity. Prereq: two 500 courses in physics; and Mathematics 431. *Schrils.*

617 *Theoretical Physics.* (3)
A continuation of 616 dealing with statistical mechanics, themodynamics, electrodynamics, relativity, quantum theory. Prereq: Physics 616 or equivalent. *Schrils.*

618 *Thermodynamics.* (3)
A review of the two classical laws of thermodynamics and their dynamical and statistical mechanical support; Nernst's heat theorem; applications of classical theormodynamics to important problems, relativity thermodynamics. Prereq: Physics 522; Mathematics 431. *Kern.*

624 *Theory of the Solid State.* (3)
A lecture and problem course covering the fundamental theory of the structure and properties of complex atoms, molecules, liquids and solids. Topics include mechanical, chemical and thermal properties of matter. Prereq: Physics 714 or equivalent. *Gildart.*

629 *Nuclear Physics.* (3)
A lecture and problem course dealing with advanced experimental nuclear physics. Topics include properties of nuclei, nuclear transformations, observational methods, radioactivity and interaction of radiation with matter. Prereq: Physics 616 or equivalent. *Kern.*

630 *Nuclear Physics.* (3)
A lecture and problem course concerned with the theories of the structure of atomic nuclei. Topics include nuclear shell structure, internuclear forces, nuclear binding energies, and theory of nuclear reactions. Prereq: Physics 616 or Physics 714 or equivalent. *McEllistrem.*

631 *Atomic Structure.* (3)
A lecture and problem course treating the theory of atomic structure. Topics include atomic and molecular spectra, multiplet structure, interatomic and intermolecular forces, and quantum mechanical treatment of the vector model. Prereq: Physics 714 or equivalent. *McEllistrem.*

632 *Statistical Mechanics.* (3)
A lecture and problem course dealing with the thermal properties of matter from the standpoint of statistical mechanics. Topics include thermodynamic properties, perfect gases, and Fermi-Dirac statistics. Prereq: Physics 522 and 616. *McEllistrem.*

639,640 *Theoretical Astrophysics.* (3 ea.)
A study of those branches of physics which have thus far proved most useful in astronomical applications and a thorough treatment of several major astronomical problems which have been elucidated by these methods. Prereq: Physics 617, 554 or equivalent. *DeMarcus.*

650 *Cosmic Rays and Relativistic Phenomena.* (3)
A lecture and problem course dealing with the field of cosmic rays. Topics include relativity theory, interaction of cosmic rays with matter, shower theory, properties and production of mesons. Prereq: Physics 617 or equivalent. *Staff.*

651 *Physics of Elementary Particles.* (3)
Lectures and problems on topics which include elementary particles, meson theory, particle interactions (pion-nucleon, nucleon-nucleon, nucleon-nucleus), strange particles. Prereq: Physics 555, 617. *Staff.*

652 *Theory of Elementary Particles.* (3)
A lecture and problem course dealing with the application of modern theoretical concepts to elementary particle systems. Prereq: Physics 714. *Staff.*

706 *Methods of Mathematical Physics.* (3)
Solution of physical problems systematized according to the equations they satisfy. Variational methods, boundary conditions, eigenfunctions, Green's functions, integral representations, approximation procedures, with applications from electromagnetic theory, quantum mechanics, acoustics. Prereq: consent of instructor. *Staff.*

714 *Quantum Mechanics.* (3)
A lecture course covering a brief review of the origin of quantum theories, mathematical techniques of quantum mechanics, the general aspects of wave mechanics and matrix mechanics, the uncertainty principle. Prereq: Physics 616 or equivalent. *Kennedy.*

715 *Quantum Mechanics.* (3)
A continuation of 714 with extensions into special methods of solving problems in the theory, problems in more than one dimension, and the Pauli and Dirac theories of the electron. Prereq: Physics 714 or equivalent. *Kennedy.*

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis.
Staff.

769 *Residence Credit for the Doctor's Degree.* (1 to 18 wks. residence)
May be repeated indefinitely.
Staff.

770 *Seminar.* (1)
A weekly meeting of the staff and graduate students of the department for presentation and discussion of recent developments in physics and of work in progress in the department. May be repeated to a maximum of eight credits.
Senior Staff.

781 *Independent Work in Physics.* (3)
May be repeated to a maximum of twelve credits.
Senior Staff.

790 *Research in Physics.* (3)
May be repeated to a maximum of six credits.
Senior Staff.

791 *Research in Physics.* (5)
May be repeated to a maximum of ten credits.
Senior Staff.

ASTRONOMY

591 *Cosmology I.* (3)
Consideration of observational basis of cosmology, cosmological theories of general relativity, the steady state theory, and kinematic relativity. Prereq: M&A 431. *Krogdahl.*

593 *Advanced Celestial Mechanics II.* (3)
The three—and n-body problems; special solutions; potential theory. Prereq: Celestial Mechanics I (MA 391) or equivalent.

POLITICAL SCIENCE

Graduates of accredited colleges may become candidates for a Master's degree in Political Science. Students who are deficient in Political Science

background must make up such deficiencies by taking such additional courses as may be recommended by the Department.

Approximately two-thirds of the twenty-four semester hours required for the Master's degree must be taken in Political Science. Twelve semester hours of the work in Political Science must be in courses open only to graduate students.

Admission to candidacy for the Doctor's degree in Political Science is governed by the regulations of the Graduate School. These regulations require a qualifying examination taken by the candidate during or after his fourth semester of full-time graduate study or its equivalent in those fields considered relevant to his program, such determination of fields to be made by the candidate's program committee. Normally, twenty-four of the total semester hours presented by the candidate must be in strictly graduate courses. Candidates for either a Master's or a Doctor's degree in Political Science are expected to have a knowledge of the related social sciences as a background for work in political science.

On recommendation of the student's Special Committee only one modern foreign language may be required for the Ph.D. degree in Political Science.

Upon completion of the above requirements, the candidate must take an oral examination covering primarily the dissertation and the field in which the dissertation falls.

Additional details concerning departmental requirements may be secured from the Chairman of the department.

I. COMPARATIVE GOVERNMENT

520 *Government and Politics of South Asia.* (3)
A study of the political institutions of South Asia and their position in world politics. Prereq: P.S. 265.

550 *Government and Politics in Subsaharan Africa.* (3) II
The course will focus on the relationship between ideologies, institutions, and individuals in African political systems. Implications of these factors for African political behavior (domestic and international) will be examined. *Magid.*

555 *Comparative Government-Parliamentary Democracies.* (3) I, S
A study of the governments of Great Britain and the Dominions, France, and Scandinavia. *Drennon.*

556 *Government and Politics of the Soviet Union.* (3) II, S
Analysis of political development in the Soviet Union with emphasis on party-government relations, Communist ideology, and major approaches to the study of Soviet Politics. *Drennon.*

568 *The Governments and Politics of Eastern Asia.* (3)
An introductory study of the political institutions of China, Japan. *Chambliss.*

569 *Latin American Government and Politics.* (3)
A study of contemporary Latin American political institutions and of the dynamics of the Latin American political process.

757 *Seminar in Comparative Democratic Political Systems.* (3)
An analysis of democratic political systems with emphasis upon the comparative approach as a method of political analysis. Prereq: PS 555 or consent of instructor. *Drennon.*

759 *Seminar in African Political Systems.* (3) I
The seminar will focus on dimensions of change in African political systems. Dimensions to be analyzed include ideology, economic development, socialization, authority, political recruitment and political party and interest group behavior. *Magid.*

776 *Political Development of Southeast Asia.* (3)
Study of the processes of political change in Southeast Asia; concepts, approaches and methodology; problems of political development; research problems in studying political development in Southeast Asia. *Butwell.*

II. INTERNATIONAL LAW AND DIPLOMACY

501 *Latin American Relations.* (3) II, S
The relations between the United States and the Latin American countries, with emphasis on the Monroe Doctrine and Pan-Americanism. *Drennon.*

530 *The Conduct of American Foreign Relations.* (3)
The formulation, conduct, and control of American foreign policy, basic principles, comparison with other countries. Prereq: P.S. 151.

541 *The Foreign Policy of the Soviet Union.* (3)
A survey of the Soviet record in foreign affairs and an introduction to the guiding concepts and the principal techniques of Soviet foreign policy. Prereq: P.S. 556.

550 *International Law.* (3) II
Sources and sanctions of international law, recognition, intervention, jurisdiction; nationality; protection of citizens abroad; diplomatic intercourse of states; treaties; and the treatment of aliens.

566 *The United Nations.* (3) II, S
Background of the United Nations; functions and development of the chief organs and affiliated agencies; the Great Power Veto; problems; achievements.

758 *Seminar in Soviet Politics, Government, and Foreign Policy.* (3)
Emphasis on methodology of various approaches to the study of the USSR as well as substantive research. Subjects will alternate yearly between Soviet Politics and Soviet Foreign Policy. Prereq: PS 541, and 556, or permission of instructor.
May be repeated to maximum of six credits.

774 *International Relations and Organization.* (3) II
Social and economic factors leading to the establishment of international administrative organs, the International Labor Organization, the League of Nations; the United Nations and related organizations.

775 *Contemporary American Diplomatic Problems.* (3) I, S
An examination of the more important current problems of American foreign policy.

Related Courses in Other Departments

Economics 527 International Economics.

History 500 & 501 The Diplomacy and Foreign Policy of the United States.

History 565 & 566 The British Empire.

History 583 Europe Since 1919.

History 584 Russian Revolutions and the Soviet System I.

History 587 Russian Revolutions and the Soviet System II.

History 589 History of Russian Social and Political Thought, 1789-1914.

History 591 Political and Diplomatic History of East Central Europe from the French Revolution to the end of World War I.

History 594 Political and Diplomatic History of East Central Europe since World War I.

History 595 & 596 The Far East.

Law 540 Conflict of Laws

III. THE POLITICAL PROCESS

570 *Political Parties.* (3) I, II

An analysis of the organization and functioning of political parties in the United States, historically and at present, and a survey of the impact of pressure groups on political parties and political action. *Jewell.*

573 *Public Opinion.* (3)

A study of the nature of public opinion and its influence on government, the role of the press, and other media, propaganda techniques, and voting behavior.

576 *Legislative Process.* (3) II

A study of Congress and the state legislatures, covering the legislative power structure, the selection of legislators and the roles they play, decision-making, and the relations of the legislative and executive branches. *Jewell.*

779 *Voting Behavior.* (3) I

A study of recent research in the field of voting behavior, including analysis of survey research techniques. Prereq: An undergraduate course in parties or public opinion, or consent of instructor.

780 *Legislative Behavior.* (3) II

A study of recent research in the legislative process, emphasizing both the substantive and methodological aspects. Prereq: An upper-division course in the legislative process or consent of instructor. *Jewell.*

Related Course in Other Department

Psychology 544 Social Psychology.

IV. PUBLIC ADMINISTRATION

577 *Introduction to Public Administration.* (3) I, S

A study of theories of administrative problems of line management and of staff and auxiliary functions, and the problem of administrative responsibility.

578 *Public Personnel Administration.* (3) II

A survey of the concept of the merit system in public administration, recruitment, position classification, pay policies, employee relations and morale, tenure, promotion, transfer, and training in the public service.

579 *Public Policy for Private Enterprise.* (3)

A study of the development and implementation of government regulatory policy with major emphasis in the fields of anti-trust and public utilities.

790 *Special Problems in Public Administration.* (3) I

A research course in selected problems of public administration. The problems will be selected in accordance with the needs and desires of students registered for the course.

791 *The Organization as a Political System.* (3)

Examination of theoretical concepts pertaining to the design of organizational structure and the prediction and control of administrative behavior, including detailed analyses of the models evolving from traditional, behavioral and decision-making approaches to the study of political systems.

Related Courses in Other Departments

Economics 402 Labor Problems.

Economics 504 Public Finance.

Economics 524 State and Local Taxation.

Economics 530 Labor Legislation.

Law 542 Administrative Law.

Social Work 500—Public Welfare Administration.

Social Work 530 Community Organization.

Social Work 551 Public Assistance.

V. PUBLIC LAW AND JUDICIAL BEHAVIOR

559 *American Constitutional Development.* (3) I, S
Historical survey of the making of the constitution and its interpretation through principal statutes and judicial decisions down to 1870. *Trimble.*

560 *American Constitutional Development.* (3) II
Continuation of the above survey from 1870 to the present.

563 *The American Judicial Process.* (3)
A study, from the standpoint of the social sciences, of the judicial process at the state and national levels, dealing with the organization of courts, the making of judicial decisions, and the exercising of judicial power. *Ulmer.*

761 *The Constitution and Civil Rights.* (3) I, S
The American conception of civil rights as expounded by the Constitutional Fathers and as interpreted by the courts. The social implications of these rights. *Trimble.*

762 *Federal Centralization.* (3) II
A study of the shifting of power and control from the states to the federal government as a result of the economic development of the country and the alteration of our constitutional system. *Trimble.*

764 *Seminar in Judicial Behavior.* (3)
A survey of published research in judicial behavior and a study of the methodological innovations in this field. Prereq: Permission of instructor. *Ulmer.*

VI. STATE AND LOCAL GOVERNMENT

540 *Rural Local Government.* (3)
A study of local government in rural America with particular emphasis upon county government. *Vanlandingham.*

552 *Municipal Government.* (3) I, II
A course in the study of the structure and functions of modern city governments with considerable attention to governments situated within metropolitan areas. *Vanlandingham.*

553 *Urban Government and Politics.* (3) I, II
An analysis of the formulation of public policy in small towns, middle-sized cities, and metropolitan areas. A theoretical model appropriate to all three settings will be formulated. The principal methods of studying community decision-making will be evaluated. *Booth.*

574 *Kentucky Government and Constitution.* (3) II
An intensive study of government and administration in Kentucky. The course is intended primarily for teachers of civics in the secondary schools, and for teachers of government in colleges. *Reeves.*

751 *Seminar in Metropolitics.* (3) I
Overview of research on Metropolitan Government and Politics; power structures, voting behavior and elections in Metropolitan areas; emphasis on student research in Metropolitan problems. Prereq: PS 553 or consent of instructor. *Booth.*

752 *Problems in State and Local Government.* (3) II
An intensive study of the basic problems of state and local government. Varying emphasis will be given, particular problem areas consistent with the background and needs of the student. Added emphasis will be given also to such current problems as are of fundamental importance. *Booth.*

VII. THEORY

571 *Early Political Theory.* (3) I
Political theories of classical Greece and Rome, the Middle Ages, the Reformation, and the emergence of the modern national state.

572 *Modern Political Theory.* (3)
Political theories of the modern age, including the national state and nationalism, individualism, conservatism, idealism, utilitarianism, and revolutionary socialism.

575 *Contemporary American Political Thought.* (3)
Analysis of American political ideas with particular emphasis upon varied conceptions of government's role in and relation to the large society and its individual and group components.

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis. *Staff.*

769 *Residence Credit for the Doctor's Degree.* (1 to 18 wks. residence)
May be repeated indefinitely.
Staff.

770 *Seminar in Contemporary Political Theory.* (3) I, S
An intensive study of the nature of the contemporary ideologies of socialism, communism, syndicalism, pluralism, anarchism, fascism, political and social democracy. *Pranger.*

771 *Political Inquiry and Analysis.* (3) I, II
Analysis of the application of scientific method to the study of political phenomena; problems of concept formation; law, cause, and explanation; theory construction; and the place of values in political inquiry.

795 *Independent Work.* (3) I
Reading course on graduate level directed by members of staff qualified to direct graduate work. It will involve selection of the material, books, research reports, etc. to be read by the student under the direction of a staff member. *Staff.*
May be repeated to a maximum of six credits.

PSYCHOLOGY

The department's graduate program includes work leading to the master's degree in general psychology and to the Ph.D. degree in the fields of clinical or general psychology, the latter with concentration in any of the various areas represented in the department.

The clinical training program includes experience in a variety of clinical facilities, such as the University of Kentucky Medical Center, the U.S. Veterans Administration Hospital, the U.S. Public Health Service Hospital, and Kentucky State institutions.

The Department is affiliated with the University testing and counseling services. The records of scores obtained by students on various tests of intel-

ligence, aptitudes, and achievement are available to graduate students who wish to do research on problems of student personnel.

The Department cooperates in the operation of the Child Guidance Service.

Laboratories for the study of animal behavior are provided and equipped for research and class work on white rats and other lower animals.

Special departmental requirements for admission: three letters of recommendation and scores on the Verbal, Quantitative, and Advanced Psychology parts of the Graduate Record Examination. Applicants are admitted without GRE scores only in special cases in which the academic record is exceptional. Scores on the Miller Analogies Test are considered, when available.

On recommendation of the student's Special Committee only one modern foreign language may be required for the Ph.D. degree in Psychology.

505 *Experimental Psychology.* (4) I

An experimental study of the nature of sensation and perception—the process by which we know the world through our senses: vision, hearing, taste and smell, the skin senses. Prereq: Psychology 100. *Donahoe.*

506 *Laboratory to Accompany 505.* (0)

Two hours.

507 *Psychology of Learning.* (4) II

Fundamental principles and findings from laboratory investigations of classical, instrumental, and verbal learning. Prereq: PSY 100, 336, or equivalent.

508 *Laboratory to Accompany 507.* (0)

Two hours.

509 *Animal Behavior.* (4) I

Experimental techniques used in investigations of animal behavior. Topics include: heredity and environment, activity, instinct, motivation, learning, sensory discrimination, and personality in subhuman species. Prereq: Psychology 100. *Newbury.*

510 *Laboratory to Accompany 509.* (0)

Two hours.

511 *Experimental Child Study.* (3) I

An advanced course in the psychology of the normal child. The scientific background of experimental and observation method. Opportunities are provided to work with children. Prereq: Psychology 200. *Estes.*

520 *Mental Hygiene.* (3) II, S

A general orientation to the subject of mental hygiene, its historical development, its scope and relation to various sciences. The individual and cultural determinants of behavior will be discussed. Prereq: Psychology 100.

521 *Abnormal Psychology.* (3) I, II, S

A study of the major mental disorders, especially the psychoneuroses and the psychoses, and the biological, psychological, and sociological factors which contribute to their causation. Prereq: Psychology 104 or 210. *Pattie.*

522 *Counseling Psychology.* (3) I

The methods of dealing with problems in counseling psychology in college and high school, including the problems of selection, classification, grading, personal adjustment, motivation, academic, vocational and personal counseling. Prereq: Psychology 100. *Staff.*

523 *Psychology of the Criminal.* (2) I

A study of psychological factors involved in criminality, with special emphasis on the emotional and personality patterns underlying the life of the criminal, and the problems brought about by incarceration. Prereq: Psychology 100. *Watson.*

530 *Biology of Motivation.* (2) I

Fundamental activating and goal-seeking processes of living organisms, biologically considered, including experimental and theoretical studies on such topics as instincts, drives, motives, appetites, and the taste preferences. Prereq: Psychology 100. *Newbury.*

531 *Genetic Psychology.* (3) II

Influence of hereditary factors in the development of human behavior. A critical survey of the evidence regarding psychological traits such as musical and other special abilities, intelligence, and interests. Prereq: Psychology 100. *Newbury.*

535 *Psychological Testing.* (3) I

A general orientation to the field of psychological testing. Introduction to the principles and methods of psychological testing, and a survey of the various kinds of psychological tests. Prereq: Psychology 100, 201. *Staff.*

540 *Introduction to Industrial Psychology.* (3) I

Review of the functions and findings of psychology applicable to business and industry. Topics covered are: employment procedures, personnel testing, attitude analysis, motivation, and morale. Prereq: Psychology 100. *Corder.*

541 *Psychology of Industrial Personnel Procedures.* (3) II

A practical course for those preparing for personnel administration and for psychology in industry and business. A study is made of the theory and methods of position classification, job analysis, job evaluation, merit rating, supervisor selection and training, and collective bargaining. Prereq: Psychology 100. *Corder.*

544 *Social Psychology.* (3) I, S

Theoretical and empirical analysis of individual behavior in the social setting with particular emphasis on social learning, motivation, and the measurement, formation, and changing of social attitudes. Prereq: PSY 100. Same as SOC 544.

545 *Small Group Behavior.* (3) II

The course will systematically cover theoretical and empirical approaches to small groups. Attention will be given to certain group properties and how these properties have been manipulated experimentally. Prereq: one introductory course in psychology, one introductory course in sociology. *Lott.*

550 *Speech Pathology: a Survey.* (3) I, S

An introduction to the nature, causes and treatment of the major disorders of speech: articulation, stuttering, voice, cleft palate, hearing, cerebral palsy and aphasia. Prereq: Psychology 100. *Diehl.*

551 *Speech Pathology: an Introduction to Therapy.* (3) II

Observation and discussion of and limited supervised experience with therapeutic techniques and procedures of speech therapy. Prereq: 550 or may be taken concurrently. *Diehl.*

552 *Stuttering and Its Correction.* (3) II

The nature, causes and treatment of stuttering, with emphasis on therapeutic procedures. Prereq: Psychology 550. *Diehl.*

553 *Speech Mechanisms.* (3) I

A detailed investigation of the speech musculature: respiration, phonation, resonation, and articulation. Voice disorders and cleft palate will be given special emphasis. Prereq: Psychology 550. *Diehl.*

560 *Introduction to Clinical Audiology.* (3) II

Topics covered are the auditory stimulus, air and bone conduction thresholds, masking, speech audiometry and auditory rehabilitation. Prereq: Psychology 550. *Kodman.*

561 *Audiometry.* (3) I, S

Methods and techniques for evaluating the hearing of large samples (school children, industry, etc.). Study of test instruments, calibration and variables in testing procedures. Essentials of hearing conservation. Prereq: Psychology 560 or consent of instructor. *Kodman.*

562 *Introduction to Hearing Disorders.* (3) II
Types of hearing loss. Classification of organic hearing disorders. Non-organic hearing disorders. Psychological effects of impaired hearing. Differential diagnosis. Prereq: Psychology 551 and 560. *Kodman.*

563 *Advanced Clinical Methods for the Aurally Handicapped.* (3) S
Principles and methods of speech and hearing therapy including speech reading, auditory training, speech conservation and hearing aid counseling for children and adults. Prereq: Psychology 562 or equivalent. *Kodman.*

600 *Systems of Psychology and Their History.* (3) I
A survey of the history of psychology and an intensive study of current systems of psychology. *Pattie.*

601 *Theories of Learning.* (3) I
A systematic presentation and critical analysis of the major theories of learning. Prereq: Psychology 505, 507, 600. *Horton.*

602 *Theories of Personality.* (3) II
An examination of current theories of personality. The relation of these theories to psychological research will be examined. Prereq: Psychology 505, 507 or equivalent, and 600.

603 *Psychopathology.* (4) II
Problems of differentiation between the various neuroses and psychoses with emphasis upon the affective and conative factors. Prereq: Psychology 521, 602. *Dimmick.*

606,607 *Proseminar in General Psychology.* (3 ea.) I, II
An intensive treatment of concepts, methodology, and current developments in several areas of psychology. Prereq: undergraduate major in psychology or equivalent. 607 may be taken before 606. *Staff.*

610 *Psychometrics.* (3) I
Analysis and interpretation of human measurements. The course deals with the computation and interpretation of simple, partial, and multiple correlations, regression equations, and reliability of measures. Prereq: Psy. 336 or equivalent. *Calvin.*

611 *Psychological Research.* (3) II
A study of the application of experimental methods in the major areas of psychology, including sensation and perception, learning, motivation, emotion, and personality. The design of research studies will be emphasized. Prereq: Psychology 505, 507, 610. *Donahoe.*

618 *Areas of Research in Psychopathology.* (4) I
A consideration of the research evidence of several problems in psychopathology. Prereq: One course each in abnormal psychology, statistics, and experimental psychology. Permission of instructor required.

630 *Clinical Psychology.* (3) II
A survey of basic theoretical issues and research in the areas of assessment and psychotherapy, and of ethical, legal, and other professional problems in clinical psychology. Prereq: none.

631 *Psychology of Language.* (2) II
A survey of semantic uses of languages as related to human behavior. Special attention will be given to language problems of brain injured; aphasic, cerebral palsied, and mentally disordered. *Diehl.*

640 *Practice in Testing: Intelligence Tests.* (3) II
This course provides advanced laboratory practice in the measurement of intelligence by individual techniques. Six hours a week. Prereq: Psychology 535 or equivalent. *Estes.*

641 *Psychological Measuring Instruments.* (3)
A study is made of a wide variety of psychological tests including group intelligence tests, personality and interest inventories, area aptitude tests, and special aptitude tests. Prereq: Psychology 201.

642 *Principles of Test Construction.* (3)
A survey of the principles involved in different types of standardized tests, followed by the construction and item analysis of an original test by the student. Prereq: Psychology 610.

643 *Test Standardization.* (3)
A continuation of 642. The student will administer a revised form of his preliminary test to an adequate sampling of the appropriate population and will determine its reliability and validity. Prereq: Psychology 642.

644,645 *Projective Techniques.* (3 ea.) I, II
Projective tests as instruments in obtaining information concerning thought content, attitudes and feelings; their use in clinical diagnosis and therapy. Practice in administering, scoring, and interpretation. Prereq: Psychology 630, 640. *Dimmick.*

646 *Clinical Testing.* (3) I
A survey of the structure, uses, and relevant research literature of quantitative techniques of testing in clinical psychology. Prereq: PSY 610 or equivalent.

650 *Diagnosis and Counseling in Counseling Psychology.* (3)
An advanced course in diagnosis and application of theories, techniques and tools in counseling psychology. Prereq: A graduate major in psychology or education.

651 *Psychotherapy.* (3) I
Theories and techniques of psychotherapeutic procedures including directive, non-directive, and play therapies. Demonstration and supervised experience in these techniques. Prereq: Completion of one year of graduate study in psychology. *Dimmick.*

652 *Medical Therapeutic Procedure.* (1)
Rationale, procedures, and results of four important psychiatric therapeutic methods: (1) electrical and pharmacological shock, (2) narcohypnosis or drug-analytic methods, (3) malaria and other types of fever therapy, and (4) prefrontal lobotomy.

653 *Medical Therapeutic Procedure.* (1)
This course presents the history, rationale, indications, procedures, and results of psychotherapeutic methods.

661 *Practicum in Clinical Psychology.* (3) I, II
Intensive supervision of diagnostic evaluation and treatment with individual patients, both adults and children, in various inpatient and outpatient settings. Prereq: PSY 640, 644, 645. Open only to clinical students of advanced standing with permission of instructor. Min. of 6 credits required. May be repeated to a maximum of 12 credits.

662 *Practicum in Child Psychology.* (3) I, II
Nine hours of supervised work each week. *Estes.*
May be repeated to a maximum of twelve credits.

663 *Practicum in Industrial Psychology.* (3)
May be repeated to a maximum of twelve credits.

664 *Practicum in Speech Therapy.* (3) I, II, S
Practical case work in speech therapy in speech clinic, hospitals, and public schools. Training in diagnostic examinations, case history methods, and group therapy. Prereq: Psychology 550, 551. *Diehl.*
May be repeated to a maximum of six credits.

665 *Practicum in Counseling Psychology.* (3) I, II, S
Supervised experience in application of diagnostic and interviewing techniques in a counseling service.
May be repeated to a maximum of twelve credits.

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis.
Staff.

769 *Residence Credit for the Doctor's Degree.* (1 to 18 wks. residence)
May be repeated indefinitely.
Staff.

770 *Seminar in Psychology, I.* (0) I, II
One two-hour discussion each week on a research problem under investigation by a graduate student or staff member. For M.A. candidates. *Staff.*
May be repeated indefinitely.

771 *Seminar in Psychology, II.* (0) I, II
One two-hour discussion each week on a research problem under investigation by a graduate student or staff member. For Ph.D. candidates. *Staff.*
May be repeated indefinitely.

772 *Seminar in Learning.* (3) I
The study of selected topics in the learning area with emphasis on the recent experimental and theoretical literature. May be repeated to a maximum of 6 credits.

774 *Seminar in Verbal Behavior.* (3) II
The study of selected topics in the area of verbal behavior with emphasis on recent research and theory. Prereq: Consent of instructor.
May be repeated to a maximum of six credits.

776 *Seminar in Animal Motivation.* (3) II
A variety of topics in motivation and unlearned behavioral determinants in sub-human species will be treated intensively in comprehensive reports based on the research literature and related to such problems as instinct, drive theory, activation, stress, work decrement, and neural components. Human implications may also be considered. Prereq: Consent of instructor.

777 *Seminar in Mathematical Psychology.* (3)
Topics in psychology which are receiving detailed mathematical analysis. Examples are mathematical learning theory, decision and judgment processes, advanced application of probability and statistics in psychological theory. Prereq: Psychology 610.

779 *Seminar in Social Psychology.* (3) II
Each semester some topic in the field of social psychology such as attitudes and beliefs, structure and function of social groups, social determinants of behavior, leadership, and morale will be studied intensively. Same as Soc. 779. *Lott, DeFleur.*
May be repeated to a maximum of six credits.

780 *Problems in Psychology.* (2) I, II, S
Shorter research problems are registered under this number. A minimum of six hours per week is required in consultation with the instructor. *Staff.*
May be repeated to a maximum of twelve credits.

790 *Research in Psychology.* (3) I, II, S
Research or thesis work may be registered under this number. A minimum of nine hours a week is required on research conducted in consultation with the instructor. *Staff.*
May be repeated to a maximum of twelve credits.

RADIO-TV-FILMS

While no advanced degrees are offered at present with a major in Radio-TV-Films, graduate students may find the following courses of value if they are interested in any phase of radio, television or film work.

Departmental facilities include an FM transmitter, two studios, two announce booths, two studio control rooms, music library, news wire, sound-on-film recording studio, and complete 16 mm film equipment and editing facilities.

501 *Radio-TV Regulations.* (2)
A detailed study of the Communications Act of 1934; the Rules and Regulations of the Federal Communications Commission as they apply to standard broadcasting; a study of the history of regulations with emphasis on pertinent court cases; station application procedures; music licensing regulations; censorship; libel and slander; and other regulatory and management problems. Lecture, 2 hours. *Cowgill.*

505 *Advanced Radio-TV Announcing.* (2)
Preparation for the disciplines of the announcing profession; to improve the student's oral reading ability, speech habits, and power of communication; to develop the art of speaking the broadcasting language; and to develop the ability to speak effectively extemporaneously. Lecture, 2 hours. Prereq: R-T-F 201. *Hallock.*

506 *Laboratory to Accompany 505.* (0)
Two hours.

510 *Radio and Television Advertising.* (2)
A study of the fundamental principles of advertising in American Broadcasting to learn the criteria for successful Radio and TV advertising. To develop the art of selling and creative thinking; and to provide training and opportunities for the planned development of advertising campaigns by broadcast media. Lecture, 2 hours. *Hallock.*

515 *Radio and Television Script Writing.* (2)
A study of the various forms of effective radio and television writing including commercials, news, speech, music, promotion, special events, and documentary. To provide an understanding of radio and television drama, the elements and construction thereof. To develop a proficiency in writing basic continuities, the vertebrae of contemporary broadcasting. Lecture, 2 hours. *Reilly.*

516 *Laboratory to Accompany 515.* (0)
Two hours.

520 *Radio-TV Production.*
Introduction to the skills, techniques, and problems of directing for television and radio. General procedures are outlined. Application of procedures during studio problems and projects. Lecture, 2 hours. *Reilly.*

521 *Laboratory to Accompany 520.* (0)
Two hours.

525 *Radio-TV Advanced Production.* (2)
A continuation of 520. Further problems in producing and directing, including research on assigned projects for TV and Radio broadcast. Recitation one hour per week. Lecture, 2 hours. Prereq: R-T-F 515 and 520. *Reilly.*

526 *Laboratory to Accompany 525.* (0)
Two hours.

530 *Pro Seminar.* (1)
A consideration of the role of broadcasting in our society. Problems to be solved by broadcasting. Consideration of relation of broadcasting to other mass media in structure, function, control, content, effects, and research. Lecture, 1 hour. Prereq: consent of instructor. *Replogle.*

535 *Motion Picture Production Techniques.* (3)
A study of methods, procedures, and principles involved in a motion picture production, theory and application of camera operation, editing, lighting, and sound. Each student must write, produce and direct a short film. Lecture 3 hours. Prereq: Consent of instructor. *MacLeod.*

536 *Laboratory to Accompany 535.* (0)
Two hours.

RUSSIAN

561,562 *Survey of Russian Literature.* (3 ea.) I, II, S
An outline of Russian literature in lecture to be accompanied by representative readings in Russian. *Moore.*

SOCIAL WORK

Courses in Social Work listed below may be taken for graduate credit. Major programs of study in this field leading to advanced degrees are not offered at the present time.

500 *Public Welfare Administration.* (3) II
Philosophy, background, and methods of tax-supported social work. The inter-relationship of federal, state and local services; standards and supervision as influenced by federal welfare legislation. Prereq: two courses in social work. *Wetzel.*

505 *Child Welfare Services.* (2 or 3) I, S
A study of community and national programs for child care and protection, including aid to dependent children and other social security services. *Theobald.*

510 *Psychiatric Information for Social Workers.* (2) I
An analysis of personality development and behavior patterns with special reference to psychiatric interpretations and their implication for social case work. Prereq: two courses in social work or special permission. *Gail.*

513 *Introduction to Social Case Work.* (2) II
An introductory course in the generic principles of social case work. Discussion based on selected readings and case records. Prereq: two courses in social work or special permission. *Theobald.*

516 *Social Work Research and Statistics.* (3) I
A consideration of statistical and other types of research in social work problems with illustrations drawn from current studies of government and private welfare agencies. Prereq: two courses in social work. *Wetzel.*

530 *Community Organization for Social Welfare.* (3) I, S
Methods and techniques of social welfare planning. Analysis of needs and resources, coordination of agencies, financing and developing chest and council programs, and the interpretation of social work. *Wilson.*

531 *Community Organization for Social Welfare.* (3) II
A continuation of 530 with special emphasis on the organization and function of national and international welfare agencies. Prereq: S.W. 530 or permission of instructor. *Wetzel.*

540 *Principles of Social Group Work.* (3) I, S

A critical study of the theories and practices of social group work with reference to the work of public and private agencies in this field. *Wilson.*

541 *Administration and Supervision of Group Work Agency Programs.* (3) II

The group work process as applied to agency administration, supervision of staff and volunteers, statistical and process recording, evaluation of program, personnel and committee relationships in the group work field. Prereq: S.W. 540 or permission of instructor. *Wilson.*

551 *Public Assistance Programs.* (3) II

A study of the current function of public assistance upon the federal, state and local levels with emphasis on the public assistance provisions of the Social Security Act, general relief, and work relief policies. *Wetzel.*

617 *Generic Social Case Work.* (2) II

An introductory course for graduate students with emphasis upon the application of case work in problems of increasing complexity. Prereq: S.W. 513, or special permission. *Theobald.*

625 *Social Insurance.* (2) II

A study of social insurance in Europe and the United States. Emphasis will be given to the problems in administration, financing, and coverage. *Wetzel.*

SOCIOLOGY

Graduates from accredited colleges who meet the requirements of the Graduate Program in Sociology and the Graduate School may work toward the following advanced degrees with major work in sociology: Master of Arts, Master of Science in Agriculture, and Doctor of Philosophy.

Each entering student is assigned an adviser according to his field of interest, and his program is planned in consultation with the Director of Graduate Study in Sociology.

On recommendation of the student's Special Committee only one modern foreign language may be required for the Ph.D. degree in Sociology.

A special examination is given to all incoming graduate students near the end of their first year of study at the University of Kentucky. Beginning students who perform at a high level on this examination are invited to by-pass the master's thesis and proceed directly to doctoral work. When they successfully pass the doctoral Qualifying Examination, they are awarded a Master of Arts degree. This can substantially accelerate their degree program.

To aid in financing graduate education, a considerable number of assistantships, fellowships and other stipends are available to qualified students.

In addition to teaching a full program of graduate courses and seminars, sociologists at the University of Kentucky carry on a substantial variety of research projects, consultative activities, extension education programs and community services. Through affiliations with nearby institutions, specialized experience and training is available to graduate students. The Addiction Research Center, U.S. Public Health Service, located near Lexington offers research assistantships for qualified degree candidates in sociology. The Department of Corrections of the Commonwealth of Kentucky provides research opportunities within the prisons and other correctional institutions of the state. Experience in the rural socio-

logical research of the Agricultural Experiment Station and applied sociology experience in the Agricultural Extension Service are available through the Department's participation in these programs.

Special training programs in demography and in social change are also available. The Department participates in the University's Developmental Change Center which is devoted to the interdisciplinary research and training in planned change. The Department of Behavioral Science of the College of Medicine includes sociologists on its staff and regularly conducts research and other activities of a sociological nature. Sociology graduate students with appropriate interests and training are eligible for assistantships and other appointments in these fields. These various affiliations make possible an unusually rich set of opportunities from which students can gain professional experience.

501 *Population Analysis.* (3) I
Distribution and composition, fertility and mortality, migration, ecological relationships and growth of population. Prereq: SOC 151 or consent of instructor. *Hillery.*

502 *Methods of Demographic Analysis.* (3) II
Application of statistical techniques employed in the analysis of census and vital statistics data, including methods of population standardization, life table construction, and preparation of population estimates. Prereq. or taken concurrently: SOC 501 and one of the following introductory statistical courses: ECO 207, BSC 421, or AEC 530. *Hillery.*

503 *Social Classes.* (3) I
A systematic treatment of the factors underlying social differentiation and stratification, with particular attention to class and caste; social mobility in American society. Prereq: SOC 151 or consent of instructor. *Staff.*

509 *The Family.* (3) I, II, S
A study of the institutions of marriage and the family and an analysis of the various factors and forces at work in our time which are affecting the individual marital relationship.

Prereq: SOC 151 or consent of instructor. *Gladden.*

510 *The Family.* (3) II, S
A study of the various social situations in which children grow to early adolescence with emphasis on the primary group relationships in home, neighborhood, play group, and school. Prereq: Sociology 509 or permission of instructor. *Gladden.*

519 *Sociology of Urban Life.* II (3)
This course is a study of the sociology of city life. The major emphasis is upon the ecological and social characteristics of urban life in contrast to rural community life. Prereq: an introductory sociology course or approval of instructor. Prereq: SOC 151 or consent of instructor. *Sutton.*

521 *Industrial Sociology.* (3)
A sociological analysis of the division of labor, the characteristics of occupational groupings; principal socio-economic movements, and group relationships in modern industry. Prereq: SOC 151 or consent of instructor. *Staff.*

523 *Social Determinants of Economic Behavior.* (3) II
A study of the sociology of consumption, the effect of social values upon business and employee behavior, and the socio-economic implications of welfare legislation. (Same as Economics 523.) *Staff.*

525 *Religion and Culture.* (3) I
An analysis of the structure, function, and process of religion, using the development of the Hebrew and Christian religions to show social origins of the two faiths and the effect of cultural change on their growth. Prereq: SOC 151 or consent of instructor. *Gladden.*

526 *Culture and Personality.* (3)
The cultural basis of personality. Personal character considered as the result of culturally fostered patterns. The ideal personality in several selected societies. (Same as Anthropology 526). *Essene.*

527 *Society and Health.* (3) II
Historical and cross-cultural analysis of human behavior in illness; medicine as a behavior system. Relates components of contemporary medicine to pertinent concepts of social process. Prereq: SOC 151 or consent of instructor. *Straus.*

531 *Sociological Analysis of American Society.* (3)
A study of the contemporary U.S.A. with emphasis upon the changing relations among various aspects of American society and culture. Prereq: SOC 151 or consent of instructor. *Brown.*

532 *Intergroup Relations.* (3) I, S
Analysis of relationships between groups which differ in religious, ethnic, or socio-cultural backgrounds; the development of educational and social techniques for reduction of tensions. (Same as Education 532.) *Staff.*
May be repeated to a maximum of six credits.

533 *Social Anthropology.* (3) II
History and theory of social anthropology with special emphasis on the comparative approach to analysis of structure, function, and change in social and cultural systems. Prereq: Consent of instructor. (Same as Anthropology 533.) *Pearsall.*

536 *Sociology of Deviant Behavior.* (3) I
A systematic examination of the various types of social disorganization, with particular emphasis upon the sociological explanation of underlying factors. Prereq: SOC 151 or consent of instructor. *Voss.*

537 *Criminology.* (3) I, II
A study of general conditions as to crime and delinquency, of measures of punishment and reform of offender of criminal procedure and its possible reform, and of measures for the prevention of crime. Prereq: SOC 151 or consent of instructor. *Voss.*

538 *Juvenile Delinquency.* (3) I, II
Study of the extent, ecological distribution, and etiology of delinquency in contemporary American society, including a critical examination of trends and methods of treatment. Prereq: SOC 151 or consent of instructor. *Staff.*

542 *Human Relations in Administration.* (3)
Analysis of the role of social structure, leadership, authority, power, and psychological stress in the administration of large-scale enterprises. *Staff.*

544 *Social Psychology.* (3)
Description and explanation of social phenomena in terms of the original and acquired reaction systems of the individual. Topics given special consideration: crowds, mob behavior, propaganda, and nationalism. Prereq: Psychology 100. (Same as Psychology 544.) *Lott.*

546 *Social Factors in Mental Health.* (3) I
The significance of social and cultural factors in the recognition, course, and management of mental health problems; social organization of the mental hospital and cultural alternatives to hospitalization. Prereq: prior course work in sociology, anthropology, or psychology and permission of instructor. *Gallaher.*

547 *The Sociology of Aging.* (3)
Analysis of demographic and institutional patterns, social roles, psychological and physiological changes, and rehabilitative and educational program associated with aging. Prereq: SOC 151 or consent of instructor. *Staff.*

548 *The Sociology of Public Opinion.* (3) II
Introduction to the study of public opinion and mass communication in American society. The formation of public opinion and the effects of mass media are analyzed. Prereq: SOC 151 or consent of instructor. *DeFleur.*

549 *Sociological Aspects of Mass Communication.* (3) I
The relationship between the organization of modern society and its communication media: Special emphasis is given to the way in which cultural processes and social change have an impact upon the mass media, and upon the way in which the mass media influence cultural processes and social change. The social-psychological bases of communication are studied within a context of theory and research. Prereq: SOC 151 or consent of instructor. *DeFleur.*

551 *Principles of Sociology.* (3) I, II, S
A survey of the basic elements of culture, collective behavior, communities, social institutions, and social change. Basic concepts required for the analysis of sociological data are systematically considered. Prereq: SOC 151 or consent of instructor. *Mangalam.*

561 *Comparative Sociology.* (3) I
Two or more societies are analyzed and compared sociologically. The specific societies considered may vary from time to time; for example, Soviet and American society; the middle Eastern counties; Latin America societies, etc. Prereq: SOC 151 or consent of instructor. *Staff.*

571 *Contemporary Sociology.* (3) I
A survey of the current state and organization of sociology as indicated by consideration of the main fields of sociology and developments in each. Most of the staff participate as special lecturers in their specialty. Prereq: Major or minor in Sociology and nine hours in Sociology. *Coleman.*

581 *Techniques of Social Investigation.* (3) I, II
A study of the practical applications of sociology in organizing, conducting, and interpreting social surveys and other forms of sociological research. Prereq: SOC 151 and an introductory course in Statistics. *Schwarzweller.*

625 *Sociology of Religion.* (3)
Critical study of reciprocal relation of religion and culture, the function of religion in society, social sources of religious concepts, religious differentiation and institutionalization, the problem of church and state. *Gladden.*

632 *Minority Groups.* (3)
A sociological scheme of analysis is applied to the special problems of adjustment arising from ethnic group relations and culture contacts. *Coleman.*

651 *Systematic Sociology.* (3) I
An intensive study of certain selected sociological theorists such as Weber, Durkheim, Simmel, Pareto, and others. *Kolaja.*

661 *Educational Sociology.* (3) II, S
A course in the sociological foundations of education. (Same as Education 661.) *Staff.*

681 *Research Design and Analysis.* (3) I
Problem definition and delimitation, design appropriate to problem and data, and selection of appropriate analysis techniques; critical examination of representative research studies and students' designs. Prereq: Elementary Statistics and Sociology 581 or equivalents. *Staff.*

685 *Integration of Theory and Research.* (3) I
Systematic analysis of problems related to the verification of sociological theory through empirical research. Prereq: Soc. 681. *DeFleur.*

690 *Community Action Analysis.* (3) II
The structure and dynamics of complex, collective actions are analyzed in terms of their social and cultural characteristics and their temporal patterns. *Sutton.*

702 *Seminar in Social Demography.* (3) II
A seminar designed to explore the relations between sociology and demography. Emphasis is given to the influence of social factors on demographic behavior and to the utilization of population data and demographic techniques in the investigation of sociological problems. Prereq: Soc. 501 or equivalent. *Ford, Hillery.*

727 *Seminar on Socio-Cultural Change.* (3)
A seminar for advanced students. Emphasizes economic, religious, political, technological, psychological, etc., factors in change, and social and cultural patterns and processes of change. Prereq: Anthropology 527 or permission of instructor. (Same as Anthropology 727.) *Staff.*

731 *Seminar in Comparative Social Organization.* (2) II
A seminar for advanced students. Emphasizes principles in the comparative study of social systems; the role of kinship, age, sex, locality, and voluntary associations in determining relationships between individuals and between groups in non-literate and literate societies. (Same as Anthropology 731). *Staff.*
May be repeated once.

750 *Problems in Educational Sociology.* (3) S
An advanced course in the application of sociological findings to education, including consideration of Southern regional problems and potentialities. Prereq: 12 semester hours of graduate work including Sociology 661 or equivalent. (Same as Education 750.) *Staff.*

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis. *Staff.*

769 *Residence Credit for the Doctor's Degree.* (1 to 18 wks. residence)
May be repeated indefinitely.
Staff.

770 *Seminar in Sociological Theory.* (3) II
An intensive survey of contemporary general theorists. The principal sociological concepts of each are considered and their role in the development of contemporary sociology is assessed. *DeFleur.*

772 *Topical Seminar in Sociology.* (3) I, II, S
Advanced study of topics of current importance in sociology, such as structural strain and social change, game theory, decision processes, communication and power structures. Prereq: at least nine hours in the social sciences, preferably in sociology. *Staff.*
May be repeated to a maximum of six credits.

775 *Seminar in the Family.* (2)
A seminar for advanced students interested in family research, family counseling, or dealing with family relationships in some other professional capacity. *Gladden.*

779 *Seminar in Social Psychology.* (3) II
Each semester some topic in the field of social psychology, such as attitudes and beliefs, structure and function of social groups, social determinants of behavior, leadership, and morale will be studied intensively. (Same as Psychology 779.) *DeFleur.*
May be repeated to a maximum of six credits.

780 *Special Problems in Sociology.* (1-6) I, II, S
The purpose of this course is to provide an opportunity for advanced graduate students with special interests to pursue specialized reading under supervision. *Staff.*
May be repeated to a maximum of ten credits.

792 *Research in Sociology.* (1-6) I, II, S
Individual research and reading in particular fields of sociology, under staff supervision. Open to advanced graduate students who are prepared for intensive study beyond that offered in regular classes in each field. *Staff.*
May be repeated to a maximum of ten credits.

RURAL SOCIOLOGY *(See Agriculture)*

SPANISH AND ITALIAN LANGUAGES AND LITERATURES

(At present there is no graduate program in Italian)

SPANISH

541,542 *Advanced Spanish Grammar and Composition.* (3 ea.) I, II, S
A study of the finer points of Spanish grammar. *Staff.*

543,544 *Spanish Literature of the Seventeenth Century.* (3 ea.) I, II, S
Selected literature of the Golden Age; Cervantes, the picaresque novel, leading dramatists. *Staff.*

545,546 *Spanish Literature of the Twentieth Century.* (3 ea.) I, II, S
A study of the later works of the Generation of 1898 and representative works of recent writers. *Staff.*

547,548 *Spanish American Literature.* (3 ea.) I, II, S
A study of representative writers and principal literary productions of Spanish America. *Server.*

549 *Spanish Literature of the Nineteenth Century.* (3) I, II, S
A study of Spanish Romanticism and the works of the leading Costumbristas. *Staff.*

550 *Spanish Literature of the Nineteenth Century.* (3) I, II, S
A study of the novel and drama of the second half of the nineteenth century. *Staff.*

551 *Tutorial Seminar for Majors in the Romance Languages.* (1) I, II
A survey of Spanish literature. Required of all majors in Spanish during the senior year. *Staff.*
May be repeated to a maximum of two credits.

553 *The Teaching of Modern Foreign Languages.* (3) S
A course for teachers and prospective teachers of Spanish, French, or German. *Staff.*

560 *Spanish-American Prose Fiction.* (3)
The novel and the short story from Lizardi to the present.

564 *Spanish-American Essay.* (3)
Principal currents of thought in the essay, with emphasis on the *americanistas.*

565 *Spanish-American Drama.* (3)
Dramatic production from the missionaries to the present.

566 *Spanish-American Poetry.* (3)
Spanish-American verse, stressing the outstanding poets since Sor Juana.

610 *Romance Philology.* (3) I, II, S
Study of the historical development of the various Romance languages with reading of texts chiefly from the medieval period. Special attention will be given to historical phonology and morphology. *Staff.*
May be repeated to a maximum of six credits.

641 *Old Spanish.* (3) I, II, S
A study of the vocabulary and grammar of Old Spanish, contrasting and comparing it to modern Spanish. *Staff.*

642 *Old Spanish.* (3) I, II, S
Reading of texts in Old Spanish. *Staff.*

772 *Seminar in Spanish Literature.* (3) I, II, S
May be repeated to a maximum of six credits. *Staff.*

778 *Seminar—Main Currents of Romance and German Literatures.* (3) II
A survey course which will attempt to give the student a comprehensive picture of the literary contributions that have been made through French, German, and Spanish cultures. (A reading knowledge of one foreign language required). *Staff.*

782 *Special Studies in Spanish.* (3) I, II, S
Selected studies and investigations in the Spanish language and literature, permitting the student to work in areas of special interest, and providing opportunity for original endeavor. *Staff.*
May be repeated to a maximum of six credits.

COURSE APPLICABLE TO ALL DIVISIONS

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
May be repeated once. Maximum of nine weeks can be applied toward master's degree with thesis.
Staff.

ZOOLOGY

Graduates of accredited colleges with a bachelor's degree in zoology or biology who satisfy the requirements of the graduate school may apply for admission to the graduate program for work leading to degrees of Master of Science or Master of Arts in Zoology according to Plan A or a Doctor of Philosophy in Biology (see The Biological Sciences).

400 *Fundamentals of Biology for Secondary School Teachers.* (4) S
A course designed to aid the teacher in the selection of subject matter and in the presentation of modern biology to high school students. Lectures, discussions, 3 hrs. per wk. Prereq: Employment as a high school teacher. (Same as Botany 400)

401 *Laboratory to Accompany 400.* (0)
Seven hours.

402 *Advanced Topics in Biology for Secondary School Teachers.* (4) S
A treatment of selected topics from the point of view of modern developments designed to aid the high school teacher to keep abreast of changes in theory and practice, to increase his knowledge of subject matter, and to provide better motivation for his students. Lectures, discussions, and demonstrations, 7 hrs. per wk. Prereq: Employment as high school teacher and consent of instructor. (Same as Botany 402)

502 *Animal Ecology.* (3) I
An analysis of the environment and the respective adjustments of animal life to the environmental complex. Habitats, food, respiratory needs and mechanisms, life histories, animal associations, adaptations. Prereq: Zoology 100. *Barr, Kuehne.*

504 *Heredity.* (4) I, S
Lectures and laboratory on principles of heredity, variation and eugenics. Prereq: Zoology 100. *Carpenter.*

505 *Laboratory to Accompany 504.* (0)
Four hours.

506 *Embryology.* (4) II, S
A general course in ontogeny. Studies in maturation, fertilization, cleavage, organogenesis and anomalies of development with laboratory work based on the chick and pig. Prereq: Zoology 100. *Brauer.*

507 *Laboratory to Accompany 506.* (0)
Four hours.

508 *Evolution.* (3) II, S
An advanced lecture course on some of the fundamental principles of organic evolution. Prereq: Zoology 100. *Carpenter.*

509 *Zoology Seminar.* (1) I, II
Reports on: technical papers in scientific journals, book reviews, recent developments in Zoology, scientific meetings. Required of all majors in Zoology. *Staff.*
May be repeated to a maximum of four credits.

510 *Independent Work.* (3) I, II, S
Special problems for individual students who are capable of pursuing independent investigations. For Zoology Majors. Prereq: Standing of 3.0 in Dept. *Staff.*
May be repeated to a maximum of twelve credits.

512 *Physiology of Development.* (3) I
A review of theories of differentiation and a consideration of the genetic environment, and correlative physiological factors in differentiation. Lectures, assigned readings and literature reports. Prereq: Zoology 200 or 506. *Staff.*

513 *General Histology.* (4) I
A course in the technique of preparation of animal tissues for microscopic study. Practice in imbedding, staining, sectioning, mounting, and identification of tissues. Prereq: Zoology 100. *Staff.*

514 *Laboratory to Accompany 513.* (0)
Four hours.

515 *Special Histology.* (3) II
Histology of the organs. A continuation of Zoology 513 in which the studies are based on the organs. Prereq: Zoology 513. *Staff.*

516 *Laboratory to Accompany 515.* (0)
Four hours.

518 *Ornithology.* (4) II
A study of the life-histories, habits, identification, structure, adaptations, and physiology of birds. Special emphasis upon migrations, songs, nests and economic importance of our native birds. Lectures; field excursions; laboratory studies. Prereq: Zoology 100. *Barbour.*

519 *Laboratory to Accompany 518.* (0)
Four hours.

520 *Mammalogy.* (4) I
Designed to acquaint the student with the mammals of eastern North America, their taxonomy, adaptations and natural history. Given alternate years. Prereq: Zoology 100. *Barbour.*

521 *Laboratory to Accompany 520.* (0)
Four hours.

522 *Herpetology.* (4) II
Designed to acquaint the student with the amphibians and reptiles of eastern North America, their taxonomy, adaptations and natural history. Given alternate years. Prereq: Zoology 100. *Barbour.*

523 *Laboratory to Accompany 522.* (0)
Four hours.

524 *Ichthyology.* (4) II
Taxonomy of fishes with life-histories and biology of types. Fish structure and physiology, habits, ecology. Fish-culture and economic Ichthyology; types. Fish structure and physiology, habits, ecology. Fish-culture and economic Ichthyology; care of fishes, aquaria, etc. Elements of fresh-water fishery administration. Prereq: Zoology 100. *Kuehne.*

525 *Laboratory to Accompany 524.* (0)
Four hours.

526 *Limnology.* (4) II
Detailed analysis of fresh water environment with special emphasis upon biological productivity. Two hours lecture, four hours field and laboratory. Prereq: Zoology 100 or consent of instructor. *Kuehne.*

527 *Laboratory to Accompany 526.* (0)
Four hours.

528 *General Entomology.* (4) II
Introduction to the Class Insecta. Morphology, physiology, developments, systematics, and ecology of insects; procedures and techniques of insect identification; preparation of insect collections for research purposes. Lecture, two hours. Prereq: ZOO 100 and 3 additional credits in ZOO 206 or 502. *Barr.*

529 *Laboratory to Accompany 528.* (0)
Four hours.

532 *Medical Entomology.* (4) I, S
Study of Arthropod vectors of disease. Structure, collection, identification, control measures and life history studies. Given alternate years. Prereq: ZOO 534. Same as Ag. Ent. 532. *Edney.*

533 *Laboratory to Accompany 532.* (0)
Four hours.

534 *Parasitology.* (4) I, S
Protozoan, helminth and arthropod parasites of man and domestic animals, emphasis on etiology, epidemiology, methods of diagnosis, control measures, and life histories. Techniques for host examination and preparation of material for study. Prereq: Zoology 100. Same as Ag. Ent. 534. *Edney.*

535 *Laboratory to Accompany 534.* (0)
Four hours.

536 *Medical Protozoology.* (4) II, S
The etiology, epidemiology, pathology, diagnosis, prophylaxis and control of parastic protozoa, with special emphasis on life cycles and detailed studies of the protozoan parasites of man. Given alternate years. Prereq: Zoology 534. *Edney.*

537 *Laboratory to Accompany 536.* (0)
Four hours.

538 *Helminthology.* (4) II, S

The etiology, epidemiology, pathology, diagnosis, prophylaxis and control of trematode, cestode and nematode parasites of vertebrates, with special emphasis on those of veterinary and medical importance. Given alternate years. Prereq: Zoology 534. *Edney.*

539 *Laboratory to Accompany 538.* (0)

Four hours.

540 *General Radiation Biology.* (4) II

A basic course devoted to a study of radiation techniques and research and their application in the various fields of biology. Lectures devoted to basic background and health hazard aspects followed by more comprehensive treatment of biological aspects. Laboratories devoted to use of radioistopes and techniques of their measurement using various radiation detectors and counters. Prereq: Two years of biological sciences, one year of chemistry, and consent of instructor. *Carpenter.*

541 *Laboratory to Accompany 540.* (0)

Four hours.

542 *Insect Taxonomy.* (4) I

Methods and principles of systematic entomology and zoology; characetrization of taxonomic categories; and international rules of zoological nomenclature. Collection, preparation and identification of insect specimens. Given alternate years. Lecture, 2 hours; lab, 4 hours. Same as Ent. 542. Prereq: Gen. Ent. 100 and Zoo. 100.

543 *Laboratory to Accompany 542.* (0)

550 *Comparative Physiology.* (5) II

Physiological mechanisms by which animals cope with different environmental stresses. Osmoregulation, respiration, temperature regulation and tolerance, sensory reception, circulation, etc. Prereq: 1 year college chemistry, Zoology 206, 207.

551 *Laboratory to Accompany 550.* (0)

Four hours.

600 *Advanced Invertebrate Zoology.* (4) II

A detailed treatment of the organization of the invertebrate body, including the origin and development of organ systems. Practical work includes laboratory and field studies involving collection, identification, culturing, and preservation of invertebrate animals. Prereq: Zoology 206-207, 502. *Barr.*

601 *Laboratory to Accompany 600.* (0)

Four hours.

602 *Insect Morphology.* (4) I

A study of internal and external insect structure, including function, and variation of form. Given alternate years. Lecture, 2 hours; lab, 4 hours. Same as Ent. 602. Prereq: Gen. Ent. 100 and consent of instructor.

603 *Laboratory to Accompany 602.* (4) II

604 *Advanced Animal Ecology.* (4) II

Selected topics from recent studies on the energy flow concept of ecology, population ecology and community ecology. Prereq: Zoology 502 or equivalent, 1 year of physics, organic chemistry and one year of mathematics.

611 *Speciation.* (3) I, II

Mechanisms of Evolution. A discussion of modern theories and problems concerning the formation of animal species. Three hours per week. Prereq: Zoology 508. *Carpenter, Barr.*

615 *Seminar in Animal Navigation.* (2) I

Discussions of original literature on home range homing ability and migrations of birds.

617 *Advanced Microtechnique.* (3) I, II, S
Special methods in histological technique for students of Zoology, Pathology or Anatomy. Prereq: Zoology 513, 515. *Brauer.*

620 *General Acarology.* (4) II
Introduction to study of mites. Classification, morphology, physiology and ecology of mites important to the medical, veterinary and agricultural fields. Lecture, 2 hours; lab, 4 hours. Prereq: Zoology 1, Entomology 100 and consent of instructor. Same as ENT 620. *Rodriguez.*

621 *Laboratory to Accompany 620.* (0)

630 *Insect Physiology.* (4) II
Principles of insect physiology, function of organs, circulation, reproduction, respiration, and digestion. Lecture, 2 hours; lab, 4 hours. Same as Ent. 630. Prereq: consent of instructor.

631 *Laboratory to Accompany 630.* (0)

642 *Vertebrate Natural History.* (4) I
Behavior of vertebrate animals in their natural habitats as related to shelter, food, reproduction, and other aspects of survival. Adaptations contributing to behavioral patterns will be considered. Prereq: Zoology 208-209, 502. *Barbour.*

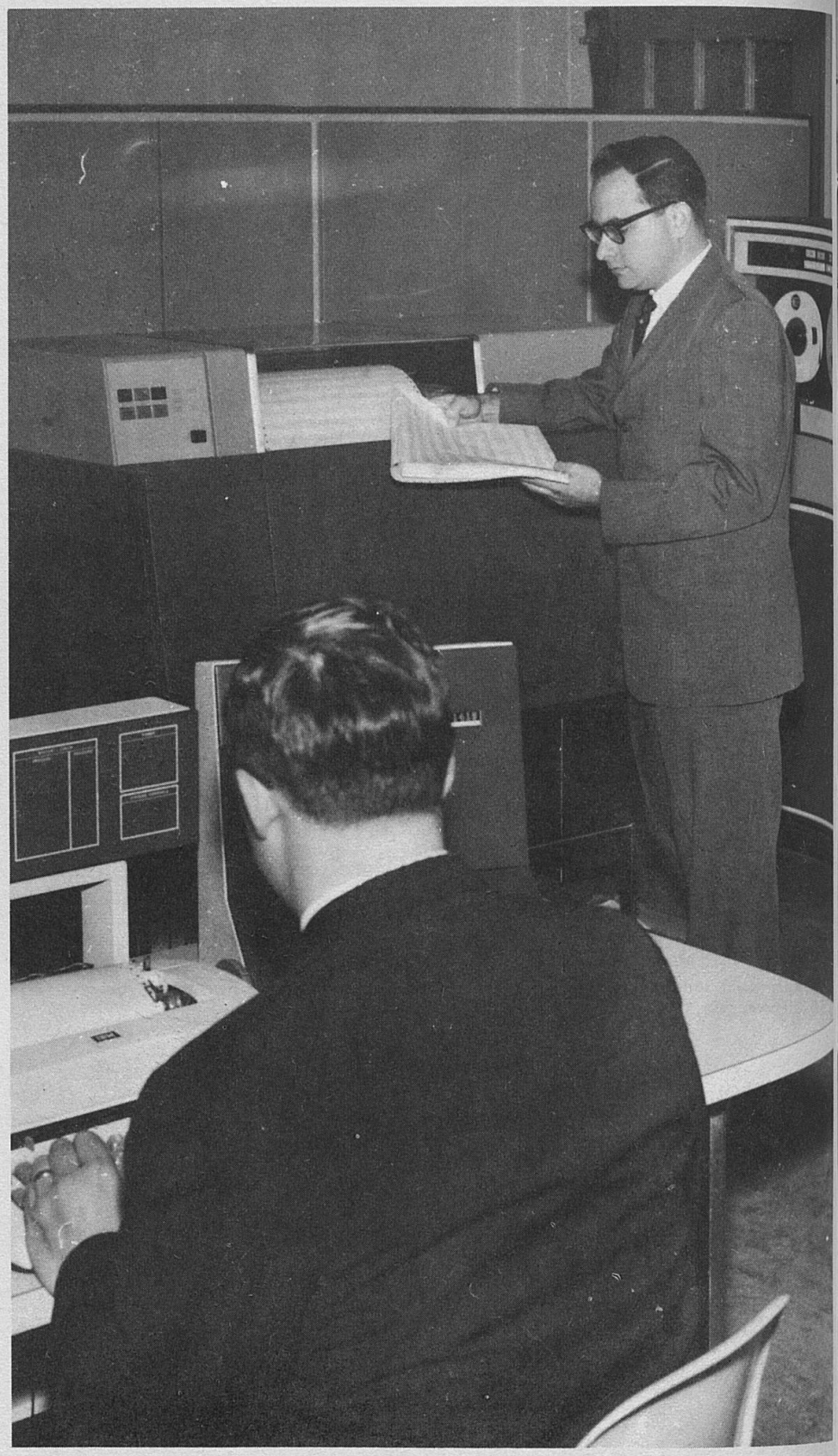
643 *Laboratory to Accompany 642.* (0)
Four hours.

709 *Graduate Seminar.* (1) I, II
Discussions of current research in Zoology. May be repeated. Prereq: Graduate standing in Zoology.

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis. *Staff.*

769 *Residence Credit for the Doctor's Degree.* (1 to 18 wks. residence)
May be repeated indefinitely.
(In Biological Sciences). *Staff.*

790 *Research in Zoology.* (1-6 hrs.) I, II, S
May be repeated indefinitely, at discretion of department. Type of research to be enclosed in parentheses, e.g. (Genetics), (Ecology), (Embryology), etc.



III. BUSINESS AND ECONOMICS

Requirements for Advanced Degrees in Business Administration and Economics

THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION

1. Admission to study for the degree is open to students who hold a bachelor's degree from any accredited college or university.

2. Graduate study in business presumes a minimum preparation of 21 hours in economics and business, including the completion of the following basic courses:

Principles of Economics	6 hrs.
Principles of Accounting	3-6 hrs.
Statistical Method	3 hrs.
Business Law	3 hrs.

3. In addition to the foregoing courses the student must have completed courses in money and banking, corporation finance, personnel management, production management, and marketing management, in either his undergraduate or graduate program.

4. A minimum of 24 semester hours must be presented in courses numbered 600 or above. The remaining six hours may be completed in approved courses numbered 500 or above. With the permission of the student's Director of Graduate Study, the candidate may submit a maximum of 9 hours in related courses outside the College of Commerce.

5. The course requirements are as follows:

600—Business Economics	3 hrs.
656—Research and Report Writing	3 hrs.
737—Advanced Business Management	3 hrs.
An advanced course in Accounting	2 or 3 hrs.
Two of the following courses	6 hrs.
655—Adv. Personnel Management	
717—Corporate Financial Policy (Econ. 611, Adv. Money & Banking, may be offered to meet the finance course requirement.)	
738—Production Management	
760—Advanced Marketing Management	
Electives	12 or 13 hrs.
Total	30 hrs.

In special cases the student's Director of Graduate Study may approve the substitution of another graduate course for a required course.

6. Further requirements, in addition to the completion of prescribed courses, are as follows:

a. Residence for at least two semesters at the University of Kentucky as a full-time student, or its equivalent as a part-time student.
b. The maintenance of a minimum average of grade B in all courses taken as a graduate student. A minimum grade of C is required for credit in a course.
c. If essential to the program pursued by the student, a reading knowledge of a modern foreign language may be required by the student's Director of Graduate Study.
d. A comprehensive final examination.

THE MASTER OF ARTS OR MASTER OF SCIENCE DEGREE IN ECONOMICS

The candidate for the master's degree is presumed to possess knowledge of the fundamentals of statistics, accounting, economic history, and a reasonable range of institutional economics which must include money and banking and public finance. If the student enters the program with a deficiency in this background, he will be expected to remedy the deficiency concurrently with his graduate work.

In addition to fullfilling the general requirements of the graduate school, the program must include advanced economic theory. At least twelve hours must consist of courses numbered 600 and above.

Plan A

Both a reading knowledge of one modern foreign language and a thesis are required. See pages 18-20 of this Bulletin.

Plan B

Thirty hours of course work, three hours of which must be represented by an acceptable research report. The candidate may substitute a proficiency in nine hours of approved course work in mathematical sciences for the language requirement.

THE PH.D. DEGREE IN ECONOMICS

Work for the degree of Doctor of Philosophy must conform to the general requirements of the Graduate School appearing on pages 21-25 of this bulletin.

On recommendation of the Special Committee, a student may substitute nine hours in the Mathematical Sciences for one of the languages required for the Ph.D. degree in Economics.

The candidate is presumed to possess knowledge of the fundamentals of statistics, accounting, economic history, and a reasonable range of institutional economics which must include money and banking and public finance. If the student enters the program with a deficiency in this background, he will be expected to remedy this deficiency concurrently with his graduate work.

It is strongly recommended that the candidate prepare himself in calculus, matrix algebra, and linear programming as part of his background for advanced work in Economics and Business. Students lacking this background will be required to take Economics 590, Introduction to Mathematical Economics.

The written part of the qualifying examinations will cover the following classes of subject matter: (1) economic theory; (2) three other fields in economics; (3) a minor subject closely related to economics, such as business administration, political science, agricultural economics, mathematics, psychology, or sociology.

The oral part of the examinations gives further opportunity for the candidate to show facility in economic analysis and knowledge of research methods and materials.

Suggested fields of study in Economics and Business Administration and possible courses comprising such fields are as follows (a field will normally include one to three courses not open to undergraduates):

Economic theory: Economics 515, 516, 590, 603, 604, 618, 619, 690; and Agr. Econ. 620, and 621.

Statistics: Economics 550, 650, 651, and 691; Business Administration 549, 571, 572 and 720; Mathematics 521; Psychology 610.

Private Finance: Economics 505, 554, 560, 611; Business Administration 517, 529, 531, 543, 544, 584, 585, 717, 731.

Public Finance: Economics 504, 524, 606, 607, 608, 685; Business Administration 547, 559, 722; Law 529, 512; and Political Science 577 and 578.

Accounting: Business Administration 508, 513, 518, 528, 529, 546, 547, 559, 708, and 722.

Mathematical Economics: Economics 590, 690, 691.

Management: Business Administration 437, 438, 462, 518, 539, 719, 720, 737, 738, 760; Economics 600, 655 and Psychology 540.

Marketing: Business Administration 519, 536, 539, 540, 541, 549, and 760; Economics 527 and 600; and Agr. Econ. 606.

Money and Banking: Economics 505, 516, 609, 611; Business Administration 585.

Agricultural Economics: Agr. Econ. 620, 621, 640, and 650.

Labor Economics and Industrial Relations: Economics 402, 530, 555, 566, 655; Law 544; Psychology 540; and Political Science 579.

International Economics: Economics 527, and courses in Economics in the School of Diplomacy and International Commerce.

THE PH.D. DEGREE IN ECONOMICS AND BUSINESS

The requirements are the same as for the Ph.D. in Economics except that two fields in business will be substituted for two of the fields in economics.

DESCRIPTION OF COURSES

BUSINESS ADMINISTRATION

437 *Business Management.* (3) I, II

A study of planning, organizing and controlling; an interdisciplinary approach; actual decision-making cases. *Irwin, Massie.*

438 *Quantitative Analysis in Management.* (3) II
An introduction to quantitative techniques in management decisions. Includes basic linear programming, Monte Carlo, and waiting line theory. Prereq: Business Administration 437. *Irwin.*

445 *Office Management.* (3) II
Planning and scheduling of work; employment procedures; supervision of employees, retraining, promotion; equipment. *McMurtry.*

462 *Small Business Operation.* (2) II
Application of management principles and techniques to the special problems of establishing and operating a small business enterprise. *Massie.*

508 *Accounting Theory.* (2) I
The function of accounting, asset valuation, recognition of revenue and expenses, and classification of equities will be studied with a view to presenting a coordinated body of accounting theory. Prereq: Business Administration 297. *Haun.*

509,510 *Business Law.* (3 ea.) I, II
A survey of the principles of contracts, sales, bills and notes, and that portion of the law of torts applicable to business practices. *Haun, Lewis.*

513 *Auditing.* (3) II
The theory of auditing, the valuation of assets, analysis of accounting procedure, and the presentation of statements. Special problems applicable to particular business will also be presented. Prereq: Business Administration 297. *Beals.*

517 *Corporation Finance.* (3) I, II
Principles concerning the issue of securities, the management of the corporate income, the disbursement of dividends, the creation of sinking funds, and reorganization procedure. Prereq: Economics 252 and Business Administration 108 or 109. *Pickett, Ellis.*

518 *Cost Accounting.* (3) I
The place of cost accounting in the general field of accounting, special records and cost statistics, and application to particular businesses. Prereq: Business Administration 108. *Beals.*

519 *Retail Merchandising.* (3) II
Selecting a business location, internal layout, departmentalization, merchandising control, store policies toward the public, training, and management of personnel, and related subjects. Prereq: Business Administration 260. *Tarpey.*

523 *International Commercial Policy.* (3)
America's position in the world economy and its international accounts; United States financial policies, war debts, financial cooperation and investment policy. Prereq: Economics 527.

524 *Exporting and Importing Techniques.* (3)
A study of the methods and procedures involved in the import and export of goods. Prereq: Economics 527.

528 *Advanced Cost Accounting.* (3) II
The use of standard costs, estimated cost systems and procedures, non-manufacturing costs, budgetary control, and management uses of cost data. Prereq: Business Administration 518. *Beals.*

529 *Credit and Statement Analysis.* (2) I
The theory underlying credit-granting; credit administration; analysis and interpretation of financial statements. Prereq: Business Administration 107. *Haun, Beals.*

531 *Investments.* (3) II

Analysis of corporation statements for investment purposes; the security market; market influences on security prices; effect of interest changes on security prices; and the development of investment programs. Prereq: Economics 252. *Pickett.*

532,533 *C.P.A. Problems.* (3 ea.) I, II

This course is designed to prepare students for C.P.A. examinations. Advanced accounting theory is stressed through the study of a wide range of problems. Prereq: Business Administration 297. *Haun, Beals.*

536 *Sales Management.* (3) I

The case method is used, supplemented with outside reading and written reports. Prereq: Business Administration 260. *DeVoe.*

539 *Industrial Purchasing.* (3) II

Organization of purchasing; relations with other departments; qualifications and training of buyers. Purchasing procedures; sources of supply; price negotiation; stores control; value analysis. Prereq: Economics 252. *DeVoe.*

540 *Advertising Management.* (2) I

A study of advertising from the point of view of marketing and advertising executives; problems in integrating advertising with marketing; the advertising appropriation, and advertising campaigns. *DeVoe.*

541 *Industrial Marketing.* (3) I

The marketing of goods for business consumption. The structure of the industrial market with special problems in marketing raw materials, parts and machinery relative to manufacturing, agricultural, mining, construction and other industries. Prereq: Economics 252. *Tarpey.*

543 *Life Insurance.* (3) I

Economics of life insurance; organization and control; special forms of life insurance; fundamental principles of rate-making. Prereq: Economics 252. *Hargreaves.*

544 *Property and Casualty Insurance.* (3) II

Public control; nature of contracts; analysis of reserve functions and rate-making processes. Prereq: Economics 252. *Pickett.*

546 *Specialized Accounting Problems.* (3) II

Accounting records for consolidations and mergers, preparation of consolidated statements. Insolvency and receivership records and statements. Accounting for estates and trusts. Prereq: Business Administration 297. *Ecton.*

547 *Income Tax Procedure.* (3) II

The preparation of income tax returns for individuals and corporations of all classes and a practical application of principles of accounting. Prereq: Business Administration 297. *Haun.*

548 *Data Processing.* (3) II

Fundamentals of data processing for business organizations, including manual and automated applications, with emphasis on unit records, flow charts, and control procedures, in relation to both financial and nonfinancial data. Prereq: Business Administration 108.

549 *Market Research.* (3) I

Training in the application of scientific method to research in fields of marketing. A major marketing investigation will be conducted by the class. Prereq: Business Administration 260 and a course in statistics. *DeVoe.*

556 *Business Reports.* (2) I, II

Major emphasis is placed upon sources of data, compilation and arrangements of data, documentation, bibliographies and effective presentation of reports. Problems are assigned in the various areas of interest. *Humphrey.*

559 *Governmental Accounting.* (2) II
The requirement of adequate accounting systems for various governmental units, including the recording of usual transactions and the form and content of reports. Prereq: Business Administration 108. *Beals.*

570 *Controllership.* (3) I
The organizational position of the Comptroller, his functions and objectives; his methods and procedures. Prereq: Business Administration 296 and 518. *Haun.*

571 *Statistical Quality Control.* (3) I
Elementary probability theory, control charts, acceptance sampling plans including single, double and sequential sampling. *Christian.*

572 *Sampling Techniques.* (3) II
Application of sampling theory and significance testing in economic research, practical problems in sample design. *Christian.*

573 *Automatic Data Processing.* (3) I, II
Examination of the role of high speed data processing equipment in the solution of business and economic problems. The study of computer fundamentals; input, arithmetic and logical units, control storage, and output. Includes digital computer programming. *Solomon.*

584 *Financial Markets and Institutions.* (3) II
Analysis of securities markets, savings and loan associations, insurance companies, pension funds, credit unions, broker-dealer operations and government agencies with particular attention to their role in the flow of funds in the American economy. Prereq: Economics 505. *Carpenter.*

585 *Bank Management.* (3) II
A study of principles and cases in commercial banking practice. Bank management practices are studied within the economic, monetary, fiscal and legal framework of the American economy. Prereq: Economics 505 or consent of instructor. *Masten.*

708 *Advanced Accounting Theory.* (3) II
Critical examination of accounting concepts and standards. Study of current problems and contemporary development reflected in accounting literature and reports. *Haun, Ecton.*

717 *Corporate Financial Policy.* (3) I
A study of financial management from the viewpoint of the corporate financial officer. Problems of planning the capital structure, issuing securities, the management of working capital and policies with reference to reserves, surplus and dividends. *Pickett, Ellis.*

719 *Quantitative Methods in Business Decisions.* (3) I
Application of mathematical analysis in business decision-making. Includes linear programming, total value analysis, incremental analysis, and other phases of operations research. Prereq: Mathematics 211 and Economics 207. *Christian.*

720 *Statistics in Business Decisions.* (3) I
Statistical analysis as applied to business decisions. Includes waiting line theory, Monte Carlo method, and sampling as applied to inventory control, quality control, and similar business problems. Prereq: Economics 207.

722 *Tax Accounting Problems.* (3) II
Advanced tax accounting problems of a complex nature involved in income taxes, gift taxes, and death taxes under the federal and state laws. Prereq: Business Administration 547. *Haun.*

728 *Accounting for Control and Planning.* (3) II
A study of the application of accounting information and services in the recognition or solution of management problems in business. *Haun, Ecton.*

731 *Investment Management.* (3) II
Evaluation of sources of information and advice concerning securities, methods of analysis and policies of individuals and institutions in the management of investment funds. Prereq: appropriate undergraduate courses in accounting and finance. *Pickett.*

737 *Advanced Business Management.* (3) II
A functional study of business management. Control devices and procedures for carrying out and testing policies. *Massie, Douglas.*

738 *Production Management.* (3) I
A study of procedures and techniques employed in manufacturing plants. An analysis of actual cases in production planning and control, time and motion study, quality control, plant layout, and budgetary control. Visits to industrial plants. *Massie, Irwin.*

760 *Advanced Marketing Management.* (3) II
A critical study of significant trends, controversial issues and advanced techniques in the fields of marketing. *DeVoe.*

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis. *Staff.*

ECONOMICS

402 *Labor Economics.* (3) I, II
Insecurity, wages and income, substandard workers, industrial conflict; wage theories, the economics of collective bargaining, unionism in its structural and functional aspects; recent developments. Prereq: Economics 252. *Krislov.*

503 *Transportation.* (3) I
Railways, waterways, highways, airways. Rates, services, management, regulation. Prereq: Economics 252. *Tolman.*

504 *Public Finance.* (3) I, II
A study of public receipts; public expenditures; the principles of taxation with special reference to their application to the tax systems, federal and state. Prereq: Economics 252. *Campbell.*

505 *Money and Banking.* (3) I, II
Nature and functions of money; the importance of credit; relation of money and credit to prices; bank deposits, and loans; complete study of our national banking system. Prereq: Economics 252. *Masten.*

514 *Intermediate Macroeconomic Theory.* (3) I, II
An analysis of classical, Keynesian, and post-Keynesian theories of national income and employment. Prereq: Econ. 252.

515 *Intermediate Economic Analysis.* (3) I, II
The output, price and factor proportion problems of firms in different market situations; some problems in industry behavior; coordination of basic economic processes. Prereq: Economics 252. *McGee.*

516 *Business Cycles.* (3) I, II
The nature and characteristics of the economic factors which underlie the cyclical fluctuations in business conditions; the methods of business and investment forecasting. Prereq: Economics 252. *McGee.*

520 *International Investment.* (3) I
The long-term capital accounts in the balance of payments; reasons for investments abroad; investment and economic development. Prereq: Economics 527.

521 *International Finance.* (3) II

Short-term capital accounts on the balance of payments; financing international transactions; the money markets; international payment systems. Prereq: Economics 527.

522 *Underdeveloped Areas, and Economic Policy.* (3) II

Description and definition of underdeveloped areas, their economic growth and development, factors in economic development, policies adapted to economic development. Prereq: Economics 252 and 527.

523 *Social Determinants of Economic Behavior.* (3)

A study of the sociology of consumption, the effect of social values upon business and employee behavior, and the socio-economic implications of welfare legislation.

524 *State and Local Taxation.* (3) II

Classified property taxes; separation of sources of revenue, taxation of banks, forests, public utilities, mines, and rural and urban real estate; income, inheritance and sales taxes. *Campbell.*

525 *Economic Development.* (3) I

A comparative study of economic progress in selected countries; growth patterns, theories of development and capital formation; interaction of social and economic change. Prereq: Economics 252. *DaRosa.*

527 *International Economics.* (3) I, II

Free trade; protectionism; preferential tariffs; colonial tariff policies; dumping; commercial treaties; control of raw materials; international investments and the movement of capital; international debts; reparations. Prereq: Economics 252. *Hultman.*

530 *Labor Legislation.* (3) II

The status of labor law, mediation, conciliation, arbitration, the minimum wage, the eight-hour day, unemployment relief, safety and health legislation, and social insurance. Prereq: Economics 252. *Cabe.*

534 *Advanced Economic History of the United States.* (3) I, II

Population growth, immigration, territorial expansion, agriculture, manufactures, tariff, labor, industrial combinations, commerce, transportation facilities, money and banking, and conservation. *Erwin.*

542 *Soviet Area Economies.* (3) II

The course is designed to provide an intensive study of the economic principles, institutions, and policies which provide direction and coordination for the economic processes in the Soviet Union and Eastern European countries. Prereq: Economics 252, or consent of instructor.

550 *Advanced Business and Economic Statistics.* (3) I

Advanced time series analysis, multiple and partial correlation, elementary analysis of variance and experimental design. Prereq: Economics 207. *Christian.*

554 *Urban Real Estate.* (3) II

Urban land economics; the real estate business; essentials of real estate law and contracts, the financing of real estate transactions, property valuation and appraisal, the management of real estate properties. Prereq: Economics 252. *Pickett.*

555 *Industrial Relations.* (3) II

Historical development of industrial relations; the economic implications of job analysis, recruitment, selection and training for industry; wages, hours, promotion and health policies; employee representation, collective bargaining; union-management cooperation. Prereq: Economics 252. *Krislov.*

560 *Business Combinations and Public Policy.* (3) II

Forms of combinations; the problem of monopoly and the regulation of competition; federal and state anti-trust legislation and court decisions.

565 *Comparative Economic Systems.* (3) I, II

A study of capitalism, socialism, fascism, communism and cooperation, with attention to current experiments in economic planning. Prereq: Economics 252. *Masten.*

566 *Personnel Problems.* (2) II

A case course in the problems of supervision of employees, and the personnel policies which promote productive efficiency. Prereq: Economics 555.

579 *Collective Bargaining.* (2) I

The principles and procedures of bargaining and dispute settlement studied in detail. Includes a review of the content of labor contracts and provisions for administration. Union and management techniques considered. *Cabe.*

590 *Introduction to Mathematical Economics.* (3) I

A review of mathematical approaches to economic theory. Models applicable to production, marketing and pricing problems. (Same as Agr. Ec. 590.) *Christian.*

600 *Business Economics.* (3) I, II

The interrelations of economic laws with the social, political and legal framework of business, especially from the point of view of the industry and of the firm.

601 *Theory of International Trade.* (3) I

History of theories of international trade; theories of international equilibrium and the mechanism of equilibrium adjustments; tariff and other trade barriers; customs union. Prereq: Economics 527.

602 *Analysis of International Trade.* (3) II

The balance of payments and its analysis; determination of international payments equilibrium; analysis of world trade in merchandise; patterns of world trade; the computation and analysis of the terms of trade. Prereq: Economics 527, 601.

603 *History of Economic Thought.* (3) I

A survey of the history of economic thought from the ancient period to about the end of the Classical School. Prereq: Economics 252. *Hargreaves.*

604 *Survey of Economic Theory Since the Austrian School.* (3) II

This course is virtually a continuation of course 603. *Hargreaves.*

605 *Balances of Payment; Construction and Analysis.* (3)

A study of the balances of payments as tools used in the analysis of international economics. Prereq: Economics 527, Diplomacy 520 and 521, or permission of instructor.

606 *Municipal Finance.* (2) I

City and county budget and related problems are studied in reports and seminar.

607,608 *Problems in Public Finance.* (2 ea.) I, II

Depending on varying needs of public finance students from time to time, specific subject matter will be selected for study. Each student's report will indicate the class problems intensively examined. *Soule.*

609 *History and Theory of Money and Prices.* (3) I

The evolution of money, the rise of banking processes and the causes of fluctuations in the general price level. *Masten, Carpenter.*

611 *Advanced Money and Banking.* (3) I

A theoretical study of contemporary money and banking institutions with emphasis on central bank functions. *Masten.*

612 *Seminar in Monetary Theory and Policy.* (3) II

A comprehensive and critical analysis of contemporary monetary theory and policy. Prereq: Econ. 611 or consent of instructor.

618 *Economic Theory.* (3) I
An intensive course covering contemporary micro-economic theory and the various analytical techniques used therein. Prereq: Economics 252.

619 *Economic Theory.* (3) II
Macro-economic theory. National income analysis and employment theory. The theory of inflation and an introduction to the theories of economic development. Prereq: Eco. 252. *Williams, McGee.*

626 *Agriculture and Economic Development.* (3) II
Analytical consideration of role of agriculture in economic development in relation to overall development strategy at various stages of growth. Theoretical and policy issues of particular relevance to the agricultural development in underdeveloped agrarian economies with various resource, social, political and economic systems. Prereq: ECO 525 or consent of instructor (same as Agricultural Economics 626). *Hultman.*

650 *Research Statistics I.* (3) I
The place of statistics in research method, the theory of statistical averages, the application of advanced statistical methods to economic data; the testing of economic theory. Prereq: an elementary course in statistics. *Stroup.*

651 *Research Statistics II.* (3) II
Inferences involving linear transformations of random variables; individual degrees of freedom; complex analysis of covariance. Applications to economic and business data. Prereq: Economics 650 or Agr. Econ. 630. *Christian.*

655 *Advanced Personnel Management.* (3) II
A critical examination of the principles, methods, policies and procedures related to the effective utilization of human resources in business concerns, consideration being given to mutual relationships.

656 *Research and Report Writing.* (3) I
Investigations of business problems: sources, procedures, analysis, and presentation. *Fulmer.*

657 *Theory of Wages.* (3) II
A critical analysis of contemporary wage theories, trade union wage policy, wage differentials, wage adjustment to technological change, and wages and employment. Prereq: Economics 252. *Cabe.*

685 *Government Finance Administration.* (3) II
Government budget; accounting, debt, purchasing, treasury, revenues, and auditing administration are examined; illustrations are drawn from federal, state and local experience. Each student makes a special report on finance management or experience.

689 *Mathematical Economics—Micro Theory.* (3) II
Consumer behavior and demand, theory of the firm, market equilibrium, optimality criteria and welfare maximization. Selected topics in dynamics. Prereq: ECO 515, MA 113 or equivalent. *Christian.*

690 *Mathematical Economics—Macro Theory.* (3) II
Selected aggregative models treated mathematically. Emphasis on maximization problems for linear systems. Leontief input-output models. Prereq: ECO 515, MA 113 or equivalent.

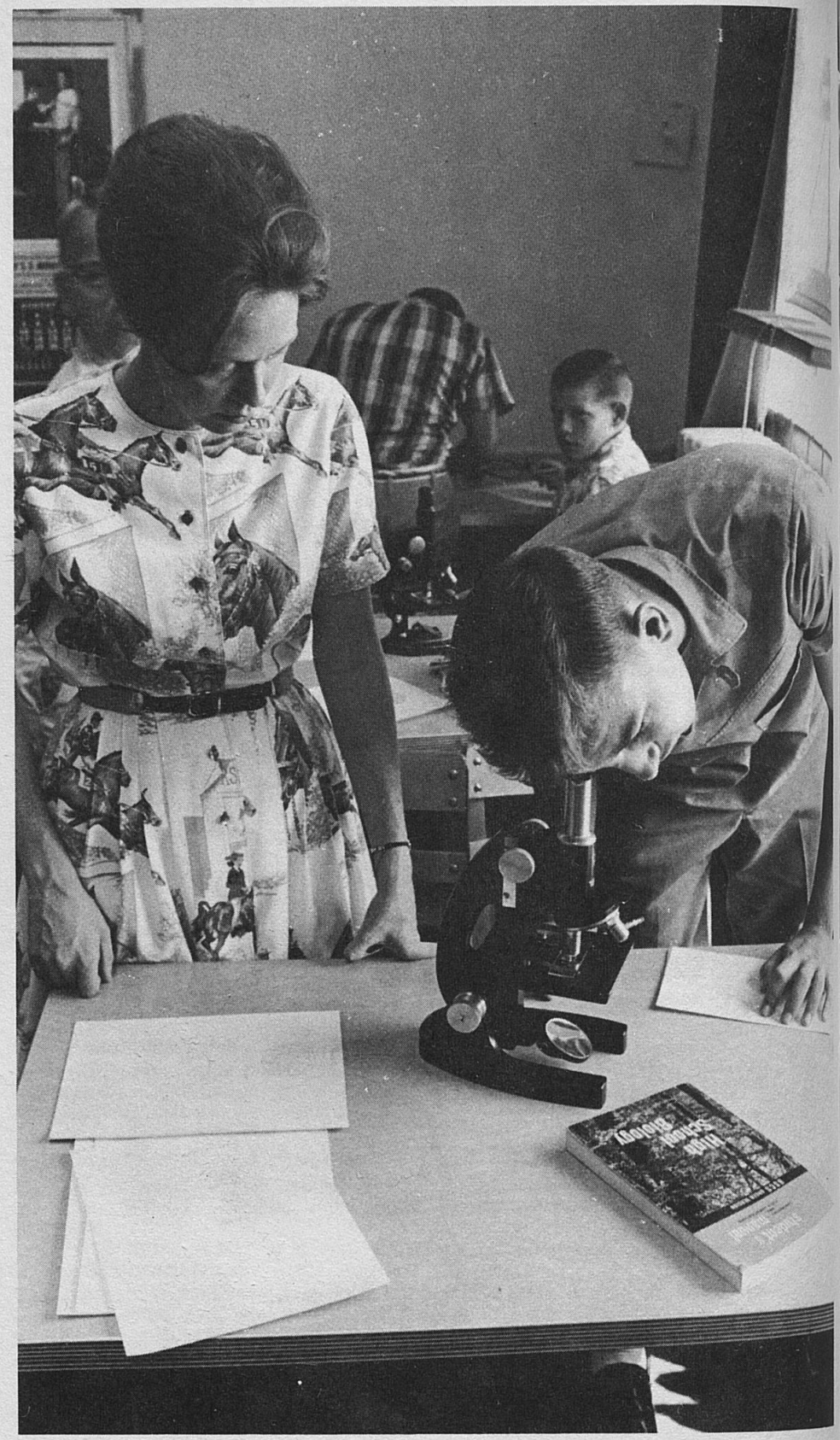
691 *Econometrics.* (3) I
The application of statistical methods to problems of economic analysis. Building and measuring relationships among economic variables. Econometric models of the economy as a whole and of individual sectors. (Same as Agr. Ec. 691.) *Christian or Tu.*

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis. *Staff.*

769 *Residence Credit for the Doctor's Degree.* (1 to 18 wks. residence)
May be repeated indefinitely.
Staff.

770 *Seminar.* (1 to 6) I, II
An extended investigation of some specific topic with a view to giving training in methods of research and studying intensively a particular subject in the field of economics.
May be repeated to a maximum of six credits.

780 *Research Problems in Economics.* (1 to 6) I, II
Students confer individually with the instructor. *Staff.*
May be repeated to a maximum of six credits.





IV. EDUCATION

General Statement of Regulations Governing Graduate Work in the College of Education

Work leading to the doctoral degree with a major in education must conform to the same rules and regulations as prescribed in the general requirements, pages 21-25 of this Bulletin. In addition to the general requirements, the following specific requirement must be met. No person will be considered as a candidate for the doctoral degree with a major in education unless he has completed three years of successful teaching experience.

(For information concerning the degree of Specialist in Education, see p. 26.)

There are two plans of work leading toward the degree of Master of Arts or Master of Science in Education. Plan II, which follows, is permissible only with the approval of the Graduate School and the Dean of the College of Education.

PLAN I

1. A minimum of 24 semester hours of graduate work must be completed and a thesis must be presented.
2. At least 12 semester hours of graduate work must be in education.
3. At least 15 semester hours of graduate work must be in courses numbered 600 or higher.
4. At least 12 semester hours must be outside the field of education, except for majors in Educational Administration, Counseling and Guidance, and Vocational Education, other than Home Economics Education. It is expected that students in Educational Administration, Counseling and Guidance, and Vocational Education will have six hours outside education.
5. At least 36 weeks of residence must be acquired as a University of Kentucky graduate student.
6. No student may satisfy more than one-half of the residence requirements for advanced degrees by part-time work. This limitation does not apply to intensive courses.
7. The total number of credits presented in education, undergraduate and graduate, must be at least 30 semester hours.
8. A standing of 3.0 (an average of B) or better must be made on all graduate work.
9. Six semester hours (if approved by the graduate adviser) may be completed in off-campus study (that is, extension work). In such case, however, a minimum of 30 weeks of *resident on-campus* work is required for the master's degree.
10. The Graduate Record Examination is required of all candidates for graduate degrees. It is to be taken the first semester the student is enrolled

as a full time student in the Graduate School. The National Teachers Examination will be required of all candidates for the degree of Master of Arts in Education or Master of Science in Education. The student should consult with his adviser to determine the proper time to take this Examination. In exceptional cases an additional examination, either written or oral, may be required. These examinations are to be taken just prior to or during the session in which the degree is to be conferred.

11. All graduate students must meet the requirements for a teaching certificate in Kentucky as established by the State Department of Education of Kentucky. These requirements are outlined in the General Catalog of the University. If deficiencies are found, they should be overcome before proceeding with graduate work. The work required to overcome these deficiencies is in addition to the minimum graduate requirements for the degree.

PLAN II

1. A minimum of 30 semester hours of graduate work must be completed.
2. At least 12 semester hours of graduate work must be in education.
3. At least 15 semester hours must be in courses numbered 600 or higher.
4. At least 12 semester hours must be outside the field of education, except for majors in Educational Administration, Counseling and Guidance, and Vocational Education, other than Home Economics Education. It is expected that students in Educational Administration, counseling and Guidance, and Vocational Education will have six hours outside education.
5. At least 36 weeks of residence must be acquired as a University of Kentucky graduate student.
6. No student may satisfy more than one-half of the residence requirements for advanced degrees by part-time work. This limitation does not apply to intensive courses.
7. The total number of credits presented in education, undergraduate and graduate, must be at least 30 semester hours.
8. A standing of 3.0 (an average of B) or better must be made on all graduate work.
9. Six semester hours and nine weeks of residence may be done in extension classes, off-campus study, or independent work courses with the permission of the student's adviser and the dean of the Graduate School.
10. The Graduate Record Examination is required of all candidates for graduate degrees. It is to be taken the first semester the student is enrolled as a full time student in the Graduate School. The National Teachers Examination will be required of all candidates for the degree of Master of Arts in Education or Master of Science in Education. The student should consult with his adviser to determine the proper time to take this Examination. In exceptional cases an additional examination, either written or oral, may be required. These examinations are to be taken just prior to or during the session in which the degree is to be conferred.

11. All graduate students must meet the requirements for a teaching certificate in Kentucky as established by the State Department of Education of Kentucky. These requirements are outlined in the General Catalog of the University. If deficiencies are found, they should be overcome before proceeding with graduate work, and in addition to the minimum 30 graduate credits required for the degree.

Each student's graduate curriculum must be a well-rounded program of courses related to the student's major interest and approved by his committee. In cases of deficient preparation the committee, with the approval of the Dean, determines prerequisite undergraduate courses to be taken. The following persons have been designated to guide graduate students in their work toward the master's degree in education:

Area	
Elementary Teachers	Moore, Ramsey, Sudduth
Secondary Teachers	
General	Barnard, Powell, Ravitz, Shipman, Smith
Agricultural	Binkley, Lamar
Art	Haines, Shipman
Business Education	Musselman, Humphreys
Home Economics	Gorman
Industrial Education	Baker
Music	Shipman
Physical Education	Clay, Carr, Gilb, Huff
Special Education	Levy
Elementary Principal	Ogletree
Secondary Principal	Ogletree
Guidance Counselor	Carse
Rehabilitation Counseling	Auvenshine
Supervisor	Ogletree, Edmonds
Attendance Officer	Kincheloe
Superintendent	Kincheloe, Ogletree
Higher Education	Martin

Education 99—This is a non-credit seminar required of all graduate students in education the first semester or summer session they are registered for graduate study.

SUGGESTED GRADUATE CURRICULA

Master's Degree Program and Provisional Certification for Superintendents, Principals, and Supervisors

A. *Counseling and Guidance* (3 hours required):
*Ed. 756—Fundamentals of Guidance

B. *Foundations* (3 hours required):
Three additional hours such as:
Ed. 645—Foundations of Education or
Ed. 661—Educational Sociology

C. *Curriculum and Instruction* (6 hours required):
*Ed. 732—Principles of Curriculum Construction

For candidates with background in secondary education:
Ed. 712—The Elementary School

For candidates with background in elementary education:
Ed. 714—The Secondary School or
Ed. 717—The Junior High School

D. *Behavioral Sciences* (9 hours required):
*Sociology 542—Human Relations in Administration

Six additional hours such as:
Sociology 544—Social Psychology, or
Sociology 551—Principles of Sociology, or
Anthropology 526—Culture and Personality

E. *Administration and Supervision* (9 hours required):
*Ed. 99—Orientation (no credit)
*Ed. 633—The Administration of the Teaching Personnel, and
*Ed. 634—Administrative Problems in Today's Education (Offered together in block of 6 hours)

(Prerequisite: Admission to the program in Administration)
*Ed. 639—Supervision of Instruction

(Prerequisite: Ed. 633 and 634 and at least three years of teaching experience)

It is recommended that students plan their programs in accordance with the undergraduate certificate held. For example, elementary leadership programs should be planned for teachers holding elementary certificates and secondary leadership programs should be planned for teachers holding secondary certificates.

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* Required.

The Second-Year Program (Non-Degree) for Standard Certification

Admission Procedure—The candidate for standard certification should:

1. Secure admission to the Graduate School.
2. Request an advisor from the Office of the Dean, College of Education.
3. Confer with the advisor.
4. Apply through the advisor for admission to the program.

Requirements of the Program for Standard Certification (non-degree)

Ed. 771—Seminar in Educational Administration, or Behavioral Sciences (6 semester hours).
Ed. 608—Internship in Educational Administration
Ed. 792—Research Problems in Educational Administration, or
Ed. 793—Research Problems in Curriculum and Supervision

Six to nine hours of electives appropriate to the field in which the applicant is specializing:

For Superintendent:
Ed. 636—State School Administration

For High School Principal:
Ed. 630—High School Administration

For Elementary Principal:
Ed. 629—The Elementary Principal

For Supervisor:
Ed. 608—Internship in Educational Administration (6 semester hours)

Standard Certification may be obtained upon completion of the "Second Year" program, and four years of experience as a school leader. After September 1, 1962, Rank I classification under the Kentucky Minimum Foundation law requires the com-

pletion of a 30-hour program above the master's degree; and after September 1, 1964, superintendents will not be certified until a 30-hour program above the master's has been completed.

Requirements for Degree of Specialist in Education in Administration and Supervision

Specific requirements in the program for this degree in Administration and Supervision are:

1. Graduate Record Examination scores of not less than 850 total on the two aptitude sections combined.
2. Satisfactory scores on the National Teachers Examination.
3. That the candidate be engaged in a leadership position where the staff can work with him on the job. (This requirement may be modified if the candidate has had wide experience in leadership positions.)

Admission Procedure—The candidate for the degree of Specialist in Education (Ed.S) should:

1. Secure admission to the Graduate School.
2. Request an advisor from the Office of the Dean, College of Education.
3. Confer with the advisor.
4. Secure an application form from the Chairman of the Committee on Advanced Study in Education (Room 111, Dickey Hall), and complete the form and return it to the same office.

The Dean of the Graduate School reports action taken on applications.

Requirements of the Doctoral Program in Educational Administration and Supervision

Admission to the program for the doctorate (Ed.D. or Ph.D.) in Educational Administration and Supervision requires the same procedure as outlined above for the degree of Specialist in Education.

MASTER'S DEGREE PROGRAM COUNSELING AND GUIDANCE

Curriculum for master's degree (30 semester hours required)

		Sem. Hrs.
Required:		
EDU 755	Human Development and Behavior	3
EDU 756	Fundamentals of Guidance	3
EDU 522	Educational Tests and Measurements	
or		3
PSY 535	Psychological Testing	
EDU 758	Group Guidance Problems and Practices	3
EDU 760	Counseling Theory and Practice	3
EDU 761	Supervised Practice in Counseling (May be repeated to a maximum of 9 hours)	3
EDU 661	Education Sociology	
or		3
EDU 640	Philosophy of Education	

Electives: 9 hours from Psychology, Sociology, Anthropology, or Social Work as recommended by the advisor.

As a part of the Master's degree program in Counseling and Guidance, students may specialize in Rehabilitation Counseling by meeting the following requirements:

		Sem. Hrs.
ANA 206	Elementary Anatomy	4
EDU 521	Introduction to Vocational Rehabilitation	3
EDU 522	Educational Tests and Measurements	
or		3
PSY 535	Psychological Testing	
EDU 527	Survey of Physical Defects	3
EDU 657	Educational Statistics	3
EDU 664	Studies in Vocational Rehabilitation	3
EDU 760	Counseling Theory and Practice	3
*EDU 761-2	Supervised Practice in Counseling	3

EDU 764	Using Occupational and Educational Information in Counseling and Guidance	3
*EDU 777-2	Seminar in Counseling and Guidance	3
PSY 521	Abnormal Psychology	3
PSY 544	Social Psychology	3
PSY 640	Practice in Testing; Intelligence Tests	3
SW 530	Community Organizations for Social Work	3

Electives:

Three hours from Education, Psychology, Rural Sociology, Social Work or Sociology as recommended by the advisor.

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* Courses designated by the suffix-2 are specifically adapted to the Rehabilitation Counseling program.

SIXTH-YEAR DEGREE PROGRAM COUNSELING AND GUIDANCE

Curriculum for the Ed.S. degree (30 *semester hours required*) Sem. Hrs.

Required: 15-21 hours from the following, in addition to the courses required for the master's degree in Guidance and Counseling:

EDU 657	Educational Statistics	3
EDU 761	Supervised Practice in Counseling (May be repeated to a maximum of 9 hours)	3
EDU 762	Organization and Administration of Guidance Services	3
EDU 763	Research and Evaluation in Guidance	3
EDU 764	Using Occupational and Educational Information in Guidance and Counseling	3
EDU 777	Seminar in Guidance and Counseling (May be repeated to a maximum of 6 hours)	3
PSY 640	Practice in Testing: Intelligence Tests	3

Electives: 6-9 hours outside of Education (to be approved by adviser)

Research: 3-6 hours in independent research as approved by adviser

MASTER'S DEGREE PROGRAM SUPERVISING TEACHERS

Elementary Level

EDU 550	The Role of the Teacher and the Principal in Guidance	3
EDU 640	Philosophy of Education	3
EDU 712	The Elementary School	3
EDU 724	Organization and Supervision of Student Teaching	3
EDU 732	Principles of Curriculum Construction	3
EDU 661	Educational Sociology	3

Secondary Level

EDU 550	The Role of the Teacher and the Principal in Guidance	3
EDU 640	Philosophy of Education	3
EDU 714	The Secondary School	3
EDU 724	Organization and Supervision of Student Teaching	3
EDU 732	Principles of Curriculum Construction	3
EDU 661	Educational Sociology	3

MASTER'S DEGREE PROGRAM—ELEMENTARY EDUCATION

A. Professional education courses (12 hours required)

Curriculum block (6 hours required):
EDU 712—The Elementary School
EDU 732—Principles of Curriculum Construction
Note: EDU 740, Teaching Reading and Related Language Arts in the Elementary School, or a course approved by the advisor, may be substituted for EDU 712.

Human Development, Guidance, and Testing block (6 hours required):
EDU 739—Survey of Research in Human Development and Education
One course in the area of Guidance and Testing to be approved by the advisor.

B. Courses outside Education should be related to the student's teaching field and should be planned with, and have the approval of, the student's advisor.

C. Summary of Requirements:

1. Must be eligible for a teaching certificate by the time the M.A. degree is completed.
2. Must have a total of 30 semester hours in Education at both the graduate and undergraduate levels.
3. Must have 15 hours of graduate work in courses numbered 600 or higher.
4. Must have at least 12 hours of graduate work in Education.
5. Must have at least 12 hours outside the field of Education.
6. Must have a standing of 3.0 (an average of B) or better on all graduate work and must be admitted to full graduate standing.

The student is required to take a non-credit seminar, EDU 99, the first time he is enrolled in the Graduate School.

MASTER'S DEGREE PROGRAM—SECONDARY EDUCATION*

A. Professional education courses (12 hours required):

Choose one: (3 hours required)
EDU 522—Educational Tests and Measurements
EDU 550—The Role of the Teacher and the Principal in Guidance
EDU 756—Fundamentals of Guidance

Choose one: (3 hours required)
EDU 645—Foundations of Education
EDU 658—Problems in Educational Psychology
EDU 661—Educational Sociology

EDU 714—The Secondary School (3 hours required)
A 3-hour course recommended by the student's edvisor

B. Courses outside Education should be related to the student's teaching field and should be planned with, and have the approval of, the student's advisor.

C. Summary of Requirements:

1. Must be eligible for a teaching certificate by the time the M.A. degree is completed.
2. Must have a total of 30 semester hours in Education at both the graduate and undergraduate levels.
3. Must have 15 hours of graduate work in courses numbered 600 or higher.
4. Must have at least 12 hours of graduate work in Education.
5. Must have at least 12 hours outside the field of Education.
6. Must have a standing of 3.0 (an average of B) or better on all graduate work and must be admitted to full graduate standing.

The student is required to take a non-credit seminar, EDU 99, the first summer term or the first semester he is enrolled in the graduate school.

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* This program is being changed. Consult with advisor to determine effective dates.

MASTER'S DEGREE PROGRAM—BUSINESS EDUCATION

A. *Five Courses Selected from the following:* (15 hours)

EDU 513—Teaching Office Practice, Clerical Practice, and Office Appliances
EDU 514—Teaching General Business Subjects
EDU 615—Problems in Business Education
EDU 618—The Social Business Subjects in High School
EDU 622—Business Education in Colleges and Universities
EDU 623—Administration and Supervision of Business Education
EDU 626—Classification and Possible Use of Community Resources in Business Education
EDU 774—Seminar in Business Education
EDU 786—Independent Work in Business Education
EDU 544—Visual Teaching
EDU 661—Educational Sociology
EDU 714—The Secondary School

EDU 724—Organization and Supervision of Student Teaching
EDU 732—Principles of Curriculum Construction
EDU 756—Fundamentals of Guidance

B. *Elective* (3 hours)

C. *Courses Outside Education* (12 hours)

These are to be selected from commerce, or the student's secondary teaching major or minor, or from areas of need as shown by his scores on the Graduate Record Examination.

MASTER'S DEGREE PROGRAM—SPECIAL EDUCATION

All undergraduate requirements for a provisional teaching certificate must be met before this program can be completed for teacher certification in the Special Education Area.

Curriculum for Master's Degree (36 hours required)

Foundations of Education (6 hours required)

EDU 661—Educational Sociology (3)
EDU 640—Philosophy of Education (3)
EDU 657—Educational Statistics (3)
EDU 658—Problems in Educational Phychology (3)
(EDU 755—Human Development and Behavior may be substituted for EDU 658)

Counseling and Guidance (6 hours required)

EDU 764—Using Occupational and Educational Information in Counseling and Guidance (3)
EDU 521—Introduction to Vocational Rehabilitation (3)
or
EDU 756—Fundamentals of Guidance (3)
EDU 770—Seminar in Education of Exceptional Children (3)
EDU 526—Methods and Materials of Teaching the Mentally Retarded (3)
EDU 530—The Nature and Needs of Retarded Children
EDU 525—Methods and Materials in Teaching the Orthopedically Handicapped Including the Cerebral Palsied (3)
EDU 527—Survey of Physical Defects (3)
EDU 528—Modern Educational Problems: Education of Handicapped Children (3)
*Methods and and Materials for the Trainable Mentally Retarded (3)
*Administration and Supervision in Special Education (3)

* Two additional courses are being proposed. If approved, they will become a part of the Special Education program.

Psychology and Sociology (12 hours required)

**PSY 535	Psychological Testing	3
PSY 550	Speech Pathology: A Survey	3
PSY 560	Introduction to Clinical Audiology	3
PSY 561	Audiometry	3
PSY 640	Practice in Testing: Intelligence Tests	3
PSY 641	Psychological Measuring Instruments	3
PSY 631	Psychology of Language	3
SOC 509	The Family	3
SOC 536	Sociology of Deviant Behavior	3
SOC 538	Juvenile Delinquency	3
SOC 632	Minority Groups	3

In the event of potential duplication of course work as a result of courses previously completed on the undergraduate level, additional electives may be selected from the areas of foundations, special education, psychology, or sociology.

** Prerequisite: EDU 522 or EDU 573.

MASTER'S DEGREE PROGRAMS IN VOCATIONAL EDUCATION

For Agricultural Education Majors

EDU 714	The Secondary School	3
EDU 732	Principles of Curriculum Construction	3

EDU 670	Method in Teaching Vocational Agriculture	3
EDU 678	Selecting Teaching Materials	3
EDU 679	Adult-Farmer Schools	3
EDU 680	Directing Farm Practice	3
EDU 682	Young-Farmer Schools	3

For Home Economics Education Majors

EDU 687	Supervision in Home Economics Education (For Supervision of Student Teachers)	3
EDU 683	Current Problems in Home Economics Education	3
EDU 684	Modern Trends in Home Economics Education	3
EDU 686	Home Economics Curriculum Construction	3
EDU 787	Independent Work in Home Economics Education	3
or 656	Methodology of Educational Research	3

For Industrial Education Majors

EDU 523	Principles and Philosophy of Industrial Education	3
EDU 518	Vocational Guidance	3
EDU 534	Methods in Industrial Education	3
EDU 714	Organization and Operation of Part-Time and Evening Classes	3
EDU 630	The Secondary School	3
EDU 732	High School Administration	3
EDU 535	Principles of Curriculum Construction	3

GRADUATE COURSES IN EDUCATION

DIVISION OF COUNSELING AND GUIDANCE

521 *Introduction to Vocational Rehabilitation.* (3)

Survey of vocational rehabilitation: historical, legal, and administrative aspects of rehabilitation services; survey of rehabilitation services; and the role of the counselor in rehabilitation process.

664 *Problems in Vocational Rehabilitation.* (3) I, II

A study of actual cases of vocational rehabilitation clients emphasizing the various kinds of disabilities, the functional implication of disability, and the contribution of professional personnel in medical, social, psychological, and vocational areas. Prereq: Education 521.

755 *Human Development and Behavior.* (3) I, S

The physiological, sociological, and psychological bases of human behavior with emphasis upon the normal school child in his environment. Findings of research in the behavioral sciences and their implications for the guidance of young persons. *Carse.*

756 *Fundamentals of Guidance.* (3) I, II, S

A survey of the educational, sociological, and psychological foundations of guidance in schools and colleges. Study of the basic philosophy and nature of guidance services, organization and administration of guidance programs, the role of the guidance counselor, and the relationship of guidance services in the total curriculum. *Carse, Martin.*

758 *Group Guidance Problems and Practices.* (3) II, S

Providing for the common needs of groups of students in making more effective educational, occupational, social, and personal adjustments. Special emphasis is given to the selection, organization, and effective use of group guidance materials and techniques.

759 *Identifying and Providing for Individual Students Needs.* (3)

Research studies and reports on individual differences in the physical, intellectual, social, and emotional development of students, and of ways that have proved effective in meeting individual needs, especially in secondary schools. *Staff.*

760 *Counseling Theory and Practice.* (3) II, S
A study of the basic theories, principles, and techniques of counseling and their applications to counseling in schools and colleges. Practice in the techniques of interviewing, and the use of psychological tests, observation, records, case studies, and other procedures in the counseling process. Prereq: Ed. 755, Ed. 756. *Martin.*

761 *Supervised Practice in Counseling.* (3) I, II, S
Supervised practice in counseling in the educational setting in which the student plans to work. Requires 8 hours a week in actual counseling plus a minimum of 2 hours weekly in seminar. Prereq: Ed. 755, Ed. 756, Ed. 760, and at least 6 graduate hours in Psychology. *Staff.*
May be repeated to a maximum of nine credits.

762 *Organization and Administration of Guidance Services.* (3)
A study of the problems of supervision, staffing, finances, effective inter-personal relationships, community participation, in-service education and evaluation of the guidance program. Includes supervised experience in the planning and administration of guidance services. Prereq: Master's degree in counseling and guidance. *Martin.*

763 *Research and Evaluation in Guidance.* (3)
Research methodology applied to the evaluation and interpretation of guidance services. May include analysis and interpretation of test data from schools and school systems, emphasizing the application of test data to local school problems and the organization of reports. *McDaniel.*

764 *Using Occupational and Educational Information in Counseling and Guidance.* (3)
Collection, evaluation, organization, filing and use in counseling of current data. Supply and demand, working conditions, trends, entrance requirements, job families, and career fields. Schools, colleges, and other agencies that prepare for advancement in productive careers. *Staff.*

765 *Independent Work in Counseling and Guidance.* (2)
An independent work course for advanced graduate students who desire to investigate special problems in counseling and guidance. Prereq: one year of graduate work in Counseling and Guidance, including Ed. 755, 757 (or Psych. 610), and approval of instructor. *Staff.*
May be repeated to a maximum of four credits.

777 *Seminar in Counseling and Guidance.* (3)
A seminar for advanced graduate students. Designed to develop deeper understandings and clearer insights in guidance and counseling, through critical examination and discussion of pertinent theories, research reports, case records and counseling experiences. Prereq: 36 hours in Counseling and Guidance, including Practicum (Ed. 761 or Psych. 665), approval of adviser and staff. *Staff.*

DIVISION OF ADMINISTRATION AND SUPERVISION

502 *The Administration of Pupil Personnel.* (3) S
Administrative problems relating to child accounting, including school census, attendance records and reports, social and economic factors affecting school attendance, and duties and responsibilities of school and non-school personnel and agencies. *Staff.*

602 *Local School Administration.* (3) I, II, S
The organization, management, and control of a local school system, including such problems as federal, state, and local relationships, board of education, pupil personnel, employed personnel, public relations, finance and business management, and school services. *Staff.*

603 *Constitutional and Legal Basis of Public School Administration.* (3) II, S

A study of court decisions to discover the legal principles involved in practical problems of school administration. Prereq: Education 602, 636 or 630. *Staff.*

604 *School Buildings and Equipment.* (3)

Measurement and evaluation of existing school building facilities, planning new buildings, determining suitable equipment, and financing the building program. Prereq: Education 602 or its equivalent. *Staff.*

608 *Internship in Educational Administration.* (3) I, II, S

Field experiences are provided for prospective administrators under the cooperative supervision of University personnel and principals, supervisors, and superintendents in Kentucky public school systems. *Staff.*
May be repeated to a maximum of six credits.

628 *Field Problems in Curriculum and Supervision.* (3) I, II

A course designed to provide direct experience in dealing with educational problems in field situations. Observations, readings, and research also required. Registration only with consent of instructor. *Ogletree.*
May be repeated to a maximum of six credits.

629 *The Elementary Principal.* (3) I, S

Problems involved in the organization and administration of a modern elementary school. *Staff.*

630 *High School Administration.* (3) I, II, S

This course deals with organization, administration, and problems of the modern secondary schools, including such specific problems as school staff, program of studies, records and reports, school-community relationships, school plant, finance, and scheduling. *Staff.*

633 *The Administration of the Teaching Personnel.* (3)

The course emphasizes principles and practices in teacher preparation, selection, and placement. Includes a study of salaries, tenure, retirement, teaching loads, sick leave, personnel records, and teacher participation in school administration problems. *Staff.*

634 *Administrative Problems in Today's Education.* (3)

A study of present-day administrative problems. This course is designed to be of assistance particularly to superintendents. *Staff.*

635 *Business Administration and Finance of Public Education.* (3) II, S

A course for prospective superintendents. Emphasizes school support, including state, local, and federal revenues; budgetary policy; procedures for purchasing, accounting, and reporting costs; management of funds, property, equipment, and supplies; payroll procedures, records, and reports. *Staff.*

636 *State School Administration.* (3) S

Organization, administration, and control of education at the state level, including state-federal and state-local school relationships, state support, control of the material environment, training and certification of teachers, teachers' contracts, tenure, retirement. *Staff.*

639 *Supervision of Instruction.* (3) II, S

Development, purposes, and organization of supervisory programs. Special emphasis on the nature of educational leadership. Consideration of various approaches to supervision with special attention to current in-service educational problems. *Staff.*

718 *Trends in Higher Education.* (3)

A survey of modern tendencies in higher education; scope and development, objectives, organization, administration, curricula, finance, faculty and student personnel. Designed primarily for prospective college administrators, teachers, and registrars. *Staff.*

719 *Problems of College Teaching.* (3)
Methods commonly used in college teaching, bases for measuring instruction, marking systems, qualifications for college teaching, and efforts being made to improve college instruction. *Staff.*

733 *Technique and Professional Work of the Registrar.* (3) I, II, S
A comprehensive study of the work of the registrar in institutions of higher education, including the history, literature, and present-day tendencies; rules of the University, recommendations of the American Association of College Registrars. *Staff.*
May be repeated to a maximum of six credits.

771 *Seminar in Administration.* (3) II, S
A critical study of selected problems in school administration. The course is designed primarily for students who have had some administrative experience. Prereq: Education 602 and 639. *Staff.*
May be repeated to a maximum of six credits.

772 *Seminar in Education.* (1) I, II
A course planned for graduate students majoring in education, given under the direction of the faculty of the College of Education. *Staff.*
May be repeated to a maximum of two credits.

785 *Independent Work in School Administration.* (3) I, II
Research on a practical problem in school administration. Open only to students with at least one semester of graduate work in education. Approval of instructor necessary before registration. *Staff.*
May be repeated to a maximum of six credits.

792 *Research Problems in Educational Administration.* (3) I, II, S
An independent research course for the study of special problems in educational administration. Prereq: one year of graduate work. *Staff.*
May be repeated to a maximum of six credits.

793 *Research Problems in Curriculum and Supervision.* (3) I, II
An independent research course. Students confer individually with the instructor. Prereq: one year of graduate work. *Ogletree.*
May be repeated to a maximum of six credits.

799 *Research Problems in Higher Education.* (3) I, II, S
An independent research course for the study of special problems in higher education. Prereq: one year of graduate work. *Staff.*
May be repeated to a maximum of six credits.

DIVISION OF FOUNDATIONS OF EDUCATION

519 *The Elementary School Pupil.* (2) I, S
The psychology of the child in the primary and intermediate grades. Prereq: one course in psychology. *Sorenson.*

520 *The Secondary School Pupil.* (3) II, S
The psychology of the pupil in junior and senior high school. Prereq: one course in Psychology. *Sorenson, Reed.*

522 *Educational Tests and Measurements.* (3) I, S
The problems of measurement in the school program, with special emphasis on standardized tests. The construction and use of new-type tests, use and limitations of traditional examinations, marking systems, etc., are also considered. *Sorenson.*

532 *Intergroup Relations.* (3) S
Analysis of relationships between groups which differ in religious, ethnic, or socio-cultural backgrounds; the development of educational and social techniques for reduction of tensions. (Same as Sociology 532.) *Staff.*
May be repeated to a maximum of six credits.

548 *Educational Psychology.* (3) I, II, S
Application of psychology to the problems of learning and teaching. *Sorenson.*

550 *The Role of the Teacher and the Principal in Guidance.* (3) I, II, S
A first course for non-specialists; basic principles and practical approaches to guidance for prospective teachers and principals in service. *Staff.*

551 *The Teaching of Higher Level Study Skills.* (3) I, S
A course designed to demonstrate the teaching of study skills (including remedial work) in secondary schools. One approach to teaching these skills will include the study problems of college students. *Staff.*

640 *Philosophy of Education.* (3) I, II
An advanced course dealing with the philosophy of democratic education and applications to some of the larger educational problems of today. Prereq: 12 semester hours in education. *Hartford.*
May be repeated to a maximum of six credits.

645 *Foundations in Education.* (3) I, S
An intensive study in various fields which contribute to the development of educational theory and practice. *Hartford and Staff.*
May be repeated to a maximum of six credits.

649 *Review of Current Educational Literature.* (3) II, S
An extensive study of current educational literature as found in educational periodicals. Prereq: 12 semester hours in education. *Hartford.*

650 *General History of Education.* (3)
A survey of the history of education from the Greek period to the present. *Hartford.*

651 *History of Education in the United States.* (3)
A history of the growth and development of education in the United States from earliest Colonial times to the present, including recent movements and trends. *Hartford.*

652 *History of Educational Thought.* (3) I, S
A study of the lives and writings of the world's educators to acquaint the student with the ideals and contributions to society of great educators. *Hartford.*

655 *Comparative Education.* (3) II, S
Comparisons of modern national systems of education. *Hartford.*

656 *Methodology of Education Research.* (3) II
A course intended to acquaint the student with the various techniques of research and to aid him in methods of attack on his own particular research problems. Prereq: 12 semester hours in education. *Sorenson.*

657 *Educational Statistics.* (3) I
A non-mathematical study of the applications of statistical and graphical methods to educational data. *Sorenson.*

658 *Problems in Educational Psychology.* (3) II, S
A critical survey of the psychological theories and research apulicable to educational practices. Prereq: one year of psychology. *Sorenson.*

661 *Educational Sociology.* (3) II, S
A course in sociological foundations of education. *Hartford.*

665 *Practicum in Counseling Psychology.* (3) I, II, S
Nine hours of supervised work each week in counseling psychology in the University Counseling Office. (Same as Psychology 665.)
May be repeated to a maximum of twelve credits.

725 *Advanced Problems in Philosophy of Education.* (3)
A critical study of philosophical problems which relate to present day education. Prereq: teaching experience and 6 semester hours in philosophy of education. *Hartford.*

739 *A Survey of Research in Human Development and Education.* (3) II
A study of the research and principles of education and allied fields which are appropriate to a consideration of education as a development process. Prereq: Master's degree or by permission. *Staff.*

750 *Problems in Educational Sociology.* (3) S
An advanced course in the application of sociological findings to education including consideration of Southern regional problems and potentialities. Prereq: 12 semester hours of graduate work including Education 661 or equivalent. (Same as Soc. 750.) *Hartford.*

773 *Seminar in Foundations of Education.* (3) S
A critical study of selected problems in the foundations of education areas. *Hartford.*

778 *Seminar in History of Education in Kentucky.* (3) II, S
A seminar for graduate students in education who are interested in developing a background and perspective upon educational problems by study of the history and development of education in Kentucky. *Hartford, Manker.*

782 *Independent Work in Educational Psychology.* (3) I, II, S
An independent work course for students who have done a minimum of 12 semester hours of graduate work including Education 522, 520, or 658. *Sorenson, McDaniel.*
May be repeated to a maximum of six credits.

783 *Independent Work in the Philosophy of Education.* (3) I, II, S
An independent work course for students who have done a minimum of 12 semester hours of graduate work, including Education 640, 652, and 661. *Hartford.*
May be repeated to a maximum of six credits.

784 *Independent Work in History of Education.* (3) I, II, S
Independent work problems and topics for advanced students in history of education. *Hartford.*

DIVISION OF INSTRUCTION

724 *Organization and Supervision of Student Teaching.* (3) S
A course designed for teachers preparing to become supervising teachers. The basic principles apply to both elementary and secondary education. Includes a presentation of the experiences deemed important in developing students into effective teachers. *Reed, Smith.*

DIVISION OF CURRICULUM

507 *Safety Education.* (3) S
A course designed to aid in developing skills and techniques essential to improving automotive and pedestrian safety. Psycho-physical tests, classroom work, behind-the-wheel driving, and other basic safety education are presented. *Gardner, Huff.*

525 *Methods and Materials in Teaching the Orthopedically Handicapped, Including the Cerebral Palsied.* (3) S

Analysis of the special problems involved in teaching the orthopedically handicapped children and those who are cerebral palsied. Emphasis upon team relationships, planning the school day, adjustment and adaptation of curriculum methods and materials to meet the children's individual and group needs. Interpretation and use of professional records and research. *Staff.*

526 *Methods and Materials of Teaching the Mentally Retarded.* (3) II

Basic organization and planning of school programs for the classroom teacher of the "educable" and "trainable" mentally retarded. Major emphasis on curriculum development and teaching techniques. Observation in classes for the mentally retarded arranged. *Staff.*

527 *Survey of Physical Defects.* (3) II

A survey of causes, treatment, and educational implications of crippling conditions of school age children. Attention given to rehabiliation and life adjustment problems of individuals with single or multiple handicaps. Field trips to various facilities concerned with meeting the needs of the physically disabled. *Staff.*

530 *The Nature and Needs of Retarded Children.* (3) I, II, S

A critical examination of pertinent research in reference to the educational, physical, and psychological nature and needs of the educable and trainable mentally retarded child, including interpretation of psychological tests. Evaluation of the physical, social, emotional and mental characteristics of the retarded, to assist the classroom teacher to recognize the social potential of each child to the degree that the child with retarded mental development may become less of a burden to himself and society. *Levy.*

538 *Advanced Arts and Crafts in the Elementary School.* (3) II

Planned to give the elementary teacher an understanding of teaching methods involved in, and construction of, art activities which would enrich the classroom program. *Haines.*

539 *The Elementary Curriculum.* (3)

The philosophy and techniques of curriculum construction and some practical work in construction. *Moore.*

540 *The Analysis and Correction of Reading Disabilities.* (3)

A study of current methods and materials useful in analyzing the problems of disabled readers and giving corrective help. Students will use what is learned in working with children who have less severe reading problems. Special sections will be organized for students in special education. Prereq: Ed. 329 or 541, a course in testing, and work in linguistics.

541 *Teaching Reading and Related Language Arts in the Secondary School.* (3)

A study of current methods and materials useful in: (1) teaching reading and related language arts in secondary schools, and (2) improving reading ability in the content areas. Prereq: nine hours of English.

542 *Children's Literature.* (3)

Planned to acquaint students with literature for children, kindergarten through grade 8. Review of interests at different ages. Discussion of types of literature—folklore, modern fairy tales, myths and legends, realistic stories, biography and poetry.

543 *Teaching in the Kindergarten.* (3) I

The nature, development and education of the child of kindergarten age. Organization, equipment, curriculum, and procedures used with children of this age. Regular periods are scheduled for observing and participating in the kindergarten. *Burke.*

544 *Visual Teaching.* (3) I, II, S

A course in methods and techniques of visual instruction. Emphasis is on the effective use of films, film strips, pictures, maps, graphs, slides, field trips, by means of lesson plans. Surveys are made of visual materials. (Same as L.S. 586.) *Bissmeyer.*

549 *Sociological Aspects of Mass Communication.* (3) I
The relationship between the organization of modern society and its communication media: Special emphasis is given to the way in which cultural processes and social change have an impact upon the mass media, and upon the way in which the mass media influence cultural processes and social change. The social-psychological bases of communication are studied within a context of theory and research. Prereq: 6 hours of sociology. *DeFleur.* (Same as SOC 549)

558 *Modern Educational Problems: Education of Handicapped Children.* (3)
Procedures to be used in the education of children who are handicapped physically, mentally, or emotionally. Attention is given to work with individual children as well as with groups. *Staff.*

560-576 *Modern Educational Problems.* (3 ea.)
A brief survey of some of the problems in modern education. *Staff.*

596 *Science in the Elementary School.* (3)
A background of elementary science usable with children in the first six grades. Includes planning units of work, organizing and using materials, and references, making bibliographies for teachers and children, illustrated materials, and excursions.

641 *A Study of Research and Theory in Teaching Reading in the Elementary School.* (3)
A systematic study of the research and theory and their application to the teaching of reading in the elementary school. Attention will be given to new developments in the field. Not available for credit to students who have had Ed. 372. Prereq: Ed. 329 and work in linguistics.

642 *A Study of Research and Theory in Teaching Language Arts in the Elementary School.* (3)
A systematic study of the research and theory and their application to the teaching of listening, oral and written communication, spelling, and handwriting in the elementary school. Attention will be given to new developments in the field. Not available for credit to students who have had Ed. 566. Prereq: Ed. 329 and work in linguistics.

643 *A Study of Research and Theory in Teaching Reading in Secondary Schools.* (3)
A systematic study of the research and theory and their application to the teaching of reading in the secondary schools. Attention will be given to new developments in the field. Not available for credit to students who have had Ed. 568. Prereq: Ed. 541 and work in linguistics.

712 *The Elementary School.* (3) II
Recent research and modern trends in teaching the skills and content subjects in the elementary school. Planned for supervisors, superintendents, principals, and teachers for better understanding of a modern elementary school. *Moore.*

714 *The Secondary School.* (3) I, II, S
A course designed to acquaint the secondary teacher and the administrator with the nature and function of the secondary school. *Ogletree.*

717 *The Junior High School.* (3) I, II, S
A study of the unique functions of the junior high school. Scope and sequence of the curriculum, school organization and guidance as related to the young adolescent will be considered. A course for principals, supervisors, teachers. *Lurry.*

730 *Problems of the School Curriculum.* (3)
Problems in the field of the school curriculum and in the preparation of instructional materials. Students enrolling in this course are required to leave on file with the College of Education a complete report of each problem studied. *Staff.*
May be repeated to a maximum of six credits.

732 *Principles of Curriculum Construction.* (3)
Study of basic principles of curriculum development. Relationship of social and psychological factors to curriculum change. Survey of current approaches to curriculum organization. Consideration of means of curriculum development in school systems. *Musselman, Moore, Lurry.*

735 *The Core Program in the Secondary Schools.* (3) I, II, S
Deals with the philosophical and psychological bases of the core program and gives major emphasis to problems of teaching in the core class. A course designed for teachers, principals, supervisors. *Lurry.*

740 *Practicum in Teaching Reading and Related Language Arts.* (3)
Supervised practicum in analyzing problems in reading and related language arts and providing corrective work. Requires six hours per week in practicum with individual children or groups, plus two hours per week in seminar. A high level of knowledge in teaching reading is assumed. May be repeated once to a maximum of 6 credits.

742 *Administration and Supervision of Public School Music.* (3) I, II, S
A study of current trends in school music, curricula, testing programs, and other supervisory procedures. *Staff.*

743 *Advanced Methods and Materials in Music Education.* (2) I, II, S
Survey and evaluation of new public school music methods and materials. *Staff.*

744 *History and Philosophy of Music Education.* (2) I, II, S
A course designed to acquaint the student with the historical developments and basic philosophies in public school music. *Staff.*

745 *Organization of Audio-Visual Aids.* (3) II
Operation of an audio-visual program considering budgeting, training of personnel, duties of staff, sources of materials, and use of equipment. Previews are made of many audio-visual materials. *Bissmeyer.*

746 *Motion Pictures in Education.* (3)
The history of the educational motion picture, technique in the use of films, educational scenario writing, grading and scoring films, and motion picture appreciation. *Bissmeyer.*

749 *Extracurricular Activities.* (3) S
The underlying principles and common practices of the co-curricular activities programs as developed in public schools. Home room activities, assembly programs, and clubs are the three major sections of the course; other activities included when necessary. *Cierley, Burkeen.*

770 *Seminar in Education of Exceptional Children.* (3) I, II, S
Study of philosophy, principles, trends, and research in education of exceptional children. Students will carry on an extensive study of a problem dealing with education of an exceptional child. *Levy.*

780 *Independent Work in Elementary Education.* (2) I, II
An independent work course for students who have done a minimum of 12 semester hours of graduate work including Education 712 or 629. *Moore, Ramsey, Sudduth.*
May be repeated to a maximum of four credits.

781 *Independent Work in Secondary Education.* (3) I, II, S
An independent work course for students who have done a minimum of twelve semester hours of graduate work including Education 714 or 630. *Cierley, Lurry, Reed, Smith.*
May be repeated to a maximum of six credits.

790 *Research Problems in Secondary Education.* (3) I, II, S
An independent research course. Students confer individually with the instructor. Prereq: one year of graduate work. *Cierley, Lurry, Reed, Smith.*
May be repeated to a maximum of six credits.

791 *Research Problems in Elementary Education.* (3) I, II
An independent research course. Students confer individually with the instructor. Prereq: one year of graduate work. *Moore, Ramsey.*
May be repeated to a maximum of six credits.

BUSINESS EDUCATION

511 *Teaching Secretarial Subjects.* (3) II, S
Special techniques and devices for teaching shorthand, typewriting and secretarial office practice. Required of business education majors. *Musselman.*

512 *Teaching Bookkeeping and Accounting.* (3) I, S
Methods materials, and techniques used in the teaching of bookkeeping and accounting. *Musselman.*

513 *Teaching Office Practice, Clerical Practice, and Office Appliances.* (3) I, II, S
Methods and materials used in teaching office practice and procedures, clerical practice and the various machines commonly used in business offices. *Musselman.*

514 *Teaching General Business Subjects in the Secondary Schools.* (3) II, S
The aims and purposes of the general business courses are studied. Analysis is made of the objectives of the general business subjects, and methods and materials used in teaching them are emphasized. *Musselman.*

605 *Teaching Consumer Courses in the High School.* (3) I, S
Methods, materials and techniques of teaching high school pupils the various aspects of consumer education. Emphasis is placed on procedures and the student should have a background of training in economics before taking the course. *Musselman.*

615 *Problems in Business Education.* (3) I, II, S
A study of advanced problems of interest to business teachers such as testing in business subjects, guidance, job studies, placement and follow-up, equipment, and supervision. *Musselman.*
May be repeated to a maximum of six credits.

618 *The Social Business Subjects in High School.* (3) I
An examination of the various social business subjects to determine their contribution to the objectives of business education. *Musselman.*

621 *The Commerce Curriculum.* (3) II, S
A study of business subjects offered in the high school to determine their content and the place each should occupy in high school curricula. A course of study is developed for each subject. *Musselman.*

622 *Business Education in Colleges and Universities.* (3) S
Consideration of the problems pertaining to the teaching of business subjects at the college level. Consideration is also given to the development of curricula to meet teacher certification requirements in various states. *Musselman.*

623 *Administration and Supervision of Business Education.* (3) II, S
Duties and responsibilities of city and state supervisors, department heads, and others engaged in directing business education. *Musselman.*

626 *Classification and Possible Use of Community Resources in Business Education.* (3) I, S

Course provides for community analysis, and the development of possible ways and means to supplement the business education course in the secondary school with a study of vital community resources. *Musselman.*

774 *Seminar in Business Education.* (1) I, II, S

A study of current literature in business education with special reference to trends in this field. *Musselman.*
May be repeated to a maximum of two credits.

786 *Independent Work in Business Education.* (3) I, II, S

An independent work course for students who have done a minimum of 12 semester hours of graduate work, one-half of which must have been in business education. *Musselman.*
May be repeated to a maximum of six credits.

DIVISION OF VOCATIONAL EDUCATION

AGRICULTURAL EDUCATION

580 *Teaching Vocational Agriculture.* (15) I, II

Preparation for teaching of agriculture. About one-half of the course is practice. *Hammonds, Binkley, Lamar, and supervising teachers.*

581 *Adult-Farmer Schools and Young-Farmer Courses in Agriculture.* (3) I, II

A general introduction to adult-farmer schools and young-farmer courses with some observation of work in both of these fields. *Hammonds, Binkley, Lamar, and supervising teachers.*

582 *Problems in Agricultural Education.* (3) I, II, S

Class work on current problems in agricultural education common to special groups of students (not individual-problem work). *Hammonds, Binkley, Lamar.*
May be repeated to a maximum of six credits.

585 *Farm Practice Supervision.* (1) I, II, S

Practice and directed study in supervising farming programs in vocational agriculture. *Hammonds.*

670 *Method of Teaching Vocational Agriculture.* (3) S

The principles of method applied to the teaching of agriculture. Prereq: experience in teaching vocational agriculture. *Hammonds.*

671 *Teaching Prevocational Agriculture.* (3)

Aims, purposes, and methods of teaching prevocational agriculture. Each student works out the content of a course, including selecting the teaching materials. *Hammonds.*

672 *Determining Content in Vocational Agriculture.* (3) S

Interpretation of local data as a basis for course building. Each student works out the content of a four-year course in vocational agriculture. *Hammonds, Luster.*

675 *Modern Problems in Agricultural Education.* (3) I, II, S

Class work (not individual-problem work) on modern problems in agricultural education. *Hammonds.*
May be repeated to a maximum of nine credits.

677 *Advanced Problems in Agricultural Education.* (3) I, II, S

Specific problems selected according to the needs of the individuals. *Hammonds.*

678 *Selecting Teaching Materials.* (3) S
Selection of specific references and other teaching materials to be used in the teaching of vocational agriculture. *Luster.*

679 *Adult-Farmer Schools.* (3) S
Preparation for teaching adult farmers; organization of adult-farmer schools, curriculum content, method of teaching, and follow-up work. *Lamar.*

680 *Directing Farm Practice.* (3) S
Supervised farming as a method of teaching; standards, planning, supervision, and records. *Binkley.*

681 *Teaching Farm Shop.* (3) S
A study of necessary content for shop, plans for securing and equipping the shop, and methods of teaching farm shop. *Cox.*

682 *Young-Farmer Schools.* (3) S
Content and method of teaching young-farmer courses in vocational agriculture. *Cox.*

795 *Research Problems in Agricultural Education.* (3) I, II, S
Individual problems of importance to agricultural education. *Staff.*
May be repeated to a maximum of nine credits.

DISTRIBUTIVE EDUCATION

515 *Problems in Distributive Education.* (3) I, II, S
Problems in teaching vocational distributive education in day, part-time, and evening schools. The problems are selected in accordance with the needs and desires of the students. Prereq: Education 517 and 528. *Baker.*
May be repeated to a maximum of six credits.

516 *Problems of the Coordinator in Industrial and Distributive Education.* (2) I, II, S
A course for coordinators of Industrial and Distributive Education, including planning of local programs, use of advisory committees, selection and arrangement of teaching materials and over-all planning and operation of the program. *Baker, Owens.*
May be repeated to a maximum of four credits.

517 *Determining Teaching Content in Distributive Education.* (3) I, II, S
Course construction in the field of distributive education. This course is planned to meet the needs of persons engaged as instructors in the field of distributive education. *Baker, Fagan.*

528 *Technique of Teaching Distributive Education.* (3) I, II, S
A study of the methods of teaching as applied to distributive education. The purpose of the course is to train prospective teachers to teach in the field of distributive education. *Baker, McDowell.*

HOME ECONOMICS EDUCATION

586 *Technique of Teaching Home Economics.* (3) I, II
A study of methods of teaching as applied to home economics. *Haile.*

588 *Adult Education in Home Economics.* (3) I, II, S
Problems in teaching vocational homemaking in day, part-time, and evening schools. Prereq: Education 586. Prereq: (or to be taken concur.): Education 362. *Haile.*

590 *Problems in Home Economics Education.* (3) S
Problems in teaching home economics for high school students and adults. The course may include such subjects as teaching in, and supervision of, the school community cannery and the teaching of housing. *Staff.*
May be repeated to a maximum of nine credits.

683 *Current Problems in Home Economics Education.* (3) II, S
Recent developments in home economics education. Prereq: Education 586 and 362; teaching experience. *Kelsay.*

684 *Modern Trends in Home Economics Education.* (3) I, S
A basic course for students in home economics education. The course includes the development of home economics education and modern trends in curriculum, methods of teaching, and evaluation. *Gorman.*

685 *Home Economics Curriculum Construction.* (3) S
A study of the underlying principles of curriculum building for junior and senior high school and adult education in home economics. Prereq: Education 586 and 362. *Gorman.*

686 *Evaluation in Home Economics Education.* (3) I, S
A course to acquaint teachers of home economics with techniques used in measuring attainment in home economics in the junior and senior high school and college. Prereq: teaching experience. *Gorman.*

687 *Home Economics Supervision.* (3) I, S
A course planned primarily to help prepare teacher-trainers and supervisors of home economics education. Prereq: Education 586 and 362; teaching experience; and permission of instructor. *Kelsay.*

693 *Directed Supervision in Home Economics Education.* (3) I, II
This course includes practice in teaching for observation by others, student teaching, and school visiting. Prereq: two years of teaching experience and Education 687. *Gorman.*

775 *Seminar in Home Economics Education.* (3) I, II, S
Individual investigations and reports on special problems in home economics education. *Gorman.*
May be repeated to a maximum of nine credits.

787 *Independent Work in Home Economics Education.* (3) I, II, S
An independent work course for students who have done at least 12 semester hours of graduate work, one course of which must have been in home economics education. *Staff.*
May be repeated to a maximum of six credits.

INDUSTRIAL EDUCATION

518 *Methods in Industrial Education.* (2) S
The most approved methods in instructional management, including lesson planning, in the field of vocational industrial education. *McDowell.*
May be repeated to a maximum of four credits.

523 *Vocational Guidance.* (2) I, II, S
Course content includes units on aims and purposes, individual inventory, and counseling techniques. Emphasis is placed on occupational information and guidance, placement, follow-up, and organization and administration of a guidance program. *Owens.*

524 *Modern Industrial Analysis.* (2) I, II, S
Modern industrial organizations; trends in industrial educational policies; the proper approach to and analysis of these problems as they affect the industrial vocational teacher. *Baker, McDowell.*

529 *Evaluation in Industrial and Distributive Education.* (2) I, II, S
The theory and practice of standardized, classroom, and performance testing as a means of measuring student achievement. *Fagan.*

534 *Organization and Operation of Part-Time and Evening Classes.* (2) I, II, S
A course for administrators, coordinators, and teachers in part-time and evening industrial education. Covers the duties of a coordinator in cooperative training programs. *Baker.*

535 *Principles and Philosophy of Industrial Education.* (2) I, II, S
A course planned primarily for the advanced student in industrial education. It covers the general philosophy of vocational education as it relates to the problems and principles of industrial education. *Owens.*
May be repeated to a maximum of four credits.

536 *Surveys in Industrial Education.* (2) I, II, S
This course deals with the basic methods and techniques used in making a survey to determine the needs for trade and industrial education. How to gather, evaluate, and interpret the data is emphasized. *Baker.*

537 *Special Problems in Industrial Education.* (2) I, II, S
The supervised study of approved problems in industrial education on a research basis. *Staff.*

VOCATIONAL EDUCATION

694 *The Administration of Vocational Education.* (3) I, II
A course designed for superintendents, high-school principals, and other administrators. Its purpose is to train for administering and supervising vocational education in schools. *Hammonds.*

695 *Special Problems in Vocational Education.* (3) I, II, S
An independent work course for students interested in vocational education. Students make individual investigations and report on special problems. *Hammonds, Staff.*

776 *Seminar in Vocational Education.* (2) I, II, S
A critical study of selected problems in vocational education. The course is open only to students with experience in the field. *Hammonds, Gorman, Baker.*
May be repeated to a maximum of four credits.

COURSES APPLICABLE TO ALL DIVISIONS

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis.

769 *Residence Credit for the Doctor's Degree.* (1 to 18 wks. residence)
Staff.
May be repeated indefinitely.

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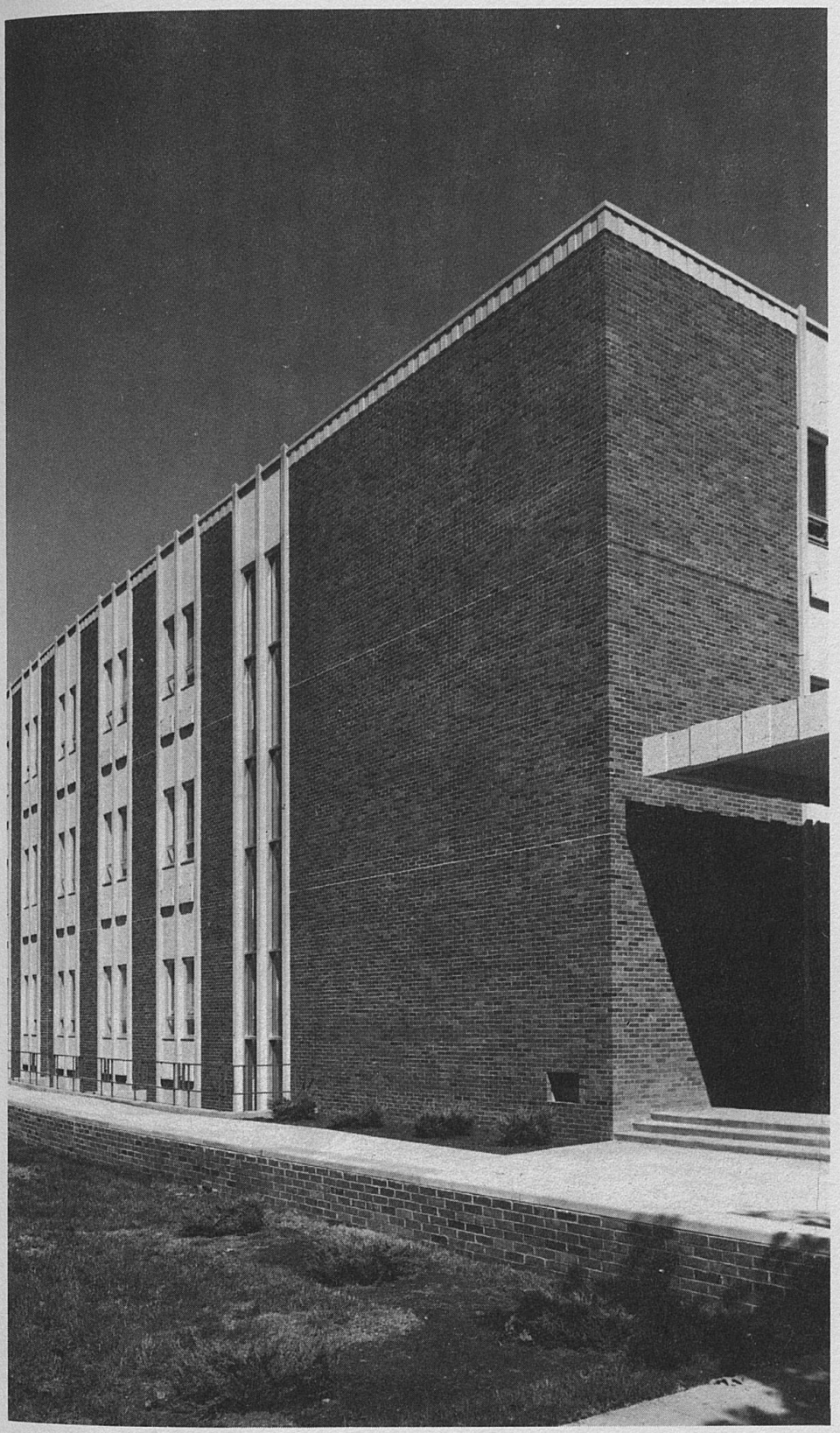

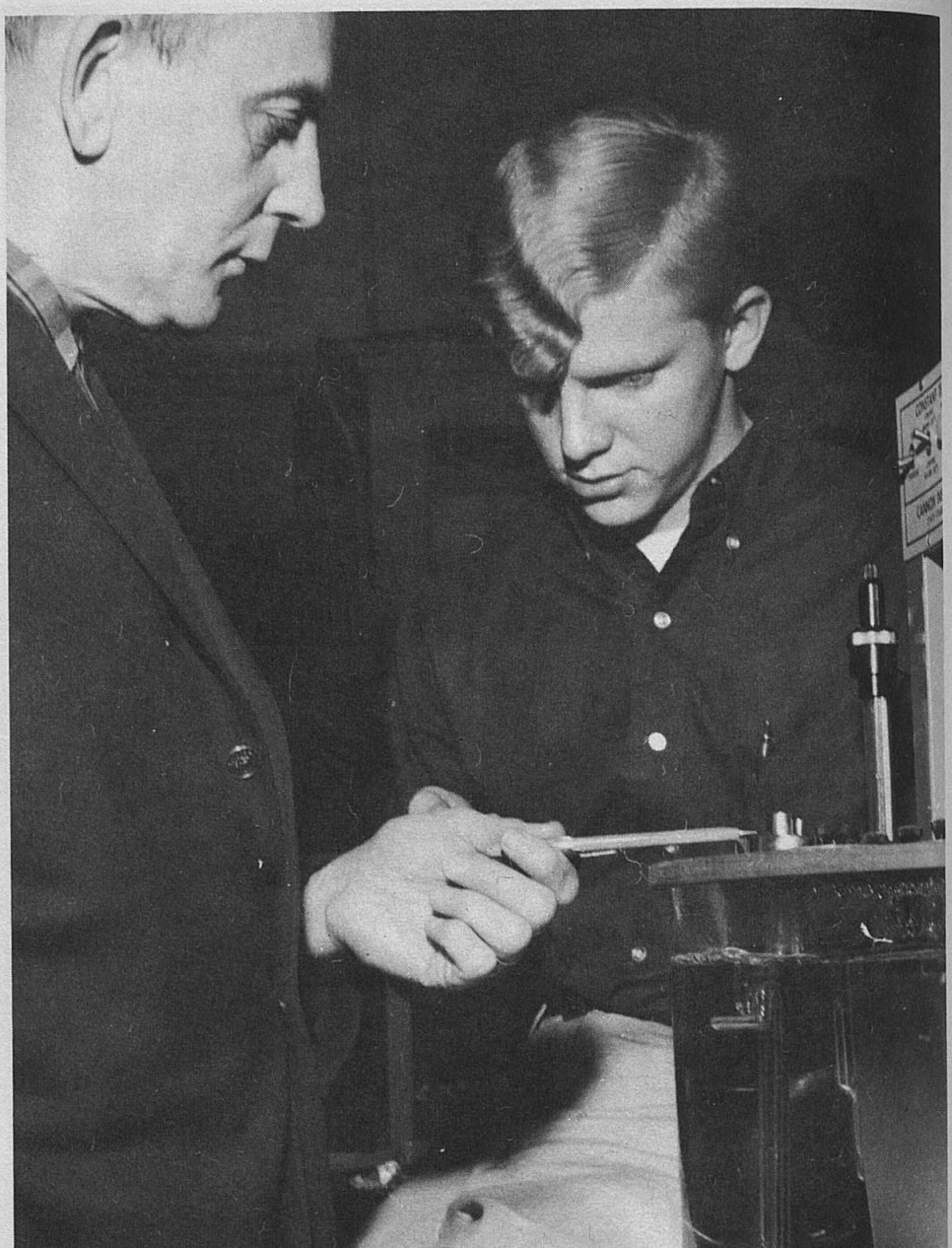

V. ENGINEERING

Requirements for Advanced Degrees in Engineering

(See also pages 13-16.)

Two classes of advanced degrees are offered in the College of Engineering, the masters' degrees and the professional degrees.

THE MASTERS' DEGREES IN ENGINEERING. The masters' degrees in engineering may be obtained by satisfying the following requirements:

1. Twenty-four semester hours in graduate courses with an average standing of 3.0 or better.
2. No grade below C may be counted.
3. Thirty-six weeks in residence.
4. An acceptable thesis.
   (In Electrical Engineering, Engineering Mechanics and Mechanical Engineering, with departmental approval a student may substitute six credits of graduate level course work for the thesis.)
5. Two-thirds of the work must be in the major subject.
6. There is no language requirement for these degrees.

The candidate must hold the corresponding Bachelor of Science degree in engineering or the equivalent from this institution or from another engineering school of recognized standing. A thorough working knowledge of chemistry, physics, and mathematics is necessary. The degrees offered are Master of Science in Agricultural Engineering, Master of Science in Civil Engineering, Master of Science in Electrical Engineering, Master of Science in Engineering Mechanics, Master of Science (major in Engineering Mechanics), Master of Science in Mechanical Engineering, Master of Science in Metallurgical Engineering, Master of Science in Nuclear Engineering.

REQUIREMENTS FOR THE PH.D. DEGREE

Doctoral work is offered in Civil Engineering, Engineering Mechanics, Mechanical Engineering, and Metallurgical Engineering. See the general requirements for the degree of Doctor of Philosophy as listed on page 21 of this bulletin.

AGRICULTURAL ENGINEERING

NOTE: Agricultural Engineering 775, 657, 658 and at least one other agricultural engineering course in the 600 series are required for the Master of Science Degree in Agricultural Engineering.

COURSES FOR AGRICULTURAL STUDENTS

400 *Farmstead Planning and Mechanization.* (3) I, II

Analysis of feed, water, and manure-handling systems on the farm. The processing and storage of farm products. Farmstead layout and design. Selection and control of materials handling equipment. Lecture, one hour; laboratory, four hours. Prereq: AEN 100 or consent of instructor. *Walker, White.*

410 *Farm Power and Machinery.* (3) S

A study of farm tractors and implements. Operating principles of valves, carburetion, ignition, and lubrication of the engine. Use and care of selected tractor-mounted implements. Emphasis on maintenance. Class and laboratory work on tractors and implements. Lecture, two hours; laboratory, two hours. *Young.*

430 *Farm Water Management.* (3) I

Elementary surveying, mapping, and determination of areas of farm land; consideration of precipitation, runoff, and soil erosion relationships; planning terraces, waterways, drainage systems, and farm reservoirs. Lecture, two hours; laboratory, three hours. Prereq: AEN 100 or consent of instructor. *Ligon.*

440 *Dairy Equipment.* (2) II

Engineering principles involved in the construction, operation, and management of machinery and equipment used in processing dairy products. Lecture, two hours. Prereq: Agr. Engr. 110 and Agr. Engr. 111 and 3 hours of Physics. *Parker.*

442 *Farm Electrification.* (3) II

Study of the various aspects of farmstead electrification including the fundamentals of farmstead wiring and the selection, operation and economics of farm electrical equipment. Special attention given to materials handling and crop processing equipment. Lecture, two hours; laboratory, two hours. Prereq: AEN 100 or consent of instructor *White.*

450 *Special Problems.* (1-3) I, II, S

An intensive study of some phases of Agricultural Engineering in which the student is particularly interested. Approval of the instructor is required. *Staff.*
May be repeated to a maximum of six credits.

COURSES FOR ENGINEERING STUDENTS

416 *Energy Sources and Machinery for Agriculture.* (4)

A study involving the use of fundamental concepts of energy and materials in analytical and experimental approaches to the development and design of Energy Converters and machinery for agriculture. Lecture, three hours; laboratory, two hours. Prereq: MA 431, EM 221, EM 313, EM 431. *E. Smith.*

425 *Functional Design of Agricultural Structures.* (4) I

Functional requirements of farm buildings and structures; planning for plant and process efficiency; selection and utilization of materials; sanitary equipment and disposal of wastes; preparation of plans, estimates, and specifications. Lecture, two hours; laboratory, four hours. Prereq: EM 431, EG 102. *Walker.*

435 *Principles of Soil and Water Conservation Engineering.* (4) II

Engineering aspects of the control of surface and subsurface water to aid agricultural production. Mapping of farm land; design and construction of terraces, dams, waterways, drainage, and irrigation systems. Lecture, three hours; lab, two hours. Prereq: ME 330 or CE 350. *Ligon.*

446 *Agricultural Processing and Electrification.* (4) I

Application of engineering principles to the handling and processing of agricultural products. The utilization of electricity in agriculture. Instrumentation and control of agricultural processes. The analysis of processing systems on the farmstead. Lecture, three hours; lab, two hours. Prereq: EE 306, ME 330, or CE 350. *White.*

505 *Engineering Analysis.* (3) II

A study of the professional method of dealing with engineering problems and the application of this method to problems encountered in the agricultural industry. Lecture, two hours; lab, two hours. Prereq: AEN 416, 425, 435, 445. *E. Smith.*

519 *Advanced Farm Machinery.* (3) I, II

Engineering analysis of agricultural machines, power units, and equipment with emphasis on functional design requirements, development procedures, safety requirements, and evaluation of performance. To be offered as a formal class or as a special problems course. Prereq: Agr. Engr. 417. *Smith.*

525 *Design of Structures for Biological Systems.* (3) II
The influence of environmental factors on biological efficiency, design and selection of equipment and controls for providing environmental requirements of biological systems.

535 *Soil and Water Conservation Engineering.* (3) II
Consideration of elements of hydrology related to agriculture; functional analysis, economic analysis and design of more complex systems for soil and water control and management.

548 *Advanced Agricultural Processing.* (3) I, II
Analytical study of engineering problems dealing with the handling and processing of agricultural products, such as grading, sorting, drying, and curing and the preparation of plans for these operations. To be offered as a formal class or as a special problems course. Prereq: Agr. Engr. 425 and 445. *White.*

618 *Power and Machinery Engineering.* (3) II
A consideration of fundamental concepts of energy and materials in the identification and mensuration of parameters needed in the development of new machines for agriculture.

638 *Advanced Structural Design for Biological Systems.* (3) I, II
The use of similitude, dimensional analysis, and statistical theory in the analysis of selected agricultural structural problems. The prediction of system performance as environmental conditions change; and the analysis of system reliability. Prereq: AEN 525 or consent of instructor.

635 *Advanced Soil and Water Conservation Engineering.* (3) I, II
A consideration of advanced techniques useful in research, analysis, and design related to soil and water conservation facilities. Mathematical and statistical techniques and theory of models are included. Prereq: AEN 535 or consent of instructor.

646 *Advanced Agricultural Processing and Electrification.* (3) I, II
An analytical and descriptive study of advanced agricultural engineering topics related to agricultural processing and electrification, food preservation, quality measurement and control and the application of electromagnetic energy to agriculture. Prereq: AEN 548.

658 *Instrumentation in Agricultural Engineering Research.* (3) I, II
The principles and application of measuring instruments and devices for obtaining experimental data. Prereq. or concur: Agr. Engr. 657. *Staff.*

750 *Special Problems in Agricultural Engineering.* (1-3) I, II, S
A minimum of three hours per week of laboratory and consultation will be required per credit. In addition, outside reading, analysis, and literature search will be required.

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
Staff.
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis.

775 *Seminar.* (0) I, II, S
Weekly meetings with members of the staff for reports and discussions on research and current trends and practices in agricultural engineering. One class hour. *Staff.*
May be repeated twice.

CHEMICAL ENGINEERING

422 *Mass Transfer.* (3) II
Continuation of CME 421. Principles of mass transfer operations—distillation, gas absorption, liquid extraction, drying, etc., including quantitative problems in design and operation of equipment. Prereq: ME 325 and ME 330 or equivalent and consent of instructor. *Hite.*

565 *Petroleum Refinery Engineering.* (3) II
Application of chemical engineering fundamentals to petroleum processing methods and equipment. Prereq: CME 422 or equivalent and consent of instructor. *Hite.*

CIVIL ENGINEERING

425 *Soil Mechanics.* (3) I, II

A study of soil and its utilization in foundations for structures and subgrade for highways. Stabilization and improvement of bearing values. Lectures and recitations, two hours a week. Prereq. or concur: Geol. 200 and EM 331 or 322. *Pendley.*

426 *Laboratory to Accompany 425.* (0)

Three hours.

480 *Structural Mechanics II.* (3) I, II

Continuation of CE 380 with emphasis on sophisticated methods of analyzing complex structures. Lecture and recitation, three hours. Prereq: CE 380. *Mory.*

515 *Geometronics.* (3) I

Fundamental principles of geodesy, engineering astronomy and precise survey procedures; triangulation, trilateration and adjustment computations; theory of electronic distance measurement; applications to the horizontal and vertical control of engineering construction and photogrammetric mapping. Lecture, 2 hours; lab, 3 hours. Prereq: MA 431 and approval of instructor. *Dearinger.*

521 *Engineering Aspects of Surficial Soils and Landforms.* (3) II

Techniques of terrain analysis for civil engineering purposes through the use of air photo interpretation (quantitative and qualitative) and other sources of pedologic, geologic and topographic information. Lecture, 2 hours; lab, 3 hours. Prereq: GLY 200. *Dearinger.*

540 *Pavement Analysis and Design.* (3) II

Pavement subgrade soil factors affecting design and performance; types and characteristics of pavements; economic comparison of pavement; aggregate and binder considerations; composition design of pavements including structural and durability problems. Lecture, 2 hours; lab, 3 hours. Prereq: CE 340. *Hutchinson and Pendley.*

541 *Laboratory for CE 540.*

542 *Highway Traffic Characteristics.* (3) I

Vehicle operating characteristics; driver, pedestrian and roadway characteristics as they individually, and collectively as traffic stream characteristics are related to the planning, design and operation of highway facilities. Lecture, 3 hours. Prereq: CE 340. *Hutchinson.*

543 *Development of Transportation Facilities.* (3) II

Analysis of factors affecting development of transportation facilities: history of transportation development; problems of highway geometrics, design standards and traffic estimates and assignment; basic planning and location principles; programming improvements, maintenance and new construction; concepts of highway management, finance and public relations. Lecture, 3 hours. Prereq: CE 340, CE 542 or consent of instructor. *Hutchinson.*

550 *Engineering Hydraulics.* (3) II

Analysis of flow in closed conduits and natural and artificial open channels. Design of hydraulic structures. Lecture, 3 hours. Prereq: CE 352. *Land.*

553 *Hydrology.* (3) I, II

Occurrence, control and utilization of water particularly as a problem of Civil and Sanitary Engineering. Prereq: CE 355 or consent of instructor. *James.*

555 *Engineering Economy.* (3) I

Economic evaluation and financial analysis of engineering alternatives in which the goal of economic efficiency is applied to engineering design. Lecture, 3 hours. Prereq: CE 305 and ECO 252 or consent of instructor. *James.*

566 *Public Health Engineering.* (3) II

Application of engineering principles to the control of the environment, as used by sanitary engineers in federal, state or international health agencies. Lecture, three hours. Prereq: consent of instructor. *Staff.*

568 *Sanitary Engineering Laboratory.* (5) I

Lectures and laboratory practice in principles, application and interpretation of analytical tests used in sanitary engineering research and plant control. Lecture, three hours; lab, six hours. Prereq: consent of instructor. *Lauderdale.*

580 *Theory of Structures III.* (3) I

Plastic design of steel. Theory of trussed arches. Theory and design of continuous trusses. Lecture and recitation, three hours. Prereq: CE 480 and MA 431. *Mory.*

625 *Advanced Soil Mechanics I.* (3) I, II

Detailed study including experimental determination of the strength and deformation properties of granular and cohesive soils. Colloidal phenomena in soils as related to the behavior of clay soils are included. Lecture, two hours per week; lab, three hours. Prereq: CE 425 or consent of instructor. *Hardin or Deen.*

626 *Advanced Soil Mechanics II.* (3) I

Theoretical and experimental study of the flow of water through soils including steady seepage and consolidation. Detailed study including experimental determination of the compaction characteristics of soils and the effects of compaction on various soil properties. Lecture, two hours per week; lab, three hours. Prereq: CE 425, 625 or concur. *Deen* or *Hardin.*

627 *Applied Soil Mechanics.* (3) II

Application of soil mechanics to the design and analysis of earth structures. Lecture, three hours per week. Prereq: CE 625 or consent of instructor. *Deen.*

628 *Advanced Foundation Engineering.* (3) II

Application of the principles of soil mechanics to the design and analysis of foundations. Lectures, three hours. Prereq: CE 625 or consent of instructor. *Hardin.*

629 *Soil Dynamics.* (3) II

A study of the response of soils to dynamic loads including foundation vibration problems and the response of footings to impulse loads. Theories of wave propagation in granular and porous media and methods of measurement of the dynamic properties of soils in the laboratory are included. Lecture, 3 hours. Prereq: CE 625, EMC 513. *Hardin.*

640 *Highway Administration, Economics and Finance.* (3) I

A study of highway administration, economics and finance; including organization of highway departments, sources and types of revenue, road costs, classification of roads, benefits from improvements, and program planning. Lecture, three hours. Prereq: CE 440 or consent of instructor. *Drake.*

642 *Highway Location Analysis.* (3) I, II

Optimization of highway location through a study of the effects of terrain, traffic, geometrics, standards and specifications, earthwork, structures, pavement, drainage, right of way acquisition, maintenance and road user costs; application of computer oriented methods of volumetric computations and economic analysis. Lecture, 2 hours; lab, 3 hours. Prereq: CE 340. *Dearinger.*

645 *Highway Design, Construction and Maintenance.* (3) II

A study of highway design, construction and maintenance; including physical aspects of design, drainage, road types, structural pavement design, construction methods and supervision and maintenance methods. Lecture, three hours. Prereq: consent of instructor. *Drake.*

646 *Bituminous Paving Materials.* (3) II

Origin, production, use-classifications and significant engineering properties of bituminous materials; design of bituminous concrete pavements and highway wearing surfaces. Includes the most recent developments of practical and potential significance in the highway industry. Covers specifications and materials testing. Lecture, two hours; lab, three hours. Prereq: CE 440 and CE 441 or consent of instructor. *Havens.*

647 *Cements, Concretes and Aggregates.* (3) I
Origin, production, use-classifications and significant engineering properties of Portland cements, concretes and mortars. Covers: precise methods of design and control of mixes; durability considerations; pozzolans; additions and admixtures; mineral aggregates; structural, paving and mass concretes; specifications and materials testing. Lecture, two hours; lab, three hours. Prereq: CE 540 and CE 541 or consent of instructor. *Havens.*

652 *Open Channel Flow.* (3) II
The hydraulics of free surface flow including such topics as uniform flow, varied flow, unsteady flow, the hydraulic jump flow transitions, spillways and channel delivery. Lecture, 3 hours. Prereq: CE 550. *Staff.*

653 *Advanced Hydrology.* (3) II
Advanced discussion of special topics relating to hydrology including sediment transport, flow through culverts and bridges, frequency analysis, waves, infiltration, and computer models. Lecture, 3 hours. Prereq: CE 553. *James.*

654 *Hydraulic Structures.* (3) I
Structural and hydraulic analysis required for the design of concrete and earth dams and appurtenant structures. Lecture, 3 hours. Prereq: CE 550. *Staff.*

655 *Water-Resources Planning.* (3) II
Presentation of techniques for evaluating water-resource projects to meet social objectives with specific reference to such purposes as flood control, drainage, water supply, hydropower, navigation and recreation. Lecture, 3 hours. Prereq: CE 555. *James.*

659 *Advanced Sanitary Engineering Design I.* (3) I
Application of theory of water treatment processes to the functional and hydraulic design of water treatment facilities. Lecture, two hours; lab, three hours. *Staff.*

660 *Advanced Sanitary Engineering Design II.* (3) II
Application of theory of waste treatment processes to the functional and hydraulic design of waste treatment facilities. Lecture, two hours; lab, three hours. *Staff.*

662 *Water Works and Water Treatment.* (3) I
Theory of water supply and purification, microbiology of fresh water, design of water works and water distribution systems. Lecture, three hours. Prereq. or concur: CE 568, MB 400 and MB 401. *Lauderdale.*

664 *Sewerage and Sewage Treatment.* (3) II
Aerobic and anaerobic methods of waste stabilization, biochemical oxygen demand, stream purification, design of sewerage and sewage treatment plants. Lecture, three hours. Prereq: CE 568, MB 400 and MB 401. *Staff.*

668 *Advanced Instrumentation for Water Resources Research.* (3) II
The theory and application of advanced techniques of analysis to water resources research. Lectures and lab, 3 hours. Prereq: CE 568. *Lauderdale.*

674 *Hydraulics of Pipe Lines.* (2) II
The theory of flow of incompressible fluids in closed conduits including study of pipe friction, pipe systems, unsteady flow, surges, and water hammer. Lecture, 2 hours. Prereq: CE 550. *Staff.*

681 *Dynamics of Structures.* (3) II
Behavior of materials under dynamic stresses, dynamic response of multidegree of freedom–concentrated mass systems, dynamic response of distributed mass structures, design of structures for earthquake, wind, traffic and machinery loads. Prereq: EM 513 or permission of instructor. *Gesund.*

682 *Experimental Structural Analysis.* (3) I

Theory and practice of model analysis to facilitate the solution of unusual problems in structural engineering. Dimensional analysis, similitude requirements, materials, fabrication, loading and instrumentation of models, and interpretation of results. Lecture, 1 hour, lab, 6 hours. Prereq: EMC 531 or consent of instructor. *Gesund.*

686 *Advanced Metal Structures.* (3) I

Plastic analysis and design; shear, local and lateral buckling, compression members, welded, riveted and bolted connections, deflections and shakedown. Light gage cold-formed steel design. Strain hardening and stress concentrations; residual stresses, brittle fracture; fatigue. Torsion, thin-walled sections, multicell sections. Prereq: CE 408 and EMC 531 concurrent. *Pincus.*

690 *Suspended Structures.* (3) I, II

Theory and application of stress analysis and design as applied to suspended structures and suspension systems. Lecture, two hours; lab, two hours. Prereq: consent of instructor. *Mory.*

691 *Advanced Reinforced Concrete Theory.* (3) II

Background and origin of modern reinforced concrete design procedures and codes. Comparison of American and foreign methods of analysis. Review of current research and projection to anticipated future changes in design and construction practices. Prereq: EM 531. *Gesund.*

692 *Slab and Folded Plate Structures.* (3) I, II

Design and analysis of reinforced concrete floor slabs and folded plate roofs. Elastic and inelastic methods. Lecture, three hours. Prereq: EM 531, Math. 431, or consent of instructor. *Gesund.*

693 *Shell Structures.* (3) I, II

Design and analysis of reinforced concrete shell structures, including domes, barrel shells, hyperbolic paraboloids and cylindrical tanks. Lecture, three hours. Prereq: MA 431 or consent of instructor. *Gesund.*

694 *Advanced Structural Analysis I.* (3) I, II

Theory and application of the column analogy method of stress analysis and design as applied to prismatic and haunched members in continuous structures with emphasis on arches. Lecture, three hours. Prereq: CE 480 and CE 492. *Mory.*

695 *Advanced Structural Analysis II.* (3) I, II

Theory and application of stress analysis and design methods as applied to continuous unsymmetrical frames carrying horizontal loads; frames with haunched members and continuous arches on slender piers. The translatory and rotary elastic constants and stresses due to displacements are obtained by the column analogy. Lecture, three hours. Prereq: CE 694 or consent of instructor. *Pincus.*

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)

May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis. *Staff.*

769 *Residence Credit for the Doctor's Degree.* (1 to 18 wks. residence)

May be repeated indefinitely. *Staff.*

771 *Seminar.* (0) I, II

Review of current literature in the field of Civil Engineering, general discussion and presentation of papers on departmental research. Required of all graduate students. One hour. *Staff.*

780 *Special Problems in Civil Engineering.* (3)

Individual work on some selected design problems in one of the various fields of Civil Engineering. Laboratory, six hours. Prereq: approval of the Head of Department. *Staff.* May be repeated to a maximum of nine credits.

790 *Special Problems in Civil Engineering.* (3)
Individual work on some selected research problems in one of the various fields of Civil Engineering. Lab, six hours. Prereq: approval of the Head of Department. *Staff.* May be repeated to a maximum of nine credits.

ELECTRICAL ENGINEERING

415 *Electromechanics.* (3) I, II
A study of construction, operating characteristics (by mathematical analysis), and applications of electrical machines. Three class hours. Prereq: EE 221, 222. Concur: EE 416. *Krimm, Back.*

416 *Electrical Engineering Laboratory III.* (2) I, II
Laboratory practice and experimental studies related to EE 415. Lecture, one hour. Prereq: EE 221. Concur: EE 415. *Krimm.*

417 *Laboratory to Accompany 416.* (0)
Three hours.

420 *Engineering Analysis I.* (3) I, II
Determinants and matrices; electrical-mechanical analogies; solutions of engineering problems using Fourier series, integral and transforms, Laplace transforms, Gamma and Bessel Functions. LeGendre's polynomials. Three class hours. Prereq: EE 221, MA 431. *Allison, Graham.*

435 *Circuits III.* (3) I, II
Fundamentals of network theory in communications circuits; transmission lines and wave filters. Three class hours. Prereq: EE 221. *Graham, Back.*

461 *Electronics and Communications I.* (3)
Thermonic emission, diode characteristics; vacuum tube and transistor characteristics; graphical and mathematical analysis of small-signal amplifiers; gain and band-width. Recitation, three class hours. Prereq: EE 222, MA 212, Phy. 232, 242. Concur: EE 462. *Puckett.*

462 *Electrical Engineering Laboratory II.* (2) I, II
Experimental exercises in vacuum-tube and transistor characteristics; basic A-F circuits, as voltage and power amplifiers, and rectifiers. Lecture, one class hour. Prereq: EE 222. Concur: EE 461. *Puckett.*

463 *Laboratory to Accompany 462.* (0)
Three hours.

467 *Electric and Magnetic Fields.* (3) I, II
Field laws and theorems in vector form; fields in dielectric and magnetic media; forces, moments, energy, power; brief introduction to time-varying fields. Prereq: Physics 232, MA 212; concur: MA 431. Three class hours. *Romanowitz.*

507 *Electrical Controls I.* (3) I, II
Design and analysis of open-loop control components and systems. Three class hours. Prereq: EE 420. Prereq. or concur: EE 415, 416. *Jackson, Maney.*

508 *Electrical Engineering Laboratory IV.* (2) I, II
Laboratory study of control methods and systems employing magnetic and electronic components; analog computers. Lecture, one hour. Prereq: EE 507. Concur: EE 572. *Jackson, Maney.*

509 *Laboratory to Accompany 508.* (0)
Three hours.

511 *Information Theory.* (3) I

Time and frequency domains; sampling theorems; review of AM and FM; pulse modulation; probability and random signal theory; autocorrelation; entropy; coding schemes, channel capacity; noise. Prereq: Math. 431 and consent of instructor. Lecture, three hours. *Distler.*

517 *Electrical Machinery II.* (3) I, II

Electro-mechanical energy conversion systems studies. Development of generalized equivalent circuits for various conditions of operation. Prereq: EE 415, 416. *Maney.*

520 *Engineering Analysis II.* (3) I, II

Investigation of transient and steady-state conditions in electrical and mechanical systems, using Laplace transform methods; network analysis and synthesis; complex variable applications, feedback system stability criteria. Three class hours. Prereq: EE 420. *Distler, Allison.*

523 *Electrical Equipment Problems.* (2) I, II

A creative design study of comprehensive engineering problems, primarily electrical but related to engineering in general. One class hour, five hours by appointment. *Maney.*

537 *Electric Power Transmission I.* (3) I

Transmission line parameters, generalized circuit constants; analysis of line performance. Three class hours. Prereq: 415, 416, 435. *Maney, Krimm.*

538 *Electric Power Transmission II.* (3) II

Per-unit studies; symmetrical components, experimental studies on a-c network analyzer. Three class hours. Prereq: EE 537. *Maney, Krimm.*

562 *Electronics and Communications II.* (3) I, II

Feedback amplifiers, tuned and untuned amplifiers; oscillators, AM and FM transmitters. Three class hours. Prereq: EE 435, 461, 462. *Puckett.*

564 *Electronics and Communications III.* (3) I, II

Timing, scanning, trigger and pulse circuits; video and broad-band R-F amplifiers. Generation, transmission and radiation of V-H-F and microwave energy. Three class hours. Prereq: EE 562, 467. *Allison, Bradley.*

565 *Electrical Engineering Laboratory V.* (2) I, II

Laboratory practice and experimental exercises relating to studies in EE 564. Lecture, one hour; lab, three hours. Concur: EE 564. *Graham, Bradley.*

566 *Magnetic Amplifiers.* (3) II

Wave-form analysis of circuits with nonlinear magnetic elements; saturable reactors and self-saturating magnetic amplifiers in steady-state and transient operation; some characteristics of semiconductor diodes including Zener types; effects of negative and positive feedback on magnetic amplifiers. Three class hours. Prereq: EE 415, 461. *Distler.*

567 *Fields and Waves.* (3) I, II

Time-varying electromagnetic fields; wave equations, Maxwell's equation; radiation and propagation. Three class hours. Prereq: EE 467. *Allison, Kadaba.*

568 *Laboratory to Accompany 565.* (0)

Three hours.

572 *Electrical Controls II.* (3) I, II

Analytical and graphical techniques applied to the design of linear feedback control systems, emphasizing a root-locus method. Non-linear systems are briefly discussed. Three class hours. Prereq: EE 520, 507, Concur: EE 508. *Jackson, Maney.*

580 *Logical Design of Digital Systems.* (3)
Computation elements; analysis and synthesis of systems, Boolean functions and applications to relay and electronic circuits; circuit logic, memory elements; design of counters, sequential devices, digital devices; brief treatment of programming. Three class hours. Prereq: Junior standing. *Graham.*

585 *Molecular Engineering.* (3) II
Fundamental particles; Quantum concepts, statistics; crystal structure; Thermal properties of solids; Dielectric properties, optical properties; Free-electron model of metals; Band theory; Semiconductors; Solid state devices. Three class hours. Prereq: Math. 431, EE 467. Prereq. or concur: EE 520. *Kadaba.*

595 *Independent Problems.* (1) I, II
For electrical engineers. A problem, approved by the head of the department, provides an objective for study and research. *Staff.*
May be repeated to a maximum of three credits.

596 *Independent Problems.* (2) I, II
Same conditions as EE 595. *Staff.*
May be repeated to a maximum of six credits.

Prerequisite for graduate work: Students desiring to take any of the following courses should have a thorough working knowledge of chemistry, physics and mathematics. For major work, a candidate must hold a bachelor's degree in Electrical Engineering or its equivalent.

601 *Electromagnetic Energy Conversion I.* (3)
General dynamical theories are developed for electromechanical energy systems. Various constraints are applied to the equations of motion and energy transfer. Lecture and recitation. Prereq: EE 517, 467 or equivalent. *Maney.*

602 *Electromagnetic Energy Conversion II.* (3)
Continuation of EE 601, with special attention to specific areas of machine types. Prereq: EE 601 or equivalent. *Maney.*

606 *Electric Power Transmission.* (3)
The theory underlying the calculation and operation of long distance transmission circuits. Special attention to relay control. Prereq: EE 538. *Maney.*

611 *Linear Circuit Analysis I.* (3)
Laplace and Fourier transform methods of analysis of linear lumped constant systems under transient and steady state conditions; feedback amplifiers; filter networks; stability and physical realizability. Prereq: EE 520, 535, 572. *Distler, Graham.*

612 *Linear Circuit Analysis II.* (3)
Continuation of EE 611 with an introduction to non-linear systems. Prereq: EE 611. *Distler, Graham.*

613 *Servomechanisms.* (3)
Analysis and synthesis of linear and non-linear closed-loop control systems; analog computer and phase-plane techniques; root-locus and Laplace transform methods applied to linear systems. Prereq: EE 572. *Jackson.*

623 *Lines and Wave Guides.* (3)
Open-wire and coaxial lines, standing waves, stub matching; impedance transformation, rectangular and circular wave guides. Prereq: EE 435, 467, 564. *Allison, Kadaba.*

624 *Solid State Electronics.* (3) I
Bose and Fermi statistics, semiconductor theory. Solid state devices, electrical properties of insulators. Theory and applications of magnetic materials including ferrites. Prereq: EE 585 or equivalent. *Kadaba.*

626 *Microwave Engineering.* (3)
Generation, detection and measurement of microwave energy; vacuum tubes at ultra high frequencies, the klystron and the magnetron. Lecture, two hours, three hours lab. Prereq: EE 564, 565, 567. *Allison, Kadaba.*

627 *Electromagnetic Fields.* (3)
Advanced studies in electromagnetic fields. Prereq: EE 567. *Allison, Kadaba.*

631 *Discrete Information Theory I.* (3) I
Entropy, Markov sources, algebra of codes, classification of codes, Shannon's theorems, compact codes, linear codes, error detection and correction, syndrome vectors. Prereq: EE 511 or consent of instructor. Lecture, three hours. *Distler.*

632 *Discrete Information Theory II.* (3) II
Plotkin, Gilbert, and other bounds, Hamming Codes, Reed-Muller and other linear codes, cyclic codes, Bose-Chanduri codes, sequential decoding, convolution encoding. Prereq: EE 631. Lecture, three hours. *Distler.*

680 *Advanced Logical Design.* (3) II
Boolean matrices; bridge circuits; bilateral, cascaded, and iterative networks; secondary assignment methods for the design of sequential circuits. Design of actual digital computers. Prereq: EE 580 or equivalent. *Navarro.*

711 *Network Synthesis I.* (3) I
The first of a two-semester sequence of courses giving a comprehensive treatment of modern network synthesis. Prereq: EE 611, 612 or equivalent. Lecture, three hours. *Graham.*

712 *Network Synthesis II.* (3) II
The second of a two-semester sequence of courses giving a comprehensive treatment of modern network synthesis. Prereq: EE 711. Lecture, three hours. *Graham.*

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
Romanowitz.
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis.

771 *Seminar.* (0)
Review of current literature in the field of Electrical Engineering, general discussion and presentation of papers on departmental research. Required of all graduate students. *Romanowitz.*

781 *Special Problems in Electrical Engineering.* (1)
Open to graduate students only. Individual work on an assignment approved by the head of the department. *Staff.*
May be repeated to a maximum of three credits.

782 *Special Problems in Electrical Engineering.* (2)
Open to graduate students only. Individual work on an assignment approved by the head of the department. *Staff.*
May be repeated to a maximum of six credits.

783 *Special Problems in Electrical Engineering.* (3)
Open to graduate students only. Individual work on an assignment approved by the head of the department. *Staff.*
May be repeated to a maximum of nine credits.

ENGINEERING MECHANICS

503 *Theoretical Elasticity I.* (3) I

An introductory mathematical account of the classical linear elastic solid. Stress, strain and displacement as tensor quantities; stress-strain relations; field equations for stress and displacement; wave propagation in solids; strain energy; anisotrophy. Prereq: MA 433 or consent of instructor.

513 *Mechanical Vibrations.* (3) I, II

Vibrations of systems of one and several degrees of freedom, critical speeds and torsional and lateral vibrations of shafts. Lecture and recitation, three hours. Prereq: EM 331 and EM 313. Prereq. or concur: Math. 431. *Adams, Dillon, Shippy.*

531 *Advanced Strength of Materials.* (3) I, II, S

Unsymmetrical bending of beams, thin plates, stress analysis of thick-walled cylinders, and rotating discs. Theory of elastic energy, curved beams, stress concentration, and fatigue. LLecture and recitation, three hours. Prereq: EM 331. *Adams, Gillis.*

532 *Experimental Stress Analysis.* (4) II

Experimental stress analysis from an engineering viewpoint. Preliminary optics; stress-optic law; isoclinics and stress trajectories; strain gages; rosettes; miscellaneous experimental techniques. Lecture, two hours; lab, two hours. Prereq: EM 531. *Adams.*

603 *Theoretical Plasticity I.* (3) I

An introductory mathematical treatment of the perfectly plastic solid. Real and idealized materials; yield criteria; flow rules; experimental basis of the theory; contained plastic flow; some two-dimensional problems. Prereq: MA 433 or consent of instructor.

604 *Theoretical Plasticity II.* (3) II

Continuation of EM 603. Limit analysis; plastic bending and torsion; structures and shells; thermoplasticity; plastic wave propagation. Lecture and recitation, three hours. Prereq: EM 603. *Dillon, Jaswon, Gillis.*

605 *Foundations of Inelasticity.* (3) I

A critical and constructive discussion of the assumptions and experimental evidence for inelastic material response from a viewpoint of the mechanist. Lecture and recitation, three hours. Prereq: EM 604 and EM 662 or consent of instructor. *Dillon.*

606 *Theoretical Elasticity II.* (3) II

Continuation of EM 503. Two-dimensional systems; St. Venant theory of torsion and flexure; compatibility and in compatibility; body-forces: thermoelasticity; Volterra dislocations. Prereq: EM 503. Lecture and recitation, three hours. *Jaswon, Leigh.*

607 *Advanced Inelasticity.* (3) II

A continuation of EM 605 with a study of the latest research results in the area of inelasticity. Lecture and recitation, three hours. Prereq: EM 605. *Dillon.*

632 *Theory of Elastic Stability.* (3) II

Buckling of centrally compressed bars. Detailed consideration of elastic and plastic buckling of prismatic bars under simultaneous action of axial and lateral loads. Buckling of frames, lateral buckling of beams, shear effect, energy methods. Lecture and recitation, three hours. Prereq: 531. *Jaswon, Adams.*

651 *Numerical Methods in Potential Theory and Elasticity.* (3) I

A modern numerical treatment of classical problems. Newtonian and logarithmic potentials; boundary-value problems; representation formulae; integral equations and their numerical solution; computer techniques of numerical analysis. Lecture and recitation, three hours. Prereq: MA 433, or consent of the instructor. *Jaswon.*

652 *Numerical Methods in Potential Theory and Elasticity.* (3) II

A continuation of EM 651. Modern numerical treatments of more difficult classical problems. Biharmonic potentials and their representations; boundary-value problems of classical elasticity; point forces; integral equation formulations; numerical analysis and computer techniques. Prereq: EM 651. Lecture and recitation, three hours. *Jaswon.*

661 *Nonlinear Continuum Mechanics I.* (3) I

Nonlinear Continuum Mechanics I and II are an introduction to the continuum physics and mathematical theory of the nonlinear mechanical behavior of materials. Prereq: consent of instructor. Lecture and recitation, three hours. *Leigh.*

662 *Nonlinear Continuum Mechanics II.* (3) II

Classes of materials. Finite elasticity and hyperelasticity. Nonlinear fluids with memory. Approximation theory for memory functionals. Approximations to memory materials. Thermodynamics of memory materials. Lecture and recitation, three hours. Prereq: EM 661. *Leigh.*

644 *Advanced Dynamics I.* (3) I

An advanced course in the study of the dynamics of mechanical systems. Application of Lagrante's equations, Euler's angles, Coriolis acceleration, and other dynamical principles to mechanisms, rotating and reciprocating devices, and other systems. Lecture and recitation, three hours. *Shippy, Dillon, Leigh.*

646 *Advanced Dynamics II.* (3) II

Continuation of EM/ME 644. Conservation theorems and Hamiltonian formalism; nonlinear mechanical systems; small vibrations; stability of mechanical systems. Prereq: EM or ME 644. Lecture and recitation, three hours. *Shippy, Dillon, Leigh.*

768 *Residence Credit for Master's Degree.* (1 to 9 wks. residence)

May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis. *Staff.*

769 *Residence Credit for Doctor's Degree* (1 to 18 wks. residence)

May be repeated indefinitely. *Staff.*

771 *Bio Mechanics Seminar.* (1) II

A weekly meeting of the staff and graduate students in Engineering, Physiology Science, Biophysics, Psychology, etc. for the discussion of research and recent developments in Biomedical Engineering such as Biodynamics. May be repeated two times. Prereq: consent of instructor. *Lange, Krause.*

MECHANICAL ENGINEERING

400 *Elements of Engineering Thermodynamics.* (3)

(For Civil, Electrical, and Mining Engineers.) General energy equations, mixtures of gases and vapors, flow of fluids, vapor power cycles, internal combustion cycles, and refrigeration cycles. Recitation, three hours. Prereq: Physics 232 and Math. 212. *Staff.*

510 *Introduction to Nuclear Engineering.* (3)

An introduction to the application of radio-activity and nuclear energy in engineering. Application to measurements, process control and elementary nuclear design of neutron chain reactors. Lecture and recitation, three hours. Prereq: PHY 232, MA 331 or MA 431. *Funk, Lafferty.*

511 *Elements of Reactor Design.* (4)

Characteristics of reactor materials; heat removal requirements; determination of reactor size, composition and configuration to satisfy the nuclear, thermal, hydraulic and mechanical design requirements. Lecture and recitation, three hours. Prereq: ME 510. *Lafferty, Funk.*

512 *Laboratory to Accompany 511.* (0)
Three hours.

517 *Instrumentation for Research.* (3)
An exploration of modern instrumentation techniques and problems; transducer principles; analysis of dynamic response of instrumentation systems; theory of measurements; random processes; pressure, temperature, strain gages and inertial measurement techniques; magnetic, optical, electrostatic and other recording systems; automatic data reduction; measurement errors. Lecture and recitation, two hours; lab, three hours. Prereq: consent of instructor. *Staff.*

530 *Gas Dynamics.* (3)
Consideration of the mass, energy and force balances applied to flowing compressible fluids. Isentropic flow, diabatic flow, ow with friction, wave phenomena, and generalized one-dimensional gas dynamics. Lecture and recitation, three hours. Prereq: ME 321, ME 330. *Marshall.*

532 *Fluid Transients and Power Control.* (3)
A course in the analysis of fluid transients and the theory and design of fluid power controls and their application in engineering systems. Prereq: ME 330. *Thorpe.*

564 *Propulsion System Design.* (3)
Design of systems for aircraft or missile propulsion. Centrifugal compressors, axial-flow compressors, turbine and exhaust systems, and combustion chambers. Lecture, one hour. Prereq: ME 530. *Marshall.*

565 *Laboratory to Accompany 564.* (0)
Six hours.

590 *Elements of Aero-Space Technology.* (4)
Flight performance of airborne and ballistic vehicles. Space vehicle propulsion and structures. The space environment. Lecture, three hours. Prereq: ME 321 and ME 330. *Lange.*

591 *Laboratory to Accompany 590.* (0)
Two hours.

592 *Aero-Space Component Design.* (3)
Preparation of a formal proposal on a given requirement in the aero-space field. Execution of the design. Testing of a prototype under proper environmental conditions. Lecture, one hour. Prereq: ME 590. *Lange.*

593 *Laboratory to Accompany 592.* (0)
Six hours.

610 *Nuclear Reactor Analysis.* (3)
A lecture and problem course covering the use of the one-velocity, Fermi Age group, and elementary transport models in the design and analysis of reactor systems. Lecture and recitation, three hours. Prereq: ME 510. Prereq. or concur: PHY 554, MA 432, *Lafferty.*

615 *Plasma Dynamics.* (3)
A lecture course dealing with the study of basic laws of plasma physics, hydrodynamics and electromagnatic theory in association with transport phenomena. Application of these principles to energy conversion systems. Prereq: MA 432, ME 620, ME 630 and consent of instructor. *Staff.*

620 *Advanced Engineering Thermodynamics I.* (3)
Critical treatment of the laws of thermodynamics, temperature scales; applications of theory to compressors and internal combustion engines; frequent reference to research papers. Lecture, three hours. Prereq: ME 321 or consent of instructor. *Drake.*

621 *Advanced Engineering Thermodynamics II.* (3)
Continuation of ME 620. *Drake.*

625 *Advanced Heat Conduction.* (3)
Comprehensive study of heat conduction; derivation of governing physical and subsidiary equations; discussion of the various boundary conditions; review of classical heat conduction solutions; discussion of current problems, methods of solution and engineering applications of heat conduction. Lecture, three hours. Prereq: ME 325 or equivalent or concurrent, MA 432. *Thorpe.*

626 *Advanced Heat Convection.* (3)
Comprehensive study of heat convection; derivation of equations of convection of mass, momentum, and energy; boundary layer equations; classical solutions of laminar convection problems; review of turbulent convection; analogies between momentum and energy. Lecture, three hours. Prereq: ME 625. *Drake.*

627 *Radiation Heat Transfer.* (3)
Basic concepts and definition of radiative intensity and flux vectors, discussion of emission, absorption, scattering and Kirchoff's Law; Planck distribution and Stefan-Boltzman Law; Engineering calculations of gas radiation and radiative transfer between surfaces. Lecture, three hours. Prereq: ME 325 or equivalent, or concur: MA 432. *Thorpe.*

628 *Convective Mass Transfer.* (3)
A unified treatment of convective mass transfer; theory of mass transfer; Reynolds flow; calculation procedures for mass transfer; application to systems; simultaneous heat and mass transfer. Lecture and recitation, three hours. Prereq: ME 325, ME 530. *Drake.*

630 *Advanced Fluid Mechanics I.* (3)
Derivation of basic equations for continuous media. Some exact solutions of Navier-Stokes equations. Potential flow. Theory of turbulence and boundary layers. Lecture, three hours. Prereq: ME 330 or equivalent, or concur: MA 432. *Staff.*

631 *Advanced Fluid Mechanics II.* (3)
One, two, and three dimensional compressible flow of fluids. Free-turbulence; jets and wakes. Superfluids. Surface phenomena. Molecular flow of gases. Lecture, three hours. Prereq: ME 630. *Staff.*

632 *Advanced Fluid Mechanics III.* (3)
Conference course permitting latitude in choice of topics. Lecture, three hours. Prereq: ME 631 and consent of instructor. *Staff.*

642 *Advanced Kinematics of Machinery I.* (3)
Fundamentals in the analysis and synthesis of mechanisms including coupler curves, guided plane systems and linkage design. Lecture, three hours. Prereq: Approval of director of graduate study. *Tao.*

643 *Advanced Kinematics of Machinery II.* (3)
A continuation of ME 642 dealing with the motion of rigid planes passing through multiple positions. Theory and application. Lecture and recitation, three hours per week. Prereq: ME 642. *Tao.*

644 *Advanced Dynamics I.* (3)
An advanced course in the study of the dynamics of mechanical systems. Application of Lagrange's equations, Euler's angles, Coriolis acceleration, and other dynamical principles to mechanisms, rotating and reciprocating devices, and other mechanical systems. Lecture and recitation, three hours. Prereq: EM 313, ME 344, MA 432 and consent of instructor. (Same as Engineering Mechanics 644). *Carter, Thorpe.*

645 *System Concepts and Analysis.* (3)
Conceptual development and study of complex systems; their synthesis and design; analysis and optimization of system parameters. Input-output relationships; formulation of mathematical models, parameters and constraints on physical systems. Lecture and recitation, three hours. Prereq: consent of instructor. *Funk.*

646 *Advanced Dynamics II.* (3)
Continuation of EM/ME 644. Conservation theorems and Hamiltonian formalism; nonlinear mechanical systems; small vibrations; stability of mechanical systems. Lecture and recitation, three hours. Prereq: EM/ME 644. (Same as Engineering Mechanics 646). *Thorpe.*

647 *System Optimization.* (3)
A course in the theory and application of optimization techniques with emphasis on large engineering systems. Lecture and recitation, three hours. Prereq: consent of instructor. *Funk.*

648 *Automatic Guidance and Control.* (3)
Theory of the automatic control of machines and vehicles. Mathematical models of sensors, computers and actuators. Transfer functions of various vehicles and machines. Effects of non-linearities and noise. Problems of reliability; pneumatic, hydraulic, and electrical systems. Lecture and recitation, three hours. Prereq: consent of instructor. *Drake.*

662 *Propulsion Systems.* (3)
Theory of propulsion by jet; efficiencies, specific consumptions; specific thrust, specific impulse. Primary jet devices; turbojet, ducted fan, ramjet, rocket, ram rocket, nuclear power plants. Secondary jet devices for space propulsion; solar propulsion, arc heating devices, ion drive, electromagnetic drive. Lecture and recitation, three hours. Prereq: consent of instructor. *Marshall.*

663 *Energy Conversion Processes.* (3)
A course in the theory of operation of various types of energy conversion devices such as thermoelectric and thermionic converters, photovoltaic and solar cells, MHD engines and fuel cells. Lecture and recitation, three hours. Prereq: consent of instructor. *Drake, Funk.*

664 *Experimental Methods in Nuclear Engineering.* (3)
A lecture and laboratory course covering the utilization of radiation in engineering, measurement and analysis of parameters pertinent to reactor design and operation, and radiation shielding; reactor response and control studies using analog computer. Lecture and recitation, two hours; lab, three hours. Prereq. or concurrent: ME 610. *Lafferty.*

665 *Nuclear Reactor Dynamics.* (3)
Analysis of dynamic behavior of nuclear reactor systems; transfer function methods applied to nuclear reactors operation and control, stability and analysis from Nyquist and Bode plots, effect of feedback and compensation; instrumentation for reactor start-up and operate conditions. Lecture and recitation, three hours. Prereq: ME 610. *Funk, Lafferty.*

666 *Radiation Damage and Shielding.* (3)
A study of the effects of radiation on reactor materials and instrumentation. Macroscopic study of radiation absorption applied to radiation shielding and heat generation in reactors. Lecture and recitation, three hours. Prereq. or concurrent: ME 664. *Staff.*

683 *Biotechnology.* (3)
The human body as a mechanical system responding to sustained and transient forces and pressures, such as occur in flight, space flight and industrial environments. The physical and behavioral reaction of organisms to dynamic, thermal, radiative and gravitational stresses. Mechanical, hydraulic and pneumatic performance of body subsystems. Use of the human parameters in the design of protective and prosthetic devices and life support systems. Lecture and recitation, three hours. Prereq: ME 220 or equivalent, ME 517, ME 530, EM 513 or consent of instructor. *Krause, Lange.*

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence) *Staff.*
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis.

769 *Residence Credit for Doctor's Degree.* (1 to 18 wks. residence) (0)
May be repeated indefinitely. *Staff.*

771 *Seminar.* (0)
Review of current literature in the field of Mechanical Engineering, general discussion and presentation of papers on departmental research. Required of all graduate students. Two hours. *Staff.*

780 *Special Problems in Mechanical Engineering.* (3)
For graduate students having research ability. Each course consists of individual work in one of the various fields of Mechanical Engineering. Laboratory, six hours. Prereq: approval of head of department. *Staff.*
May be repeated to a maximum of twelve credits.

METALLURGICAL ENGINEERING

443 *Minerals Beneficiation.* (3) II
Principles and mechanics of beneficiation involved in the preparation of mine products, principles of plant design, and current developments. Lecture and recitation, three hours. Prereq: Phys. 232. *Mateer.*

444 *Minerals Benefication Laboratory.* (1) II
Application of the principles studied in Met. 443. Laboratory, three hours. Concur. or prereq: Met. 443. *Mateer.*

451 *Metallurgical Thermodynamics.* (3) I
Application of fugacity, activity and equilibrium constants to metallurgical systems. Analysis of ideal, non-ideal and regular solutions and their relation to non-metallic solutions at elevated temperatures, molten salt solutions and slags. Discussion and application of the phase rule to metal systems. Lecture, three hours. Prereq: Met. 351. *Foster.*

453 *Metallurgical Kinetics.* (3) II
Rate processes in heat and mass transfer, nucleation and growth. Fluid flow in molten metal systems. Lecture, three hours. Prereq: Met. 451. *Foster.*

461 *Physical Metallurgy.* (3) I, II
Classical and quantum theory concept of free atoms; energy states, brillouin zone theory, conduction and magnetic characteristics of solids: primary solid solutions, order-disorder reactions. Lecture and recitation, three hours. Prereq: MA 212, Phy. 232. *Morris.*

463 *Structure of Alloys II.* (3) II
Age hardening and diffusion in metal systems. Lecture, two hours; lab, three hours. Prereq: Met. 363. *Morris.*

521 *The Casting of Metals.* (3) I, II
Ferrous and non-ferrous foundry practice. Theory and metallurgy of metal castings. Application of engineering principles to the design and production of castings. Lecture and recitation, three hours. Prereq: Met. 321, 301 or 305. *Duncan.*

531 *Powder Metallurgy.* (3) I, II
Study of the principles of powder metallurgy relating to alloys of unusual compositions, metal and non-metal combinations, porous and laminated products, composite metals, and high-melting alloys. Lecture and recitation, three hours. Prereq: Chem. 442. *Swift.*

532 *Materials Science I.* (3)
Modern ideas on the engineering properties of solids. Crystallography; properties; relation of properties to structure; thermodynamics; solid state reactions. Prereq: EM 222, and MA 433 or consent of instructor. *Staff.*

535 *Mechanical Metallurgy.* (3) I, II
Elastic and plastic deformation of metallic crystalline solids; crystallographic nature of slip and twinning; work hardening, fracture and recovery. Lecture and recitation, three hours. Prereq: Engr. Mech. 222. *De Angelis.*

536 *Ceramic Engineering.* (3) I, II
The nature of ceramic materials. The forming and thermal treatment of ceramic products. Consideration of the various properties usually encountered and required of ceramic materials inclusive of cermets. Lecture and recitation, three hours. Prereq: CME 220. *Swift.*

539 *Nuclear Metallurgy.* (3) I, II
The physical metallurgy of materials used in components of nuclear reactors. Materials applicable to nuclear-reactor components in ceramics, metal ceramics, and other fields. Lecture and recitation, three hours. Prereq: B.S. in Metallurgical Engineering or permission of instructor. *Mateer.*

550 *Corrosion.* (3) I, II
The fundamental principles of corrosion control and the basic mechanisms related to a better understanding of the causes of corrosion. The application of principles to practical situations. Lecture and recitation, three hours. Prereq: Chem. 442. *Swift.*

551 *Chemical Metallurgy.* (3)
Study of reactions occurring during refining, based on principles of thermodynamics and kinetics. Examples from both ferrous and non-ferrous metallurgy. Prereq: MET 451. *Foster.*

566 *Crystallography & X-ray Metallography.* (4) I, II
Elements of crystallography, nature of x-rays, diffraction by crystal lattice, the structure factor and crystal structure determinations in metallic lattices, x-ray camera and diffractometer techniques and application of these to determination of phase diagrams, preferred orientation and residual stresses. Lecture, three hours; lab, three hours. Prereq: MET 361. *DeAngelis.*

632 *Materials Science II.* (3) I, II
Continuation of MET 532. Classification of solids; atomic structure and bonding, relation of structure to properties; deformation behavior and failure. Prereq: MET 532. *Staff.*

633 *Special Purpose Alloy Steels.* (3) I, II
Fundamental principles of the more complicated and special alloy steels and their heat treatment. Carbon, mild alloy, N.E., S.A.E., tool and super alloys are included. Alternate alloy steels for application are considered. Lecture, three hours. *Staff.*

635 *Advanced Mechanical Metallurgy.* (3) I, II
Theory of dislocations in crystals and their role in strength, plasticity, work hardening and fracture of crystalline solids. Lecture and recitation, 3 hours. Prereq: MET 535. *De Angelis.*

637 *Materials Engineering.* (3) I, II
Factors in specification and testing of materials for lightweight construction, mechanical and electrical applications, and severe service conditions. Lecture, two hours; lab, three hours. *Mateer.*

641 *Advanced Production Metallurgy.* (3) I, II
Principles and practices used in the production of alloys. Lecture, two hours; lab, three hours. *Swift.*

650 *Advanced Chemical Metallurgy.* (3) I, II
Study of reactions of materials with chemical environments. Introduction to irreversible thermodynamics. Emphasis on current literature. *Foster.*

657 *The Physical Chemistry of Steelmaking.* (3) I, II
Reactions involved in steel making processes. Slag constitution, slag control, and effects of additions to liquid metal. Influences of melting, refining, and deoxidizing practices on properties of finished steel. Lecture, three hours. *Staff.*

659 *Advanced Phase Diagrams.* (3) I, II

Review of thermodynamic fundamentals and application to binary pressure-temperature-composition diagrams. Construction and interpretation of ternary temperature-composition diagrams. Review and discussion of important ternary diagrams. Lecture and recitation, three hours. Prereq: Chem. 447, Met. 261. *Mateer.*

661 *Advanced Physical Metallurgy I.* (3) I, II

Study of the theory of phase transformations in metallic systems. Analysis of rate controlling processes for nucleation and growth controlled phase changes and for order-disorder reactions. Prereq: MET 463 or equivalent and permission of instructor. *Morris.*

662 *Advanced Physical Metallurgy II.* (3) I, II

Solidification theory and mechanisms. Diffusion in solids. Prereq: MET 661 or equivalent and permission of instructor. *Morris.*

663 *Theoretical Structural Metallurgy.* (3) I, II

Interatomic forces of crystal bonding; free electron zone theory; equilibriums and rate of approach thereto; thermal behavior, structure and free energy of alloy phases; equilibrium diagrams; diffusion; order-disorder change, nucleation and phase growth. Lecture, three hours. *Morris.*

666 *Diffraction Methods in Metallurgy.* (4)

Application of thin foil electron transmission methods to the study of the defect structure of metals, theory of electron diffraction contrast phenomena, sample preparation, x-ray theory and methods applied to the study of deformation characteristics of metals, order-disorder transformations, and crystal structure analysis. Prereq: MET 665. *De Angelis.*

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)

Staff.

May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis.

769 *Residence Credit for the Doctor's Degree.* (1 to 18 wks. residence)

Staff.

May be repeated indefinitely.

771 *Seminar.* (0) I, II

Review of current literature in the field of metallurgical engineering and presentation of papers on departmental research. Required of all graduate students. *Staff.*

May be repeated.

781 *Special Problems, Literature and Laboratory.* (1-3) I, II, S

Literature research and planning of research programs; laboratory problems and technical writing, including a term paper, are required. Consultation, lab, and lecture by appointment. *Staff.*

May be repeated to a maximum of nine credits.

MINING ENGINEERING

441 *Mining Methods.* (3) I

Surface and underground mining of coal, metallic ores, and non-metallic minerals. Economic, engineering, and operating factors. Lecture and recitation, three hours. Prereq: EMC 331; Min. 241. *Staff.*

461 *Mineral Industries Administration.* (3) I

The engineering aspects of mine administration and management, including safety engineering. Lecture and recitation, three hours.

471 *Mine Ventilation.* (3) II

The principles and methods of mine ventilating and air conditioning; the control of dangerous impurities. Lecture and recitation, two hours; lab, three hours. Prereq: Min. 241. *Staff.*

481 *Mine Plant and Machinery.* (3) II
Theory and practice of mine haulage, hoisting, drainage, pumping, and compressed air as power. Application of engineering principles to the mineral industries. Lecture and recitation, two hours; lab, three hours. Prereq: Min. 241.

541 *Coal Preparation I.* (3) I
Principles and practice of coal preparation and associated operations. Lecture and recitation, two hours; lab, three hours. Prereq: MET 443. *Staff.*

542 *Coal Preparation II.* (3) II
Continuation of Min. 541. Lecture and recitation, two hours; lab, three hours. *Staff.*

561 *Valuation of Mineral Properties.* (2) II
Methods of appraising the value of deposits of ores, mineral fuels, and non-metallics. Lecture and recitation, two hours. Prereq: Eco. 251, Min. 241.

621 *Advanced Prospecting.* (3) I
Study of the principles involved in the geophysical investigation of the minerals of the earth's crust. Lecture and recitation, two hours; lab, three hours. *Staff.*

645 *Preparation and Uses of Industrial Minerals.* (3) I, II
Sources, processing, marketing, utilization, product specifications, and economics of non-metallic minerals, including clay, limestone, abestos, and refractories. Lecture and recitation, three hours. *Staff.*

651 *Fuels and Their Combustion.* (3) I, II
The sources and properties of natural fuels and their refined products. The chemistry and physics of combustion. Combustion equipment. Lecture and recitation, three hours. *Staff.*

661 *Mine Organization.* (3) I, II
Detailed study of the structure and function of a mining enterprise from both the financial and the engineering standpoint. Lecture and recitation, three hours.

681 *Advanced Mine Engineering.* (3) I, II
Procedure and methods of collecting and recording data for the systematic development and exploitation of a mining property. Lecture and recitation, one hour; drawing and mapping, six hours. Hoyt.
May be repeated to a maximum of six credits.

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis.

771 *Seminar.* (0) I, II
Review of current literature in the field of Mining Engineering and presentation of papers on departmental research. Required of all graduate students. Two hours. *Staff.*
May be repeated.

780 *Special Problems in Mining Engineering.* (3) I, II, S
Literature research and planning of research programs; laboratory problems and technical writing, including a term paper, are required. Consultation, lab, and lecture by appointment. *Staff.*
May be repeated to a maximum of nine credits.

790 *Special Problems in Mining Engineering.* (3) I, II, S
Literature research and planning of research programs; laboratory problems and technical writing, including a term paper, are required. Consultation, lab, and lecture by appointment. *Staff.*
May be repeated to a maximum of nine credits.

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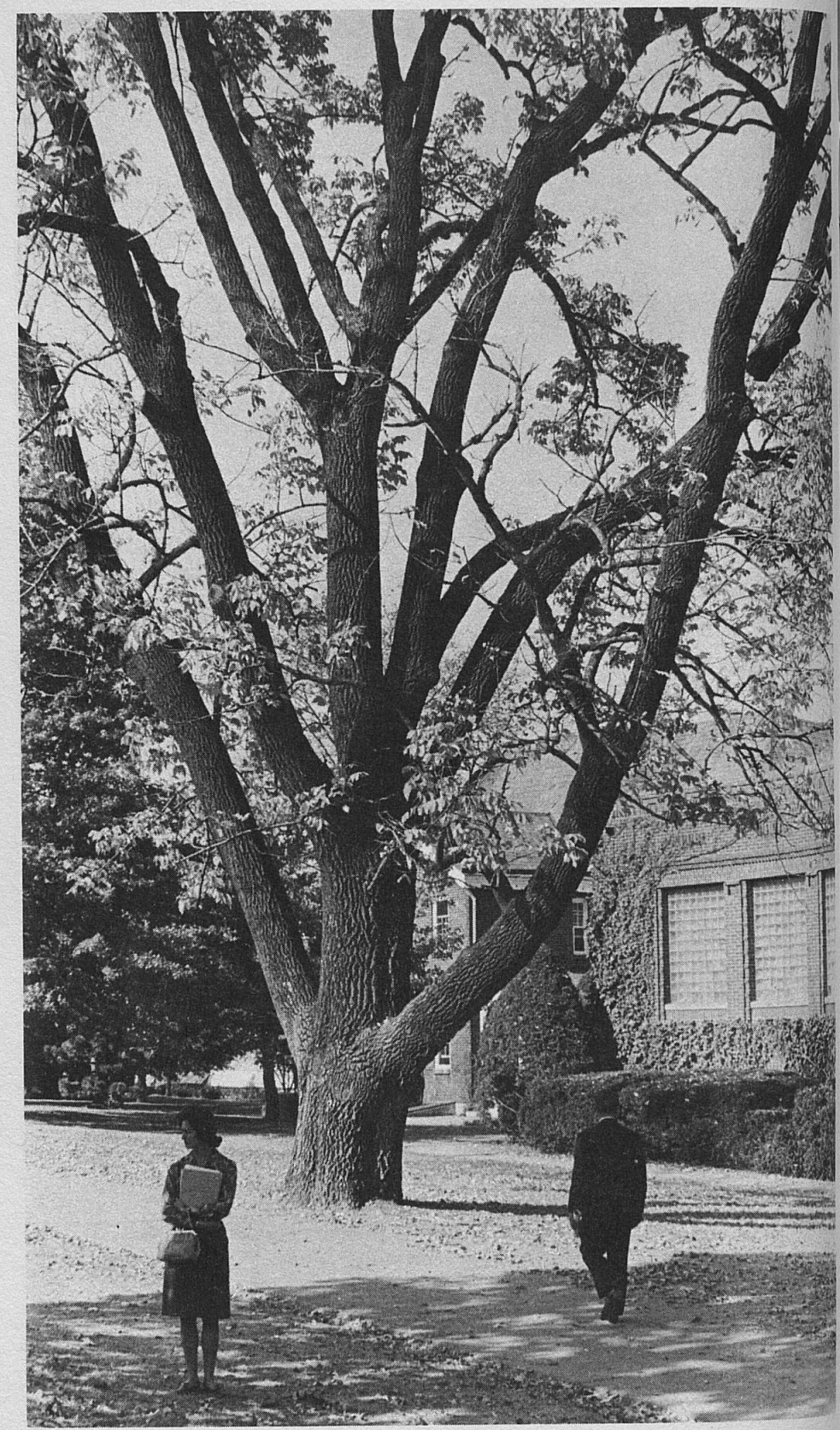



VI. LAW

The following courses in the College of Law are accepted as graduate work when taken by students majoring in Political Science, Economics, Sociology, Commerce or other fields in which such courses are recommended by the major professors. No major programs of study are offered in Law at present leading to a degree other than Juris Doctor (J.D.).

501,502 *Contracts I, II.* (3, 2) I, II

Patterson, Goble and Jones' Cases. Formation of contracts, offer, acceptance, consideration, Statute of Frauds, parties affected by contracts, contracts for benefit of third persons, assignments, joint and several contracts, performance of contracts, express and implied conditions, impossibility of performance, and illegal contracts. *Ham, Kennedy.*

509 *Criminal Law.* (2) I

Moreland's Law of Homicide, Kadish and Paulson's Cases, Hall and Glueck's Cases. Jurisdiction; the criminal act, complete and incomplete; criminal intent, actual and constructive; duress and mistake of fact, of law; justification; parties in crime; crimes against the person; and crimes against property. *Batt.*

510 *Criminal Procedure.* (2) II

Moreland's Modern Criminal Procedure, Lockhart, Kamisan and Choper's Cases. Arrest, preliminary examination, bail, methods of prosecution, the grand jury, indictment and information, arraignment and pleas, nolle prosequi and motion to quash, trial and verdict, motions after trial. *Batt.*

511 *Legal Bibliography.* (1) I

Selected materials. Practical problems in the use of statutes, reports, digests, encyclopedias, annotated cases, citation books, periodicals, reference tables, and indices. *Salmon.*

520 *Commercial Law.* (4) I

Braucher and Sutherland's Commercial Transactions (2d ed.). The study of commercial law principles with special emphasis on the law of sales, especially as governed by the Uniform Commercial Code. *Mooney.*

522 *Property III.* (3) II

Casner and Leach's Cases. Titles and conveyancing. Adverse possession; prescription; accretion dedication; mode of conveyance at common law, under the Statute of Uses, and under modern statutes; execution of easements by implication; estates; covenants for title; estoppel by deed, and priorities. *Gilliam.*

523 *Evidence.* (4) II

McCormick's Cases, 3d ed. Rules of admissibility, real, circumstantial, testimonial and documentary evidence, witnesses, hearsay rule and its exceptions, procedure of admissibility, law and fact, judge and jury, burden of proof and presumption, judicial notice, and parole evidence rule. *Richardson.*

524 *Insurance.* (2-3) II

Patterson and Young's Cases and Materials on Insurance. Nature of contract, insurable interest, making the contract, concealment, representations, warranties, implied conditions of forfeiture, waiver and estoppel, rights under the contract, and construction of the policy. *Mooney.*

525 *Oil and Gas.* (2) S

Kulp's Cases (3d ed.). Oil and gas leases—infants, married women, life tenants, and others as parties; the granting clause—lessee's interest, lessee's right to ejectment; the habendum clause—duration of leases, etc. *Staff.*

532 *Taxation I.* (3) II
Bittker's Cases. Problems in federal and state income taxation. *Whiteside.*

534 *Equity.* (3) II
Chafee and Re's Cases (3d edition). The traditional equity materials. *Staff.*

536 *The Federal Courts and the Federal System.* (3) II
Forrester and Currie's Federal Jurisdiction and Procedure. The nature of the federal judicial function and its development, distribution of the power among federal and state courts, Supreme Court review of state court decisions, the law applied in federal district courts, federal question and diversity jurisdiction, federal habeas corpus, removal jurisdiction and procedure. *Kennedy.*

540 *Conflict of Laws.* (3) II
Cheatham, Goodrich and Griswold's cases (3d edition). Nature of the subject, penal laws, procedure, judgments, domicile, capacity, form, particular subjects, litigation, family law, inheritance, foreign administrators. *Staff.*

541 *Trusts.* (3) I
Scott's Cases (4th ed.). Uses and Statute of Uses; trust creation; elements; transfer of beneficiary's interest; administration, termination and modification; charitable trusts; resulting and constructive trusts; powers. *Staff.*

542 *Administrative Law.* (3) II
Gellhorn and Byse's Cases. Establishment of administrative tribunals, limits on discretion. Notice and hearing, orders, methods of judicial relief, scope of judicial review. *Oberst.*

544 *Labor Law.* (3) II
Cox and Bok's Cases (5th edition). History, organization and structure of American labor unions, obligations of employers; questions of representation; privileges and obligations of unions; collective bargaining and dispute settlement. *Goldman.*

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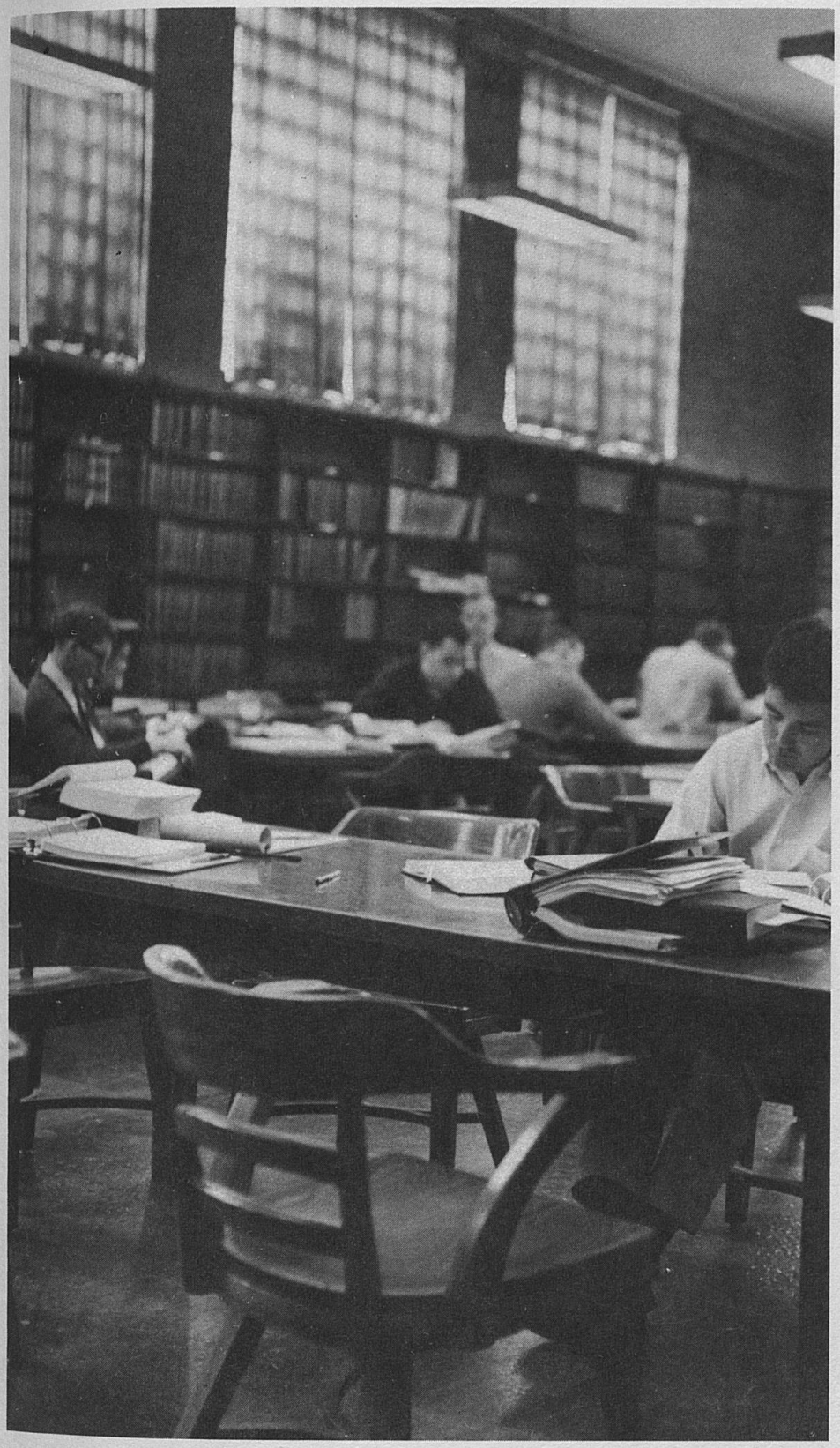
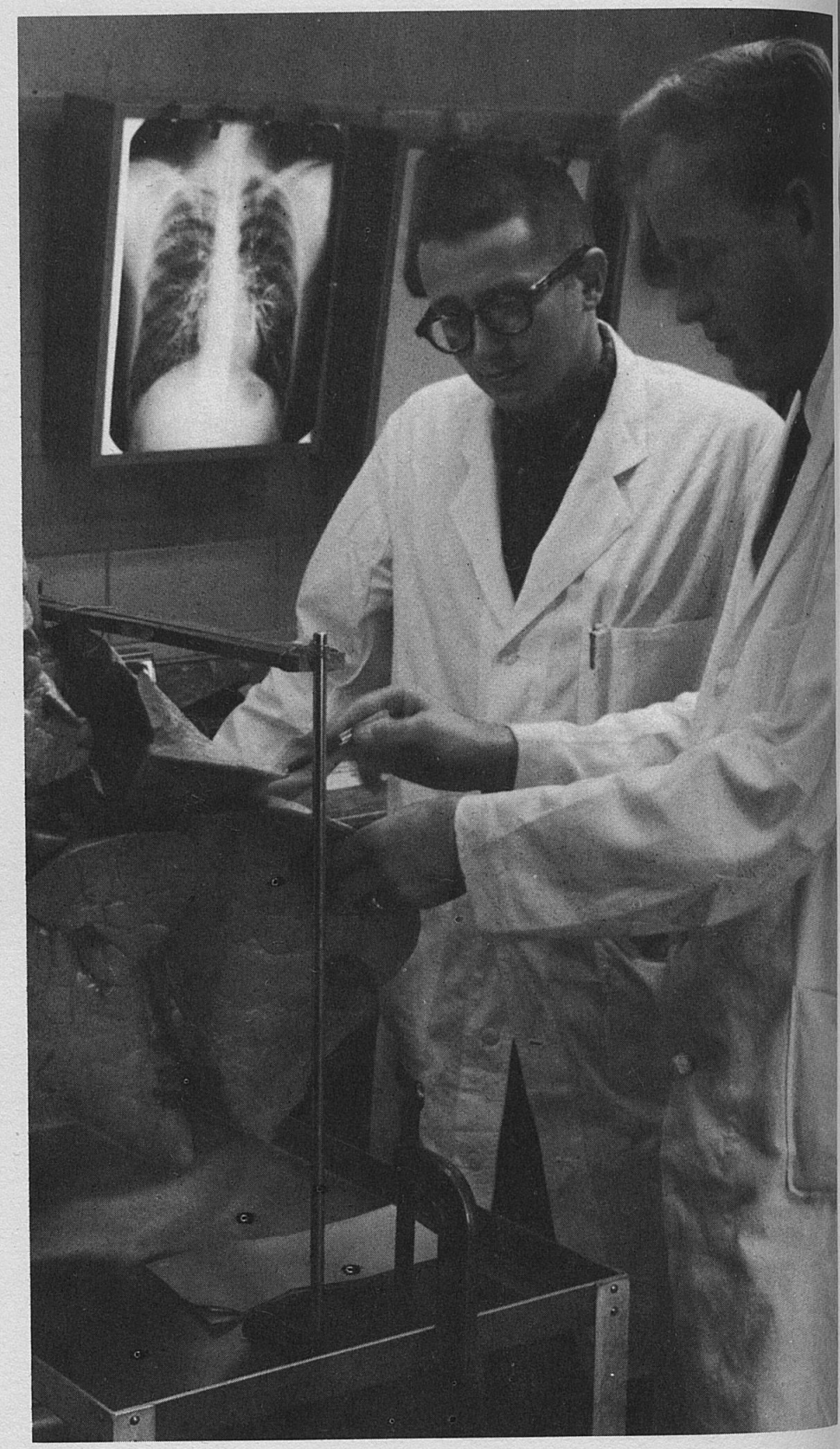




VII. MEDICINE

ANATOMY

The program of graduate studies in Anatomy is intended to provide educational opportunities for people with several different objectives. Some students will pursue an M.S. or a Ph.D. in Anatomy with the intention of teaching in departments of anatomy; some will have already obtained a professional degree, such as an M.D. or D.M.D., and may be interested in obtaining specific training in some region or system of the body to complement their professional education. Others may study in Anatomy as a minor or simply for specific credit.

Preparation for graduate work in Anatomy can be broad and varied. Ordinarily some biological sciences will be required. However, backgrounds in the physical sciences or, in special cases, in the social sciences or humanities would be accepted.

The Department is prepared to offer the M.S. and Ph.D. degrees with major training in gross human anatomy, microscopic human anatomy, embryology, endocrinology, genetics, and neuroanatomy. Also, a major interest can center in tissues, organs, regions or systems of the body, in which, for example, professional graduates such as dentists or orthopedic surgeons might wish to take specific training.

Potential applicants for graduate work in Anatomy are requested to write directly to the Chairman of the Department of Anatomy.

503 *Independent Work in Anatomy.* (3)
Independent work in anatomy is to be carried out under the direction of a given staff member or members. Specific projects are assigned including reading and usually laboratory work. Students will be examined over the materials assigned and the work carried out and they may be requested to present their findings in seminar. May be repeated once. Prereq: Some background in biology and consent of the instructor. *Staff.*

511 *Introduction to Anatomy.* (4)
The principles of organization of the human body are presented. Several methods of studying anatomy are utilized. Gross anatomy lectures follow a systemic development. Other methods include radiology, palpation of living structures, *in vivo* microscopy, and the demonstration of prosected fresh and fixed materials. Prereq: Some background in biology and consent of instructor. *Cotter and Staff.*

512 *Microscopy and Ultrastructure.* (3)
The organization of cells, tissues and organs are presented through lectures and in the laboratory, through the microscopic study of *in vivo* materials, histological sections, and illustrations. Prereq: Some background in biology and consent of instructor. *N-Winer and Staff.*

513 *Developmental Anatomy.* (2)
The development of the human body is presented through lectures, visual aids including motion pictures, histological sections, laboratory demonstrations and exercises. A majority of the time is spent on intra-uterine development; however, postnatal growth and common morphological changes associated with aging are also taken up. Prereq: Some background in biology and consent of instructor. *Fowler and Staff.*

516 *The Nervous System.* (4)
The gross and microscopic structure of the central and peripheral nervous systems and their blood supply will be studied. The neurophysiologic, neuropharmacologic and psychobiologic aspects of these systems will also be presented. The functional interpretation of the anatomy of the nervous system is essential as a basis for understanding clinical neurology and normal and abnormal behavior. Prereq: Anatomy 511, 512, 513, Behavioral Science 411, Biochemistry 511, Physiology 511, Conjoint 412 (Growth and Development) or consent of the instructor. *Gillilan and Staff.*

529 *Concepts of Morphology. Special Topics.* (2)
The objective of this course is to present concepts of morphology as they concern cells, tissues, or organs, systems and/or regions of the human body. Necessarily, the history of the development of ideas about the selected topic will be surveyed. Inherent also in the presentation of concepts of structure will be the presentation of controversies which have resulted from differing methods and interpretations. Prereq: Advanced work in biology, preferably a major or minor in a biological science, and consent of the instructor. *Staff.*

531 *Combined Gross and Neuroanatomy.* (6)
The course includes a presentation of principles and generalizations about the morphology of the human, several techniques for studying gross and neuroanatomy of the head, neck, and thorax. Neuro and gross anatomy are correlated where practicable. Dissection guide texts, atlases and original articles will be assigned. Prereq: Some background in biology and consent of instructor. *Staff.*

532 *Combined Histology and Embryology.* (4)
The course includes the microscopic study of tissues and organs of the human body and the general development of the human embryo and fetus, with emphasis placed upon the development of head, neck, and face. Texts and additional literature references are assigned. Prereq: Some background in biology and consent of instructor. *Staff.*

533 *Oral Histology.* (2)
A detailed study of the microscopic organization and ultrastructure of the several gross structures of the oral cavity and tooth development. Texts and original articles are assigned. Discussion will be carried out within the laboratory periods. Prereq: Anatomy 531 and 532, or their equivalent, and consent of instructor. *Staff.*

611 *Regional Gross Anatomy.* (8)
The course will include 1) a detailed dissection of the human body 2) a study of specific relations of the systems within major regions 3) a familiarization with reference sources in the field of gross human anatomy. Prereq: Courses in Comparative Anatomy and Embryology and Anatomy 511 or the equivalent and consent of instructor. *Benton and Staff.*

629 *Techniques of Anatomical Research.* (2)
The objective of this course is the familirization of students with research techniques in anatomy. The relationship will be tutorial. Students will work under the direction of given staff members for determined periods of time, usually on a problem. The exact length of time will depend upon the student's purposes, progress and the techniques. The problem may be new research or a repetition of previous work. Prereq: Previous senior college or graduate level work in biology and consent of instructor. *Staff.*

631 *Advanced Gross Anatomy.* (3-5)
The objective of this course is to meet individual student needs for increased knowledge in particular areas of gross human morphology. Investigations of problems involving gross morphology will be carried out. One or several defined areas of the body will be studied in considerable detail by dissection, by intensive use of the pertinent literature, by the use of visual aids, prosected materials and other appropriate learning aids. Prereq: Anatomy 611 or its equivalent. *Benton and Staff.*

633 *Advanced Developmental Anatomy.* (2-5)
The objectives of the course include a detailed study of the intrauterine development of the human as well as of fetal physiology and comparative aspects of gestation. Prereq: Comparative Anatomy, Embryology, and consent of the instructor.

634 *Advanced Endocrinology.* (2-5)
The objectives of this course include interrelating the microscopic and ultrastructural morphology of endocrine glands with the functions of these glands. Emphasis will be placed on functional aspects, chemistry and mode of action of specific hormones. All endocrine organs will be studied and given equal importance. The relationship between the central nervous system and the endocrine system will be covered in detail. Prereq: Fundamental background in biology including some previous work in endocrinology and consent of the instructor.

636 *Advanced Neuroanatomy.* (3 to 5)
The objectives include specific and detailed correlation of anatomical materials with clinical data particularly in the areas of the sub-specialties of Neurology, Psychiatry, Ophthalmology, Otolaryngology, Internal Medicine, and Neurosurgery. Clinical data from these sub-specialties will be related to the location of neuclei, the precise patterns of fiber tracts and to blood supply. The detailed content and emphasis will depend upon both the background and the purposes of the student. Prereq: Anatomy 511, 512, 513, 516, and consent of instructor. *Gillilan and Staff.*

638 *The Genetic Basis of Human Morphology.* (2-5)
The course will provide an historical survey of human genetics as background for current concepts. The genetics of man will be studied together with the problems of data gathering which are unique and are inherent in this field. The interrelations of known errors of human metabolism to alterations of cell and system morphology will be presented. Prereq: Elementary Genetics and consent of instructor.

651 *Special Projects in Anatomy of Head and Neck Correlated with Neuroanatomy.* (3 to 5)
The objective of the course is to provide the opportunity for the learning of detailed information about gross anatomical relations in the head and neck. Prereq: A course in regional gross anatomy and neuroanatomy and consent of instructors. *Gillilan, Benton, and Staff.*

662 *Ultrastructural Anatomy.* (2-5)
The objectives of this course are to advance the students' knowledge of the mammalian tissues and the human body. Those students registering for more than 2 hours of credit will do laboratory work in electron microscopy. Correlation of intra and extra cellular morphology and function will be stressed. Prereq: Previous work in microscopy including histology or cytology and previous technique work with electron microscopy such as Microbiology 660, or its equivalent, and consent of the instructor.

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
Staff.
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis.

769 *Residence Credit for the Doctor's Degree.* (1 to 18 wks. residence)
Staff.
May be repeated indefinitely.

BIOCHEMISTRY

The program of graduate studies in biochemistry is designed primarily for doctoral candidates who plan to pursue a research career in this field. Creative research in biochemistry requires broader training and more extensive laboratory experience than can be achieved at the master's level. Therefore, candidates for the master's degree will be accepted only under unusual circumstances.

As preparation for graduate work in biochemistry, students should have completed courses in chemistry through physical chemistry, in mathematics through the calculus and must have had one year of work in physics and in

one of the biological sciences. A reading knowledge of two modern foreign languages, of which one should be German and the other French or Russian, should be acquired as an undergraduate. Although students who have deficiencies in their preparation may be admitted to graduate study in the Department of Biochemistry, the time necessary for completion of their work will necessarily be lengthened. Although programs of study will be fitted to the preparation and interests of individual students, it is anticipated that most students will take advanced courses in chemistry and in physiology, microbiology, zoology or botany.

Inquiries concerning availability of financial support for graduate students should be addressed to the chairman of the department.

511 *Biochemistry for Medical Students.* (7)
A lecture, laboratory and conference course in general biochemistry with emphasis on the biochemistry of higher animals. This course is an integral part of the curriculum for first year medical students. It meets on an irregular schedule beginning in October and ending in March. Because laboratory space is limited, graduate students may be admitted only by permission of the department. *Staff.*

514,515 *General Biochemistry.* (3 ea.) I, II
An intensive introductory course in biochemistry. Topics stressed include the chemistry of naturally occurring materials, the nature of enzyme action, intermediary metabolism, and chemical aspects of the specialized biology of mammals, plants and microorganisms. Prereq: Chemistry 112, 222, 232 and one year of a biological science. Chemistry 442 and 443 are desirable for students majoring in biochemistry but may be taken concurrently. *Staff.*

517 *Experimental Methods in Biochemistry.* (2) II
A laboratory course dealing with the techniques and instrumentation of biochemical research. This course is designed to accompany Biochemistry 515 or may be taken in the following year. Since the materials employed are labile, one full day per week is spent in the laboratory. Because laboratory space is limited, students will be admitted to this course only by permission of the department. *Staff.*

610,611 *Intermediary Metabolism.* (3 ea.) I, II
A lecture and seminar course in which the degradative and synthetic pathways of metabolism in a wide variety of biological systems are discussed in depth. Prereq: Biochemistry 511 or 515. *Lester, Bollum.*

614,615 *Biochemistry of Proteins, Nucleic Acids and Enzymes.* (3 ea.) I, II
A lecture and seminar course devoted to the chemical, physical and biological properties of amino acids, proteins, and nucleic acids and to physical biochemistry including kinetic and thermodynamic aspects of enzyme-catalyzed reactions. Prereq: Chemistry 442, Biochemistry 511 or 515. *Schwert, Hu.*

618,619 *Seminar in Biochemistry.* (1 ea.) I, II
A weekly seminar, required of students majoring in biochemistry, and devoted to areas not covered in other courses and to recent developments. *Staff.*

640 *Research in Biochemistry.* (1 to 5) I, II, S
Staff.
May be repeated to a maximum of fifteen credits.

769 *Residence Credit for the Doctor's Degree.* (1 to 18 wks. residence)
Staff.
May be repeated indefinitely.

CLINICAL NUTRITION

The Master's Degree Program in Clinical Nutrition provides an opportunity for graduate study in the fundamentals of Clinical Nutrition. The curriculum is designed specifically to provide practical experience in nutrition in the treatment of illness and the maintenance of health and to deepen the student's foundation in the sciences fundamental to nutrition. It is intended primarily for those who wish to undertake careers in dietetics and clinical nutrition in University Hospitals, large Community Hospitals, and Medical Centers, for those who intend to teach in the field of clinical dietetics and those who plan careers as members of a research team in clinical nutrition and metabolism.

The program is interdisciplinary in nature. The faculty is drawn from the basic sciences as well as the clinical departments medicine, pediatrics, community medicine. The University Hospital and its related clinical facilities will be used for clinical instruction. The staff of the department of dietetics will provide professional supervision.

CM 601 *Principles of Nutrition in Population Groups.* (2) II

Epidemiological aspects of nutrition. Factors affecting adequacy of dietary intake and assessment of nutritional status in population groups. Community programs in social welfare and public health including city, state, federal and international programs. Field work 4 weeks. Prereq: Biochem. 501; Statistics 421; Physiology 502, 503; Soc. 790; consent of instructor. *Bertan.*

MED 601 *Clinical Nutrition.* (4) II

An analysis of the process by which man ingests, assimulates, and utilizes all of the constituents of food in health and disease. Relationship of biochemical and physiological factors to the nutrient requirements of the human body. Evaluation of dietary status and rationale of dietary management. Prereq: Physiology 502, 503; consent of instructor. Concur: Biochem. 501. *Pellegrino and Staff.*

MED 602 *Seminar—Current Trends in Nutrition.* (1) II

Review of the current literature of nutrition; development of the techniques for the preparation of abstracts, reviews, and bibliographies on current topics. Questions of editing, editorial styles, evaluation and graphic interpretation discussed. Prereq: Physiology 502, 503; Statistics 421; Concur: Biochem. 501. *Pellegrino and Staff.*

MED 768 *Residence Credit for Master's Degree.* (1 to 9 weeks residence)

May be repeated. Maximum of 9 weeks can be applied toward master's degree with thesis. *Staff.*

BCH 501 *Biochemistry.*

BSC 421 *Biological Statistics.*

PGY 502,503 *Principles of Mammalian Physiology.*

600 or 700 *Elective.*

To be selected from University Graduate School in the Departments of Psychology Sociology, Education, or Microbiology (610).

SOC 780. *Special Problems in Sociology.*

PATHOLOGY

While there is as yet no graduate program in pathology the department offers two courses which are open to qualified graduate students. The permission of the department chairman is required prior to enrollment.

421 *Fundamental Human Pathology.* (4)
The unit on Fundamental Human Pathology (100 hours) will provide a general survey of the various types of reactions to injury; regeneration, repair, the granulomata and the fundamentals of neoplasia. The emphasis will be upon the pathogenesis, mechanisms, and natural history of disease processes with particular stress on the interrelationships of structural and metabolic abnormalities.

422 *Systematic Human Pathology.* (7)
The unit on Systematic Human Pathology (212 hours) will continue this survey with a systematic study of the diseases of each organ system.

PHARMACOLOGY

The Department of Pharmacology offers M.S. and Ph.D. degrees in Pharmacology.

Pharmacology is the study of the actions of drugs upon living matter. Pharmacologists in modern society find careers as teachers in academic professions, as scientists engaged in research of problems related to pharmacology; and in developing new drugs along with evaluating drugs for their potential efficacy toxicity, side effects, etc.

Graduates from accredited colleges with bachelor degree in the biological sciences, in Chemistry, Physics or Pharmacy are eligible for candidacy for graduate degree in pharmacology. It is advisable that the candidates obtain a good basic training in mathematics, physics, chemistry and biological sciences. The Ph.D. program involves extensive research work under the supervision of appropriate staff scientists. At the present, special training can be obtained in fundamental Pharmacodynamics, in Neuropharmacology and in Gnotobiotic Biology.

Inquiries concerning the details of the program as well as possible financial support for graduate students should be addressed to the Chairman of the Department of Pharmacology.

521 *General Pharmacodynamics.* (2) I
A fundamental discussion of the response of the living organism to drugs analyzed primarily on the cellular and subcellular levels. Factors which affect the absorption, distribution and the disposal of drugs in the body will be discussed. The quantitative aspects of dose-response relationships to drugs will be analyzed including an introduction to the problems of biological assay. Prereq: consent of instructor. *Csaky and Staff.*

522 *Medical Pharmacology.* (3) I
Aimed to give a fundamental understanding of the pharmacodynamic action of drugs most commonly used in medical practice. Prereq: consent of instructor. *Csaky and Staff.*

541 *Biological Assay.* (3) I
A study of the estimation of potencies of treatments against some standardized scale. Prereq: Biostatics (Behavioral Science 421/22) or equivalent. Consent of the departmental chairman. *Staff.*

555 *Gnotobiotic Methodology.* (2)
A practical course for students who wish to learn how to conduct gnotobiotic experiments. In this type of work aimals are maintained either in absence or in association with known microbial contaminants. Prereq: Microbiology 200. Consent of instructor. *Gordon.*

610 *Seminar in Pharmacology.* (1) I, II
Staff.
May be repeated indefinitely.

621 *Advanced Pharmacodynamics.* (2) I
Continuation of Pharmacology 521 with particular emphasis on recent developments in the field. Prereq: Pharmacology 521 and consent of the Departmental Chairman. *Staff.*

631 *Pharmacological Methodology.* (3) II
Practical review of the important specialized methods in study of the effects of drugs. Prereq: Pharmacology 521 and 522 and consent of the Departmental Chairman. *Staff.*

645 *Physiology and Pharmacology of Biological Membranes and Transport.* (1)
Advanced study of the structure, functions, and permeability of biological membranes and the effect of change of chemical environment upon them. Prereq: Biochemistry 514/515 or Pharmaceutical Chemistry 400 or Chemistry 552 or equivalent. Physiology 502/503 or 511 or equivalent. Pharmacology 521. Consent of instructor. *Csaky.*

650 *Host-Contaminant Relationships.* (2)
The course deals with the effects of microbial associates on various systems of the animal host with special reference to gastrointestinal, cardiovascular, defensive functions and aging. Material will be presented as a comparative study between gnotobiotic and conventional animals. Prereq: Biostatistics 421/22, Chemistry 220, 230, 444, Zoology 200, Microbiology 200, MB 550 or equivalent. Consent of instructor. *Gordon.*

658 *Advanced Neuropharmacology.* (4)
A study of the general theories of the mode of action of drugs upon nervous tissue and a review of the effects of analgesics, sedatives, hypnotics, anesthetics, tranquillizers, psychotomimetics, analeptics, antidepressants, anticonvulsants and drugs effecting motor dyskinesias upon neurones, synapses and functional components of the central nervous system. Prereq: Physiology 416 or equivalent, Pharmacology 521 and 522. Consent of instructor. *Martin.*

660 *Pharmacology of Steroids.* (4)
Lectures and laboratory work dealing with the chemistry, metabolism and pharmacology of steroids. Emphasis will be placed on methods of research which will be illustrated in laboratory exercises. Prereq: Chemistry 232, Biochemistry 514/515 or Pharmaceutical Chemistry 400 or Chemistry 552 or equivalent. Pharmacology 521. Consent of instructor. *Flesher.*
(Not to be offered in 1966-67)

665 *Drug Receptor Interrelationship.* (1)
A seminar course in which the nature and topography of the reactive groups constituting the receptors of various drugs is discussed. Prereq: Chemistry 550/552 or Biochemistry 514/515 or equivalent, Pharmacology 521 and 522. Consent of instructor. *Diedrich.*
(Not to be offered in 1966-67)

670 *Clinical Psychopharmacology.* (4) I
A fundamental discussion concerning the purposes, indications and contraindications, methods of administration and effects of psychotropic drugs on human behavior. Prereq: Pharmacology 521, Psychology 100 (or equivalent) and consent of instructor. Pharmacology 522 and 670, Anatomy 516, Physiology 516, Psychology 505, 507 and 509 are strongly recommended, and selection from among these courses will be made after consultation with the Director of Graduate Studies in Pharmacology. *Wikler.*

671 *Integrative Psychopharmacology.* (4) II
A discussion of the mechanisms of action of psychotropic drugs. Prereq: Pharmacology 521, Psychology 100 (or equivalent) and consent of instructor. Pharmacology 522 and 670, Anatomy 516, Physiology 516, Psychology 505, 507 and 509 are strongly recommended, and selection from among these courses will be made after consultation with the Director of Graduate Studies in Pharmacology. *Wikler.*

750 *Research in Pharmacology.* (1-5) I, II, S
Staff.
May be repeated to a maximum of 15 credits.

768 *Residence Credit for Master's Degree* (1 to 9 weeks residence).
Staff.
May be repeated. Maximum of nine weeks can be applied toward Master's degree with thesis.

769 *Residence Credit for Doctor's Degree* (1 to 18 weeks residence).
Staff.
May be repeated indefinitely.

PHYSIOLOGY AND BIOPHYSICS

Graduates of accredited colleges with a bachelor's degree in biology, zoology, chemistry, physics, psychology or engineering may become candidates for a graduate degree in physiology.

The department offers the master's degree according to Plan A.

The doctoral program involves extensive research experience plus qualification in a minor field.

On recommendation of the Special Committee a student may substitute six hours of Mathematics beyond the calculus or nine hours of statistics and computer science for one of the languages required for the Ph.D. in Physiology and Biophysics.

Physiology is a biological field concerned with function. It is, in fact, dynamic biology. The increase in knowledge in the field of physiology as well as the change in the nature and complexity of instrumentation necessary for experimentation and analysis of experimental data have lengthened doctoral programs in physiology or necessitated a restriction in the scope of the program. The graduate program meets these problems in three stages: (1) Requirement of adequate physical, chemical, and biological background before admission to the program or a reasonable plan to make up deficiencies that exist. In general, one year of physics, three years of chemistry and one year of biological science are required. (2) A basic program covering one to two years to allow instruction in basic mammalian and cellular physiology and the correlated instrumentation including project type laboratory work. (3) Special training and research including a thesis in the areas of physiology in which the department has competence.

Additional work and minor programs may involve course work in zoology, physics, chemistry and biochemistry, psychology, microbiology and certain courses in engineering and agriculture.

502,503 *Principles of Mammalian Physiology.* (5) I
A comprehensive discussion of mammalian physiology using advanced texts and library reading; includes function as related to major body system and laboratory experience with major experimental techniques. Prereq: 1 year Physics and Organic Chemistry. *Staff.*

504 *Independent Work in Physiology.* (2-4) I, II, S
A study of some advanced problems in physiology under the direct supervision of the instructor. Discussion period, one hour; lab, four hours. Prereq: Instructor's consent. *Staff.*

505,506 *Physiology of the Supporting System.* (4) II
A course for students of Anthropology and Art. A detailed study of the architecture, function, joint combination, and muscular relations of bone. Lectures, two hours; lab, four hours. *Allen.*

507 *Introduction to Endocrinology.* (3) I, S
Introductory study of the development, structure, and fundamental functions of endocrine glands. Lectures, three hours. Prereq: Physiology 502, 503; instructor's consent. *Archdeacon, Allen.*

508,509 *Comparative Neurophysiology.* (4) I
A comparative study of anatomy and physiology of the nervous system. Lectures, two hours; lab, four hours. Prereq: Instructor's consent. *Allen.*

511 *Medical Physiology.* (7)
Instruction in physiology for medical students. *Staff.*

512,513 *Cellular Physiology.* (4) I, S
An intensive study of general physiological principles with emphasis on the chemistry and physics of the cell. Lectures, two hours; lab, two hours. Prereq: Physics and General Chemistry. *Staff.*

516 *Neurophysiology.* (2-3) II
A study of the basic phenomena and fundamental experiments in neurophysiology. The course progresses from classical Sherringtonian to modern electrophysiological and psychological techniques. Prereq: Physiology and Biophysics 502 or 511, Anatomy 516 or permission of instructor. *Boyarsky.*

602 *Physiological Instrumentation I.* (3) I
Training in techniques used in physiological research. Lecture, two hours; lab, six hours. Prereq: Physiology 502,503 or Physiology 512,513 and Math. 113 or permision of instructor.

603 *Physiological Instrumentation II.* (3) II
Physical basis of physiological measurement and analogs of physiological systems. Prereq: MA 113, PGY 511, PGY 516, and PGY 602 or consent of instructor.

604 *Experimental Endocrinology.* (2) II
Experimental study of endocrine functions. Lecture, one hour; lab, two hours. Prereq: Physiology 507. *Allen, Archdeacon.*

606,607 *Advanced Neurophysiology.* (3) II
Electrical analysis of nerve fibres and synapse; nerve impulse theories, reflexes, metabolism and central nervous function are considered from the cybernetic viewpoint. Lectures, two hours; lab, two hours. Prereq: Physiology 508,509 and Physiology 512,513; instructor's consent. *Boyarsky.*

614 *Cellular Biophysics.* (3)
An analysis of cellular processes in the light of molecular physics. Topics include the physics of macromolecules, molecular forces, quantum phenomena, colloidal properties of protoplasm, muscular contraction, vision, membrane phenomena. Prereq: Chemistry 442, Chemistry 552 or Biochemistry 511 or 515, Physiology 502, 511 or 512 or consent of instructor.

620 *Theoretical Biophysics.* (3) I
Study of mathematical techniques used in modern theoretical biophysics illustrated with applications to physiological problems. Emphasis on abstract representation of physiological systems and processes. By appointment. Prereq: Mathematics 113, Physiology 502 or 512 or Botany 501. *Engelberg, Boyarsky.*

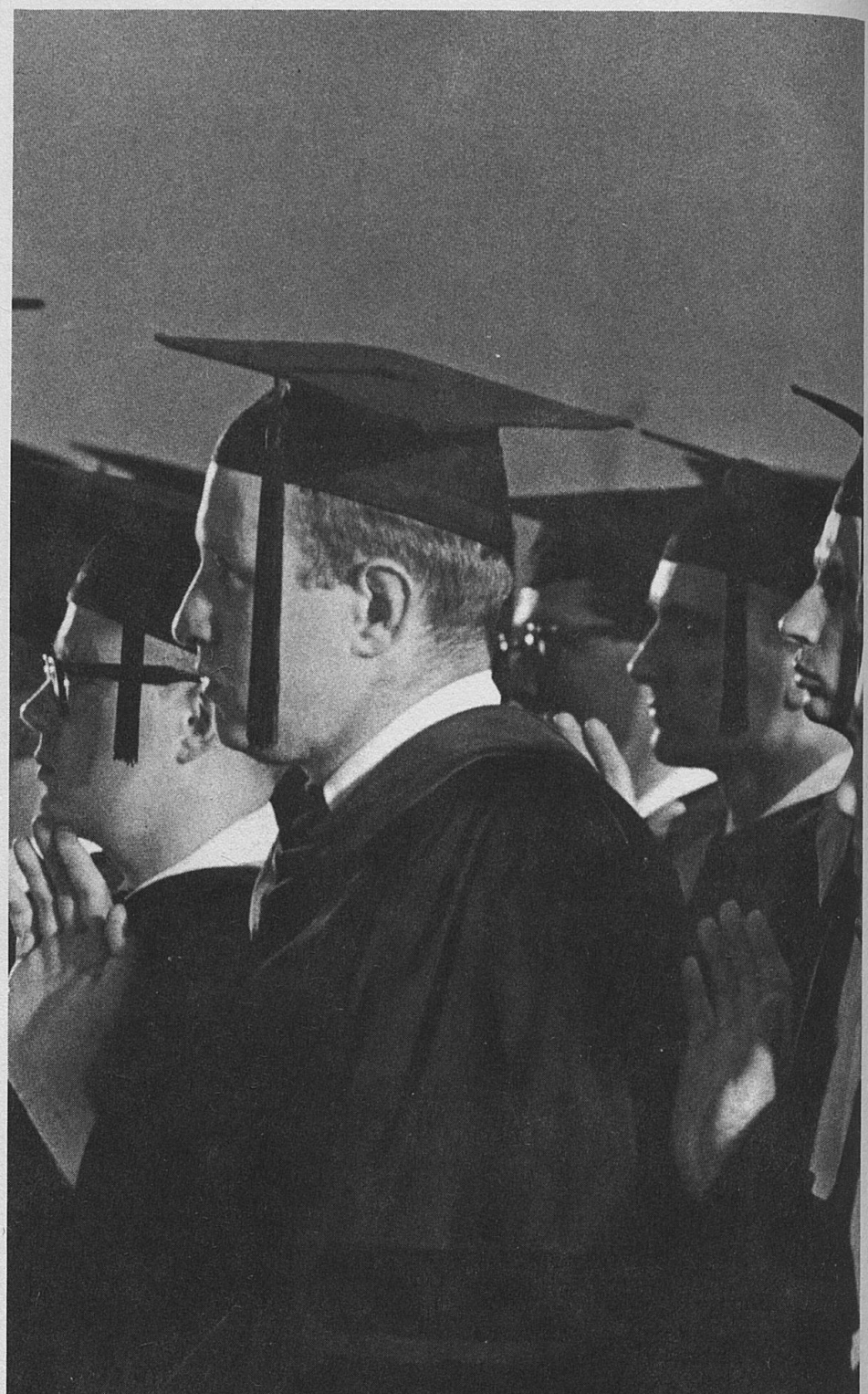
660 *Systems Biophysics.* (3) II
Modern approaches to the study of complex physiological systems. Elements of analog, information, computer and servomechanism theory and their application to physiological systems. By appointment. Prereq: Mathematics 113, Physiology 620. *Smith.*
To be offered alternately with PGY 620.

768 *Residence Credit for the Master's Degree.* (1 to 9 wks. residence)
Staff.
May be repeated. Maximum of nine weeks can be applied toward master's degree with thesis.

769 *Residence Credit for the Doctor's Degree.* (1 to 18 wks. residence)
Staff.

774 *Graduate Seminar in Physiology.* (1) I, II, S
Staff.

791 *Research in Physiology.* (2-5) I, II, S
Staff.



VIII. PHARMACY

Major programs leading to advanced degrees are not at present offered in the College of Pharmacy.

PHARMACEUTICAL CHEMISTRY

400 *Biochemistry.* (4) II

A fundamental course in the chemistry and inter-relationships of carbohydrates, lipids, and proteins, as well as the role of enzymes, vitamins, and hormones in physiological process. Laboratory exercises parallel the lecture material. Lecture, three hours; lab, three hours. Prereq: Pharmaceutical Chemistry 302 or equivalent. *Glasser.*

402 *Pharmaceutical Analysis and Control.* (4) I

A course which deals with the application of analytical methods in the determination of the strength, purity and quality of drugs and pharmaceuticals; and includes the means by which quality can be assured in a fabricated pharmaceutical product. Laboratory exercises include analysis of raw materials and dosage forms. Lecture, three hours; lab, three hours. Prereq: Chemistry 226 or equivalent.

404 *Chemistry of Medicinal Products.* (3) I

A study of the official and more important non-official medicinal agents with respect to their physical and chemical properties, relationships of chemical structure to physiological activity, as well as their potential incompatabilities. Lecture, three hours. Prereq: Pharmaceutical Chemistry 400 or equivalent. *Orth.*

406 *Chemistry of Medicinal Products.* (3) II

A continuation of PCH 404 including such topics as glycosides, steroids, and other chemotherapeutic agents. Lecture, three hours. Prereq: Pharmaceutical Chemistry 404. *Orth.*

408 *Independent Problems in Pharmaceutical Chemistry.* (1-3) I, II

Selected problems from the general field of pharmaceutical chemistry. One to three hours. May be repeated for maximum of six hours. Prereq: Advanced standing, permission of instructor. *Staff.*

410 *Advanced Organic Pharmaceutical Chemistry.* (3) I

A study of the synthesis, classification, properties, and uses of organic medicinal agents. Lecture, one hour; lab, six hours. Prereq: Pharmaceutical Chemistry 302 or equivalent. *Glasser, Orth.*

412 *Advanced Organic Pharmaceutical Chemistry.* (3) II

A continuation of Pharmaceutical Chemistry 410. Lecture, one hour; lab, six hours. Prereq: Pharmaceutical Chemistry 302 or equivalent. *Glasser, Orth.*

MATERIA MEDICA

450 *Pharmacology and Toxicology.* (5) I

A presentation of the pharmacodynamic actions, modes of administration, toxic manifestations of drugs, and the relationship of pharmacodynamic action to therapeutic use. Lecture, four hours; lab, two hours. Prereq: Materia Medica 346, or equivalent. *Walton.*

462 *Pharmacology and Toxicology.* (5) II

A continuation of Materia Medica 450. Lecture, four hours; lab, two hours. Prereq: Materia Medica 450. *Walton.*

470 *Drug Literature Evaluation.* (3) I

This course apprises the student of the pharmacological and toxicological principles and techniques employed in the clinical evaluation of drugs and enables the student to more effectively use clinical literature. It is designed as a natural continuation of MM 462. Prereq: MM 462. *Walton.*

474 *Independent Problems in Toxicology.* (1-3) I, II

Selected problems requiring literature and laboratory research are designed to meet specific needs of graduate minors in toxicology and satisfy professional elective requirements for pharmacy students. May be repeated for total of six hours. Prereq: permission of instructor. *Luckens.*

475 *Independent Problems in Pharmacognosy.* (1-3) I, II

Selected problems requiring literature and laboratory research are designed to meet specific needs of graduate minors in pharmacognosy and satisfy professional elective requirements for pharmacy students. May be repeated for total of six hours. Prereq: permission of instructor. *Doughty.*

476 *Independent Problems in Pharmacology.* (1-3) I, II

Selected problems requiring literature and laboratory research are designed to meet specific needs of graduate minors in pharmacology and satisfy professional elective requirements for pharmacy students. May be repeated for total of six hours. Prereq: permission of instructor. *Walton.*

520 *Biotoxicology I.* (3 or 5) I

Biotoxicology is a course concerned with the physiologic effects on man, animals, and plants of various toxic substances encountered in agriculture, industry, urban and rural environments and the home. Prereq: permission of instructor.

530 *Biotoxicology II.* (3 or 5) II

Biotoxicology is a course concerned with the physiologic effects on man, animals, and plants of various toxic substances encountered in agriculture, urban and rural environments and the home. Prereq: permission of instructor.

540 *Environmental Toxicology and Occupational Hygiene.* (3) II

This course is concerned with the recognition, evaluation and control of physical and toxicologic factors arising from industrial (including agricultural) environments, their influence on health and well-being of the worker and the community, and current practices in their elimination and/or mitigation. Lecture, three hours. Prereq: Materia Medica 346, Pharmaceutical Chemistry 302 or equivalent. *Luckens.*

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Sister Mary Ann McConn ..... History
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George R. Rice ..... Economics
John C. Rothwell ..... Economics

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Manuel E. Figueroa ..... Microbiology
Marilyn P. Friedrich ..... Microbiology
Arthur M. Ihrig ..... Chemistry
Olga Diane Manker ..... Microbiology
Robert S. Miller ..... History
Marcus B. Moses ..... Civil Engineering
Anna Laura Page ..... Music
Donna Belle Prichard ..... Library Science
David H. Rembert, Jr. ..... Botany
Betty Lou Rice ..... Spanish
Elizabeth Ann Schwendeman ..... Geography
Peter J. Sehlinger, Jr. ..... History
W. Craig Stevens ..... Zoology
Randall H. Waldron ..... English
Mehale A. Zalampas ..... History

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James W. Nelson ..... Biochemistry
Guessler M. Normand ..... French
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Kittye Delle Robbins ..... French
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Charles E. Scruggs ..... French
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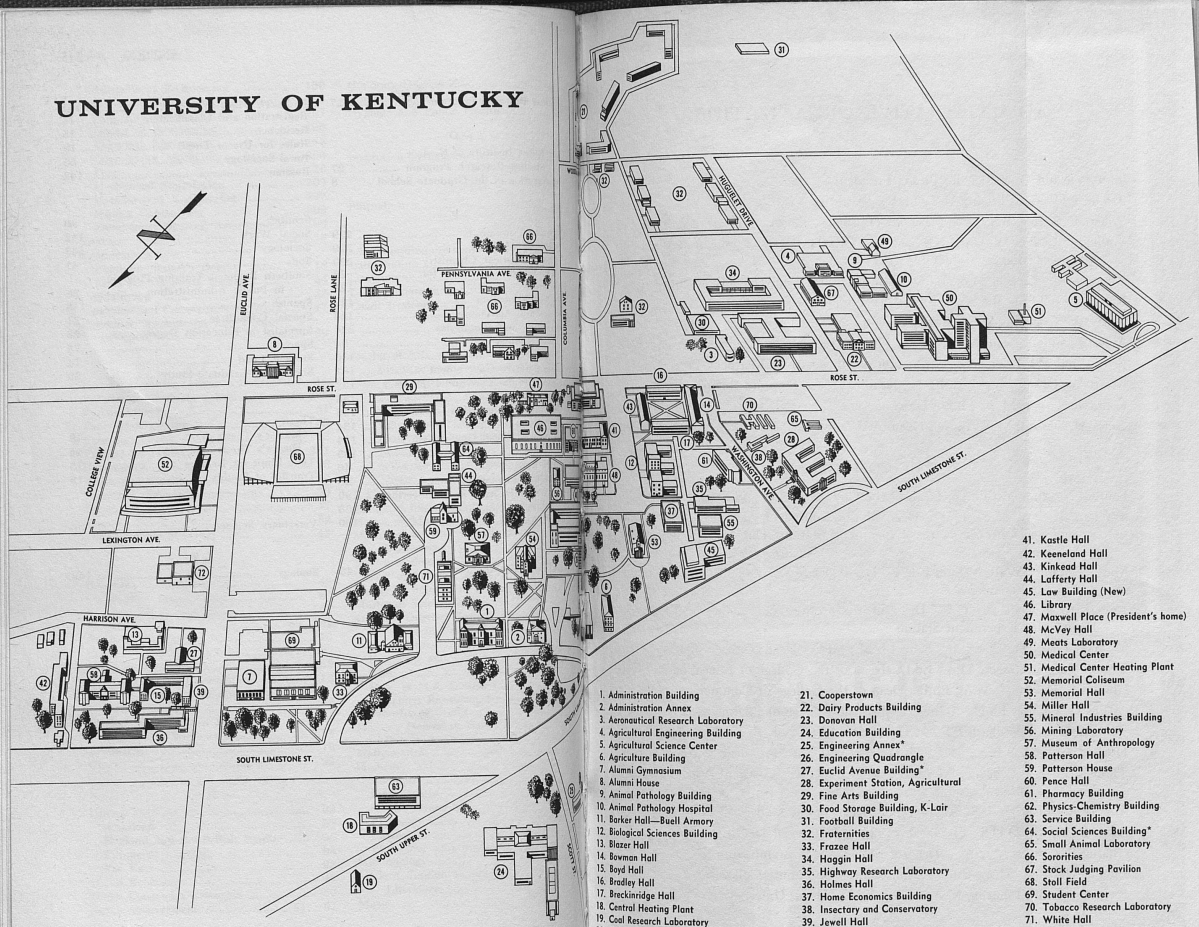

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6. Agriculture Building
7. Alumni Gymnasium
8. Alumni House
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10. Animal Pathology Hospital
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12. Biological Sciences Building
13. Blazer Hall
14. Bowman Hall
15. Boyd Hall
16. Bradley Hall
17. Breckinridge Hall
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19. Coal Research Laboratory
20. Commerce Building
21. Cooperstown
22. Dairy Products Building
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24. Education Building
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26. Engineering Quadrangle
27. Euclid Avenue Building*
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30. Food Storage Building, K-Lair
31. Football Building
32. Fraternities
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37. Home Economics Building
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39. Jewell Hall
40. Journalism Building
41. Kastle Hall
42. Keeneland Hall
43. Kinkead Hall
44. Lafferty Hall
45. Law Building (New)
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47. Maxwell Place (President's home)
48. McVey Hall
49. Meats Laboratory
50. Medical Center
51. Medical Center Heating Plant
52. Memorial Coliseum
53. Memorial Hall
54. Miller Hall
55. Mineral Industries Building
56. Mining Laboratory
57. Museum of Anthropology
58. Patterson Hall
59. Patterson House
60. Pence Hall
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62. Physics-Chemistry Building
63. Service Building
64. Social Sciences Building*
65. Small Animal Laboratory
66. Sororities
67. Stock Judging Pavilion
68. Stoll Field
69. Student Center
70. Tobacco Research Laboratory
71. White Hall
72. "Wildcat" (Bowling-Grill)

* Temporary—to be removed

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