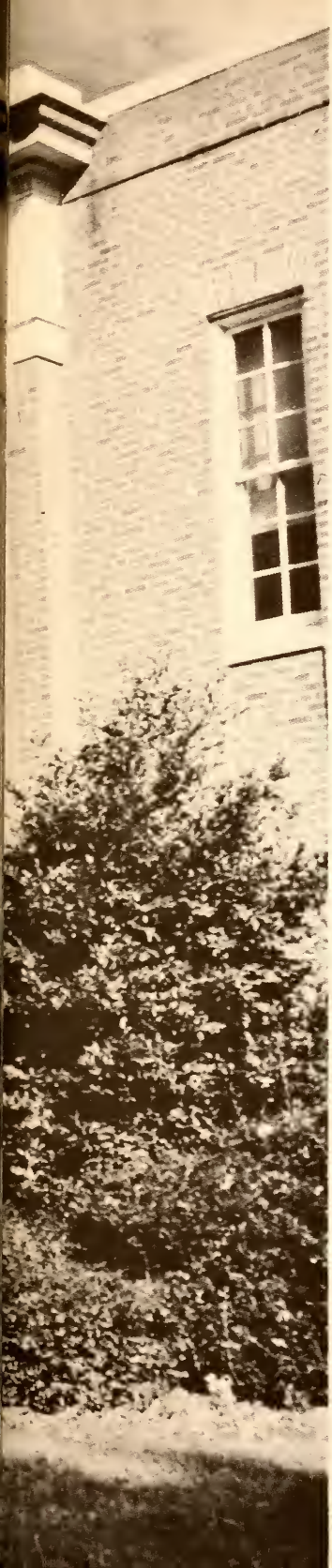
THE AGRICULTURAL AND TECHNICAL COLLEGE OF NORTH CAROLINA

AT GREENSBORO

GRADUATE SCHOOL BULLETIN

1964-1965



THE AGRICULTURAL AND TECHNICAL COLLEGE OF NORTH CAROLINA

Greensboro

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Graduate School Office
Room 200—Dudley

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ACADEMIC CALENDAR

Fall Quarter 1964

September 18, 19	Registration (Friday, 8:30-4:00; Saturday, 8:30-noon)
September 21	Classes begin (Monday, 8:00 a.m.)
September 26	Last day for completing registration with penalty of $5.00
October 10	Last day to file for qualifying examination
October 17	Last day to file for Masters' final examination
October 17	Last day to file for graduation
November 3	Founder's Day (Tuesday)
November 26, 27, 28	Thanksgiving recess (Thursday, Friday, Saturday)
November 30	Final Examination, classes that meet on Monday evening
December 1, 2, 3, 5	Final Examination, all other classes
December 5	Last day for submitting final copies of Masters' theses in Graduate School Office

Winter Quarter 1964-65

December 9, 10, 11, 12	Registration (Wednesday, 8:30-4:00; and daily except Saturday 8:30-noon)
December 10	Classes begin (Thursday, 8:00 a.m.)
December 18	Last day for completing registration with penalty of $5.00
December 18	Christmas recess begins (Friday—after last class)
January 4, 1965	Classes resume (Monday, 8:00 a.m.)
January 16	Last day to file for qualifying examination
January 16	Last day to file for Masters' final examination
January 23	Last day to file for graduation
March 1, 2, 3, 4, 6	Final Examinations
March 9	Last day for submitting final copies of Masters' theses in Graduate School Office

Spring Quarter 1965

March 10, 11, 12, 13	Registration (Wednesday 8:30-4:00 and daily during week except Saturday with hours 8:30-noon)
March 11	Classes begin (Thursday, 8:00 a.m.)
March 20	Last day for completing registration with penalty of $5.00
March 27	Last day to file for qualifying examination
April 10	Last day to file for Masters' final examination
April 10	Last day to file for graduation
April 16, 17, 18, 19	Easter recess
April 20	Classes resume (Tuesday, 8:00 a.m.)
May 8	Last day for submitting final copies of Masters' theses in Graduate School Office
May 22	Final Examination, classes that meet on Saturday morning
May 24, 25, 26, 27	Final Examination (all other classes)
May 30	Commencement (Sunday)
June 14, 1965	Registration for Summer Session

THE AGRICULTURAL AND TECHNICAL
COLLEGE OF NORTH CAROLINA

GRADUATE SCHOOL

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Graduate School

GENERAL INFORMATION

HISTORY

Graduate education at the Agricultural and Technical College of North Carolina was authorized by the North Carolina State Legislature in 1939. The authorization provided for graduate training in agriculture, technology, applied science and applied areas of study. An extension of the graduate program, approved by the General Assembly of North Carolina in 1957, provided for enlargement of the curriculum to include teacher education, as well as such other programs of a professional or occupational nature as might be approved by the North Carolina State Board of Higher Education.

PURPOSE

The Graduate School coordinates advanced course offerings of all departments within three academic schools of the College, namely, the School of Agriculture, the School of Education and General Studies, and the School of Engineering.

The Graduate School offers the academically mature student a type of instruction consistent with the demands of contemporary society. Graduate study is particularly recommended for those individuals whose interests and aptitudes carry them beyond routine application. Students are expected to develop their powers of independent thought and to become familiar with the discipline of research.

The Graduate School seeks to 1) provide the requisite environment for its students by frequent and critical re-evaluation of the curricula and 2) observe strict adherence to standards set forth by the faculties of the College and to the standards of the appropriate accrediting agencies.

ORGANIZATION

Faculty of the Graduate School. The faculty of the Graduate School is composed of individuals who have been recommended by deans of their schools and have been approved by the Graduate School Council and the President of the College. Full-time members of the College faculty who are assigned to teach graduate courses are also associated with undergraduate instruction.

Graduate School Council. Members of the Council are appointed by the President of the College. The Dean of the Graduate School serves as Council Chairman. Two specific functions of the Council are, 1) to determine requirements for graduate degrees, and 2) to recommend to the President of the College policies for the Graduate School. The Council serves as a representative body for the Graduate School faculty.

Advisory Committees of the Graduate School. Several standing committees of the Graduate School are organized to advise the Council on matters pertaining to present policies, to evaluate existing and proposed

programs of study, and to process student petitions relating to academic matters. These committees are:

Committee on Curriculum and New Programs
Committee on Publications
Committee on Student Affairs and Petitions
Committee on Admissions and Retention
Committee on Library Holdings

DEGREES GRANTED

The Graduate School of the Agricultural and Technical College offers one degree, the Master of Science.

This degree may be earned in the following fields: Agricultural Education, Chemistry, Education, and Industrial Arts Education.

HOUSING

The College maintains five residence halls for women and two for male students. A request for dormitory housing accommodation should be directed to the Dean of Students at least one quarter prior to the expected date of registration.

FOOD SERVICES

The College provides food service for students at minimum cost. Two well-equipped cafeterias and a snack bar are operated at convenient locations on the campus. Only students who live in the residence halls are required to eat in the cafeterias.

FINANCIAL ASSISTANCE

The College attempts to assist students experiencing financial difficulties, but rarely can the institution defray the total expenses of an individual. The National Defense Student Loan Fund is available to a number of persons who need assistance in continuing their work at the college. Further information regarding this program, as well as other inquiries concerning financial aid, should be directed to: Mrs. Carrie W. Harper, Student Aid Officer, A. and T. College, Greensboro, N. C.

FEES

The fees charged full-time graduate students carrying 12 to 15 quarter hours of work are the same as those charged to full-time undergraduate students. For one academic year, a state resident should expect to pay approximately $309.00, which will cover tuition and course fees. This sum *does not* include room and board charges. Tuition and course fees for an out-of-state student carrying a full schedule will total about $561.00 for the academic year.

As student fees are subject to change without prior notice, it is suggested that the Cashier's Office be consulted for complete information concerning charges for full- and part-time students.

SPECIAL FEES

Diploma fee	$15.00
Transcript (after first one)	1.00
Late registration	5.00
Master's thesis binding fee	20.00
Rental of academic regalia	8.25

GENERAL REQUIREMENTS FOR ADMISSION

MINIMUM QUALIFICATIONS OF APPLICANT

The applicant must hold a bachelor's degree from an educational institution of recognized standing.

The undergraduate work must be above average in quality, especially in the area in which the applicant wishes to concentrate. In general, undergraduate grades below "B" average in the primary field of concentration are taken as evidence of some deficiency in preparation for graduate work. Admission to study toward a graduate degree will be denied if the applicant's overall average is less than 2.6 on the 4.0 system or 1.6 on the 3.0 system in undergraduate studies.

PROVISIONAL ADMISSION

An applicant for a degree may be admitted to the Graduate School program provisionally if (1) his baccalaureate degree was earned in a non-accredited institution or (2) the transcript of his preparation reveal course deficiencies that can be removed at an early period during graduate work.

SUBMISSION OF APPLICATION FORMS

A formal application must be submitted to the Dean of the Graduate School before a permit to register for graduate study can be issued. These forms may be obtained from the Graduate School Office or from the Office of Admissions. With the application, must be filed two official transcripts of all previous undergraduate and graduate work. To be assured early processing, the application together with all supporting documents should be received by the Graduate School at least 15 days prior to a registration period.

ADMISSION AS SPECIAL STUDENT

If the applicant indicates on the admission form that he does not intend to work toward a degree, he will automatically be classified as a "special student." In order to be considered for admission, such an applicant must hold a baccalaureate degree. Registration in the Graduate School within this classification is generally restricted to those who are interested in a limited period of study, such as a summer session, for the purpose of earning graduate credits for change in teaching certificates or for earning renewal of certificates.

Individuals who enter the Graduate School as special students but later wish to change to a degree program must petition the Graduate School for permission to do so. Credits earned as a special student are subject to evaluation and may or may not be accepted toward degree requirements at this College.

Retention of Special Students. In general, special students are required to maintain good academic standing. Not more than an accumulated total of 15 quarter hours of graduate-level courses may be taken by a special student unless a detailed plan of purpose for taking courses has been approved by the Dean of the Graduate School.

GENERAL REQUIREMENTS FOR A MASTER'S DEGREE

PROGRAM OF STUDY

The applicant chooses the major field of study. An advisory committee of the Graduate School assists the student in designing his program until he has been admitted to candidacy. Normally the student must complete one quarter with a full-time program of prescribed course work (12-15 quarter hours) before he may apply for admission to candidacy. After he has been accepted as a candidate, the chairman of the department in which the student is majoring assigns an advisor upon the approval of the Dean of the Graduate School. The student and advisor together draw up a program of study to total not less than 45 quarter hours, if a thesis is to be attempted; and not less than 54 hours if a thesis program will not be pursued. The course requirements may include graduate credits earned prior to admission to candidacy and must be submitted to the Dean of the Graduate School for approval. A proposed program may be revised upon written approval of the advisor and the Graduate School Dean.

ADMISSION TO CANDIDACY

Permission to register in the Graduate School does not in itself imply that the student is accepted or will be accepted as a candidate for a Master's degree. Application for acceptance as a candidate for a degree is a separate and subsequent step, and must be initiated by the student in the office of the Graduate School.

After a student has successfully completed 12-15 hours of prescribed graduate study toward the Master's degree, with an accumulative average of at least "B," he is required to file an application for admission to candidacy. Failure to observe this requirement may result in the students being denied the privilege to register for additional credits.

Notification of admission to or denial of candidacy will be sent to the student from the Graduate School Office, after evaluation of: (1) the applicant's academic record from the Admissions Office, (2) results of the Graduate Record Examination, and (3) recommendations from all committees which administered such other tests as are required for admission to candidacy. (To include the Qualifying Examination.)

OPTIONS FOR DESIGNING A DEGREE PROGRAM

1. Thesis option—The program of study shall consist of a minimum of 45 credit hours including the thesis. After the advisor and the chairman of the department have granted permission to follow the thesis plan, a candidate shall prepare a thesis proposal and submit it to a Departmental Thesis Committee. In consultation with the departmental chairman, the advisor organizes this committee, of which he is chairman, appoints two other persons, and schedules time of meeting with the candidate.

Following acceptance of the proposal, the candidate must submit to the Dean of the Graduate School a summary of the proposal not to exceed 500 words. Official forms for this purpose are available in the Office of the Graduate School. This information must be filed before the thesis final examination can be scheduled by the Graduate School. A schedule of deadline dates should be obtained from the Graduate School Office.

Individuals who have been granted the privilege of following this option are expected to demonstrate research competencies and to prepare a scholarly account of resulting data.

2. Non-thesis option—This plan is offered to the candidate who may benefit more from a broader range of knowledge than from the preparation of a thesis. The program of study must consist of a minimum of 54 credit hours of prescribed courses.

   Individuals who are following this plan must demonstrate their ability to do original research by preparing a paper as a part of the course *Special Problems* or *Research* or *Seminar* in the appropriate area. The quality of the written manuscript will be considered more important than the quantity of data gathered.

CORE COURSES FOR DEGREE PROGRAMS

Except for the Master of Science degree in Chemistry, all degree programs in Education, Agricultural Education, and Industrial Arts require a minimum of 12 hours of core courses in professional education. Courses included in this core are: Education 605 (Principles of Teaching), Education 606 (Curriculum), Education 631 (Educational Statistics), and Psychology 621 (Educational Psychology). In addition, Education 632 (Seminar) is required of the non-thesis candidate.

Although it is not considered a core requirement, a candidate will be expected to have earned credits in research, special problems, or independent study.

FINAL EXAMINATION

At least 4 weeks before a thesis or non-thesis candidate expects to complete all work for the graduate degree, he should file in the Graduate School Office, an application for a final examination. A candidate must pass a comprehensive examination covering the field of concentration as well as other graduate courses taken. These examinations may be oral, written or both. A candidate following the thesis program is required to defend successfully the subject matter of his thesis as part of the comprehensive examination.

APPLICATION FOR GRADUATION

An application for graduation must be filed in the office of the Graduate School at least 3 weeks prior to the close of the session in which the student expects to complete the requirements for the degree.

MASTER'S THESIS AND FORMAT

The following regulations are effective regarding a Master's Thesis and a thesis format:

1. A student writing a thesis must Register for the Course Thesis during the quarter in which he expects to take the Final Examination.

2. Three typewritten copies of the completed thesis must be submitted to the Dean of the Graduate School, together with two copies of an Abstract of the thesis. The Abstract should contain no less than 400 nor more than 500 words. Consult the Graduate School's calendar for deadline dates regarding submission of these manuscripts.

3. The candidate should purchase a *Manual For Preparing Theses and other Manuscripts*, available at the College Bookstore, to familiarize himself with details concerning type, ink, paper, and other related matters of format. Supplementary information is available from the Graduate School office.

LANGUAGE REQUIREMENT

A reading knowledge of one foreign language, preferably German, is required of all candidates for the Master of Science degree in Chemistry.

ACADEMIC POLICIES

Transfer of Credit. A maximum of 9 hours of transfer graduate credit may be accepted toward the master's degree if: (1) the credit has been earned within 6 years of the date on which the master's degree is conferred, (2) the work is acceptable as credit toward a comparable degree at the institution from which transfer is sought, and (3) the courses to be transferred are approved by the Dean of the Graduate School and Director of Admissions, A. and T. College.

To request a transfer, the student should complete an application in the Graduate School office. It will be the applicant's responsibility to write the appropriate institution(s) to request that a transcript of courses be sent to A. and T. College and to secure a statement from the Graduate School of said institution that the work is acceptable as credit toward a comparable degree.

Course Levels. All students will be expected to study their programs to make certain that courses taken for credit towards a degree will meet the minimum requirements of course levels. Only 500 and 600 numbered courses may be used in a graduate degree program. At least 50 per cent of courses chosen for the field of specialization or area of concentration must bear a 600 number; this total shall not include any courses the student may have taken to reduce undergraduate deficiencies or to effect a change in certificate areas.

Grading System. Grades are recorded by letters as follows: for courses, A, B, C, D, F, (failure); for thesis research, P (if thesis is in progress).

1. In order to earn a degree, a student must have a cumulative average of "B".
2. A student automatically goes on probation when his cumulative average falls below "B".
3. He will be dropped from the degree program if he earns more than twelve hours of grades below "B".
4. A student must repeat, not more than once, any required course in which he has made a grade of "D" or "F".

Non-Credit Courses. A student may register for "no credit" (NC) in any course if he has the approval of his advisor and the Chairman of the Department. In determining the total study load allowed, "NC" courses are counted at the equivalent credit value. The tuition charge for "NC" courses is the same as for credit courses, and the courses are listed on the student's permanent record. As no grade is reported by the instructor, no attendance records are maintained. "NC" registrants *cannot change* to become credit registrants after the deadline for credit registration has passed.

Auditing. Auditing privileges in which additional fees are waived are extended only to full-time students. To audit a course, the student must obtain permission from the Dean of the Graduate School and must submit the necessary forms during registration period. A change from "credit" registration to "Audit" will not be permitted following the close of a deadline date for change in program.

Schedule of Deadlines. The Graduate School provides schedules of specific dates for completing various requirements for a degree program. These notices are not sent to individuals automatically, but may be found in the calendar of the Graduate School available upon request.

Concurrent Registration in other Institutions. A student registered in a degree program in this Graduate School may not enroll concurrently in another graduate school except upon permission *secured in advance*, from the Dean of the Graduate School, A. and T. College.

Requests for Grade Reports, Transcripts or Record Evaluation. The Admissions Office is the official records-keeping office at the College. Requests for official statements regarding courses completed, grade reports or transcripts should be filed in that office.

Class Loads.

1. *Full-Time Students:* Class loads may range from 12 to 15 quarter hours of work during a regular session of the academic year.
2. *In-Service Teachers:* The maximum load for a fully employed in-service teacher is six quarter hours during any session of the academic year.
3. *College Staff:* The maximum load for any full employed staff member will be the same as for an in-service teacher.

RESIDENCE REQUIREMENTS

A minimum of 36 hours must be earned in residence study at the College for students following the thesis program, and 45 hours for non-thesis candidates.

TIME LIMITATION

The graduate program must be completed within six successive calendar years. Programs remaining incomplete after this time interval are subject to cancellation, revision, or special examination for out-dated work. Credit transferred from another institution becomes void if it falls within a cancelled period of the student's program.

When the program of study is interrupted because the student has been drafted into the armed services, the time limit shall be extended for the amount of time on active duty, if the candidate resumes graduate work no later than one quarter following release from military service.

GRADUATE RECORD EXAMINATION

The Graduate Record Examination is required of all students who desire to become *candidates for degrees.* Students should apply directly to Educational Testing Service, 20 Nassau Street, Princeton, New Jersey, for permission to take the following two examinations:

Aptitude Test

Advanced Test in Education (Some departments may require an advanced test other than Education.)

Several centers have been established throughout the United States to administer the GRE at various times during the year. Additional information may be obtained in the Office of the Dean, Graduate School.

PROGRAMS FOR THE MASTER'S DEGREE

MASTER OF SCIENCE DEGREE IN AGRICULTURAL EDUCATION

The Department of Agricultural Education offers work leading to the Master of Science degree. Admission to the program requires that an applicant must have completed an undergraduate major in agriculture from an accredited four-year college and show evidence that he meets requirements for a collegiate teacher's certificate in Agricultural Education. Candidates for the Master's degree must complete a minimum of 12 credit hours in professional education courses to include Education 605, 606, 631, and Psychology 621.

General Requirements for the Degree

The student who writes a thesis must complete a minimum of 15 hours in agricultural education selected from the following: Agricultural Education 601, 602, 603, 604, 605 and 606, or other prescribed courses on the 500 level. A minimum of 18 hours of graduate-level technical agricultural courses, to include thesis research, are required for the degree and must be selected from the areas of Agricultural Economics, Animal, and Plant Sciences. No more than six hours in special problems courses may be used in satisfying the requirements for the degree.

The student not writing a thesis must complete Education 632 and six hours in elective work in addition to the above requirements in professional education, agricultural education, and technical agricultural courses.

MASTER OF SCIENCE DEGREE IN CHEMISTRY

The Department of Chemistry offers the degree, Master of Science in Chemistry. In addition to this program, the department provides instruction for those graduate students who wish to pursue a curriculum that could lead toward a degree in Education with specialization in Chemistry, or General Science. Individuals who desire to renew teaching certificates in the field may also enroll in certain courses in the department for this purpose.

Applicants to the program, Master of Science in Chemistry, may be granted unconditional admission if the following minimum requirements have been met: 1) applicant must hold a baccalaureate degree in chemistry or its equivalent from an institution of recognized standing, 2) the undergraduate program must have included one year of physical chemistry in which one year of differential and integral calculus were taken as prerequisites, and 3) have a cumulative quality point average of at least 2.6 on the 4.0 system.

General Requirements for the Degree

A candidate for the Master of Science degree in Chemistry must: 1) be unconditionally admitted to the degree program, 2) take the Graduate Record Examination (the aptitude test and the advanced test in Chemistry). Scores must be submitted to the Graduate School Office before admission to the final examination can be granted, 3) take the qualifying examination after successfully completing at least 12 hours of graduate level courses in chemistry, 4) pass a foreign language examination in German, 5) complete a minimum of 45 quarter hours of prescribed studies in which at least 30 hours must be in chemistry, 6) pass a comprehensive (final) examination

in the subject field, and 7) present an acceptable thesis to the Graduate School.

The program of study must include a minimum of five quarter hours of prescribed work from each of the following branches: *analytical chemistry, inorganic chemistry, organic chemistry,* and *physical chemistry.* Other graduate courses offered by the department may also be used in meeting the requirements for this degree.

Candidates for the degree, Master of Science in Chemistry, who desire to teach in the public schools of North Carolina on a graduate certificate should refer to the teacher education requirements listed under the Department of Education and Psychology.

MASTER OF SCIENCE DEGREE IN EDUCATION

The Department of Education and Psychology offers the degree, Master of Science in Education. This program is designed for the individual who wishes to seek a graduate certificate to teach, or serve in an administrative capacity in the public schools of North Carolina.

Areas of concentration included in this degree program are: (1) Elementary Education, (2) Administration and Supervision, (3) Guidance, and (4) Secondary Education.

> Unconditional admission to either of the programs indicated above will be granted if the applicant's undergradnate record meets scholastic standards, and he holds or is preparing to hold a North Carolina's Class "A" certificate in the field of his specialized area of teacher education.

General Requirements for the Degree

1. *Elementary Education Curriculum:** This program requires that the candidate complete the core curriculum in education and earn at least 27 hours in academic courses distributed in the areas of: language arts, social studies, sciences, mathematics, arts, and health and physical education. In addition, Education 632 and electives to total 15 hours are needed for the non-thesis degree program. The thesis option requires credit for Education 699 (Thesis Research) and electives to total 6 hours.

2. *Educational Administration Curriculum:* Students pursuing this area of concentration are not eligible for a graduate teaching certificate. This program is designed for those who are interested in qualifying for a principal's or supervisor's certificate.
   The basic curriculum for this program requires that the candidate complete: (1) 12 hours of core courses in education, (2) 15 hours of administration and supervision courses, and (3) 3 hours in a social science course. In addition, Education 607, 608, 612, 623, 632, Guidance 501, Psychology 622, and 3 hours of an elective course must be completed if the non-thesis plan is followed. The thesis option requires the completion of: (1), (2), and (3), described above plus credits earned in Education 612, 699 (Thesis Research), Guidance 501, Psychology 622, and 3 hours in an elective course.

3. *Guidance Curriculum:* This program in Education is designed for the individual who is seeking to qualify for a School Counselor's Certificate. Eighteen hours must be earned in Education 606, 631, Psychology 501, 621. Sociology 502 (or Education 623), and Economics 601. Guidance courses to total 23-25 hours must include 501, 602 or 603, 604, 605, 607, 608, and 609 (or Education 632). Other courses include Psychology 622, Special Education 504, and 6-9 hours of prescribed electives.

4. *Secondary Education Curriculum:** Candidates following the secondary education program must select one of the following academic areas of concentration: (1) Biology, (2) Chemistry, (3) English, (4) French (5) Mathematics, (6) History, (7) Science, or (8) Social Science. The program chosen requires that the candidate complete the core curriculum in Education and earn at least 27 quarter hours in courses prescribed for the area of concentration. In addition, Education 632 (Seminar) and electives to total 15 hours are needed for the non-thesis program. The thesis option requires credit for Education 699 (Thesis Research) and electives to total 6 hours.

MASTER OF SCIENCE DEGREE IN INDUSTRIAL EDUCATION

The Department of Industrial Education offers the degree, Master of Science in Industrial Education. Admission to the program requires that the applicant hold a baccalaureate degree from an accredited four-year college in Industrial Arts or Industrial Education or show evidence that he meets requirements for a collegiate teacher's certificate in Industrial Education in the state for which he was prepared to teach. The student pursuing the Master's degree program in Industrial Education must complete the following courses in professional education: Education 605, 606, 631, and Psychology 621.

General Requirements for the Degree

The student who writes a thesis must complete 18 hours in industrial arts courses to be selected from the following: I. A. 506, 507, 508, 509, 510, 511, 608, 609, 611, 613, 614, and 623. In addition to the above requirements, at least 15 hours must be earned in industrial education to include: I. Ed. 606, 699, and the remaining credits may be earned in I. Ed. 502, 504, 520, 521, 605, and 631.

The student not writing a thesis must complete 24 hours in industrial arts courses to include: I. A. 612 and the remaining credits may be earned in I. A. 506, 507, 508, 510, 511, 608, 609, 611, 613, 614, and 623. In addition, 18 hours in industrial education must be completed to include I. Ed. 606, and the balance of these credits must be earned from I. Ed. 502, 504, 520, 521, 604, 605, 624, and 631.

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* Effective for students matriculating since September 1, 1962. Others may obtain a degree according to the requirements listed in a College Bulletin in effect no earlier than six calendar years before the date of anticipated graduation.

DEPARTMENTS OF INSTRUCTION

Agricultural Economics and Rural Sociology

Howard F. Robinson, Chairman
Office: 224 Carver Hall

COURSES IN AGRICULTURAL ECONOMICS

Advanced Undergraduate and Graduate

502. Agricultural Policy. Credit 3(3-0)
The place of agriculture in a national and international economy; the impact of public policy on agriculture, an analysis of policy as it relates to the price support program, farm credit, international trade, aid to low income farmers, and resources development.

503. Farm Cost Accounts. Credit 3(2-2)
A study of records needed to determine the relative profitability of various agricultural enterprises, setting up and keeping running accounts of the farm business, interpretation and use of accounts in farm management.

504. Commodity Marketing Problems. Credit 3(3-0)
Economic problems arising out of the demand, supply and distribution of specific agricultural commodities; the price making mechanism, marketing methods, grades, values, price, cost, and governmental policy. Not more than two commodities will be studied in any one quarter. Selection of commodities and emphasis on problem areas will be made on the basis of current need; commodities studied will be cotton, tobacco, fruits and vegetables, and grains. Prerequisite: Ag. Econ. 331.

506. Seminar in Marketing Farm Products. Credit 2(2-0)
Discussion, reports, consultation and research efforts which throw light on marketing problems of low income farmers in North Carolina, including National and International importance of locally grown products such as tobacco and cotton.

508. Special Problems in Agricultural Economics. Credit 3(3-0)
Designed for students who desire to work out special problems in the field of agricultural economics; problem definition and formulation; developing thesis proposals.

509. Advanced Farm Management. Credit 3(2-2)
Methods of research, plans, organization, and the application of principles as they relate to farm management. Part of the students' time will be spent on the college farm.

510. Seminar in Agricultural Economics. Credit 2(2-0)
Discussion reports and an appraisal of current literature on agricultural problems. Consent of instructor.

511. Agricultural Economics Research. Credit 3(3-0)
Review of different types of research methodology used in the field of Agricultural Economics.

532. Agricultural and Social Statistics. Credit 4(3-2)
(Formerly Ag. Econ. 132a.)
Making use of census data, statistical methods, calculating machines used extensively. Prerequisites: Ag. Econ. 222, Econ. 310, or Soc. 231.

533. Agricultural and Social Statistics. Credit 4(3-2)
(Formerly Ag. Econ. 132b.)
This course is a continuation of Ag. Econ. 532.

542. Financing Agriculture. Credit 3(3-0)
(Formerly Ag. Econ. 142.)
Risks and uncertainty as applied to agriculture, the role of agricultural credit in a money economy, classification of credit, principles underlying the economic use of farm credit, primary lending agencies in North Carolina, and the growth of Federal Lending agencies in the farm credit field. Prerequisite: Ag. Econ. 222.

551. Southern Resources in a Changing Economy—*A Seminar.* Credit 3(3-0)
Trends and the formulation of economic and social problems in the South and particularly in North Carolina; labor and capital mobility, agriculture as compared with industry, the problem of underemployment, and important phases of current economic development. Prerequisites: Economics 310, Sociology 231 or Ag. Econ. 222.

COURSES IN RURAL SOCIOLOGY

Advanced Undergraduate and Graduate

501. Rural Social Problems. Credit 3(3-0)
Population, education, religion, health, land tenure, parity income, farm labor and mechanization, and housing.

502. Rural Leadership. Credit 3(3-0)
Opportunities and needs for rural leadership; educational and psychological requirements for various types of rural leaders.

503. The Rural Family. Credit 3(3-0)
The institutional nature of the rural family, etc., role in the community including its relations to educational, religious, welfare and other community organizations.

505. Rural Standards of Living. Credit 3(3-0)
Consumption behavior in the main community groups of our society.

506. Special Problem in Rural Sociology. Credit 2 to 4 hours
Work on a problem in rural sociology under the guidance of a member of the faculty.

Agricultural Education

Clarence E. Dean, Chairman
Office: 268 Carver Hall

Advanced Undergraduate and Graduate

502. Adult Education in Vocational Agriculture. Credit 3(3-0)
Principles and problems of setting up and directing adults with emphasis on conducting organizing instruction.

503. Adult Education in Agricultural Education. Credit 3(3-0)
The latest techniques and methods of teaching adults in agricultural education.

504. The Principles of Agricultural Education. Credit 3(3-0)
The principles and practices in agricultural education as revealed by research and new trends.

505. Guidance and Group Instruction in Vocational Agriculture. Credit 3(3-0)
Guidance and group instruction applied to agricultural occupations and other problems of students in vocational agriculture.

506. Problem Teaching in Vocational Agriculture. Credit 3(3-0)
Setting up problems for teaching unit courses in vocational agriculture.

507. Public Relations in Vocational Agriculture. Credit 3(3-0)
The means and methods of promoting and publicizing the local program of vocational agriculture.

COURSES FOR GRADUATES ONLY

601. Administration and Supervision. Credit 3(3-0)
Administrative and supervisory problems of vocational agriculture, the practices and policies of local, state and federal agencies dealing with administration and supervision of vocational agriculture.

602. Program Planning in Vocational Agriculture. Credit 3(3-0)
Consideration is given to the community as a unit for program planning in agricultural education. Special emphasis on collecting and interpreting basic data, formulating objectives, developing and evaluating community programs.

603. History of Vocational Agriculture. Credit 3(3-0)
A brief review of vocational education in Europe and America; special attention is given to vocational agriculture as it has developed in the United States.

605. Public Relations in Agriculture. Credit 3(3-0)
The means and methods of promoting and publicizing local programs in agriculture.

606. Research in Vocational Education. Credit 3(3-0)
A research problem is developed under the supervision of the staff.

607. Philosophy of Vocational Education. Credit 3(3-0)
This course deals with the underlying philosophy and basic principles of vocational education. Emphasis is placed upon the factors contributing to the nature, purpose, scope, organization, and administration of the vocational education in agriculture.

608. Seminar in Agricultural Education. Credit 3(3-0)
Includes a review of current problems and practices in the field of agricultural education.

609. Method and Techniques of Supervisors of Agricultural Education. Credit 3(3-0)
The course includes the common methods and techniques that should be used in setting up and supervising agricultural education on state and local levels. In addition, the course will include supervision of student teaching.

610. Decent Developments and Trends in Agricultural Education. Credit 3(3-0)
The course includes an intensive treatment of the various subject matter fields to keep teachers up to date technically as well as professionally. It is designed to cover the developments and trends in agricultural education.

611. **Recent Developments and Trends in Agricultural Education.** Credit 3(3-0)
A continuation of Agricultural Education 610 (Formerly 610b).

612. **Community problems in Agriculture.** Credit 3(3-0)
Finding the common problems of the community that relate to agricultural and developing solutions. (Formerly Agricultural Education 604.)

699. **Thesis Research in Agricultural Education.** Credit 3-5

Animal Industry

W. L. Kennedy, Chairman
Office: Ward Hall

COURSES IN ANIMAL HUSBANDRY

Advanced Undergraduate and Graduate

501. **Animal Nutrition.** Credit 5(5-0)
Metabolism of carbohydrates, fats, proteins and minerals; net energy values and application to new theories of feeding.

502. **Seminar.** Credit 1(1-0)
A review of current literature related to Animal Husbandry.

503. **Seminar.** Credit 1(1-0)
A continuation of Animal Husbandry 502.

504. **Special Problems.** Credit 3(3-0)
(Formerly A. H. 503.)
Special assignments in the advanced phases of any of the lines of animal production and meats. Students will elect work in desired subjects after conference with the instructor in charge. Prerequisite: Three courses in Animal Husbandry.

513. **Advanced Livestock Management.** Credit 3(3-0)
Special work in problems dealing with feeding, breeding, and management in the production of beef cattle.

514. **Advanced Livestock Management.** Credit 3(3-0)
A continuation of Animal Husbandry 513 with emphasis on sheep.

515. **Advanced Livestock Management.** Credit 3(3-0)
A continuation of Animal Husbandry 514 with emphasis on swine.

FOR GRADUATE STUDENTS ONLY

607. **Meat Selection.** Credit 3(3-0)
Identification, grading, and cutting of meats.

618. **Meat Production.** Credit 3(3-0)
This course is designed for those individuals whose interests are concerned with the factors that determine quality in meats as a guide to selection and purchasing. Also cutting, wrapping, freezing and meat cookery will be considered.

619. **Advanced Livestock Marketing.** Credit 3(3-0)
A special study of advanced research in beef cattle with emphasis on breeding, nutrition selection, marketing and management.

620. Sheep Production and Management. Credit 3(3-0)
Nutrition, breeding, management and marketing of lamb and mutton will be considered.

COURSES IN DAIRY HUSBANDRY

Advanced Undergraduate and Graduate

501. Dairy Seminar. Credit 1(1-0)
Assignment of papers on subjects relating to the dairy industry and methods in preparing and presenting such papers.

502. Dairy Seminar. Credit 1(1-0)
Continuation of D. H. 501.

504. Special Problems. Credit 3(3-0)
Assignment of work along special lines in which a student may be interested, given largely by the project method for individuals either in Dairy Manufacturing or Dairy Husbandry. Prerequisite: Three dairy subjects.

FOR GRADUATE STUDENTS ONLY

610. Advanced Dairy Farm Management. Credit 3(3-0)
Dairy farm operations; rations; feeding and care of the herd; selecting and grading the herd; herd sires; testing for production; barns and equipment; marketing; cost of production.

COURSES IN POULTRY HUSBANDRY
FOR ADVANCED UNDERGRADUATES AND GRADUATES

501. Poultry Seminar. Credit 1(1-0)
Special articles and reports on subjects relating to the poultry industry will be assigned each student with round table discussion.

502. Poultry Nutrition. Credit 3(2-2)
Techniques for determining the nutritive requirement of poultry and the biological analysis of feedstuffs for poultry.

503. Marketing Poultry Products. Credit 3(2-2)
Function of marketing agencies and relation to marketing costs. Types and location of markets with respect to production. Function of storage, market reporting, and marketing controls.

504. Poultry Plant Management. Credit 3(2-2)
Consideration involved in establishing a poultry enterprise. Economics and management factors involved in the operation of specialized poultry breeding, egg, and meat farms.

FOR GRADUATE STUDENTS ONLY

601. Poultry Research. Credit 3 to 5

ART

LeRoy F. Holmes, Chairman
Office: 110 Frazier Hall

Advanced Undergraduate and Graduate

501. Public School Art. Credit 3(3-0)
Study of materials, methods and procedures in teaching art in the public schools. Special emphasis is placed on selection and organization of materials, seasonal projects, the lesson plan and correlation, lectures, demonstrations, assigned readings. Summer and Spring Quarters.

502. Drawing and Painting for Graduate Students. Credit 3(0-6)
Study of basic consideration of line-form content-technique. Summer Quarter.

503. Seminar In Art History. Credit 3(3-0)
This course is a round table discussion with student reports. Prerequisite: Consent of the instructor.

504. Studio Techniques. Credit 3(0-6)
Lectures, demonstrations that illustrate and describe the properties and use af varied media. As a point of departure for individual expression, these techniques are analyzed and discussed.

505. Advanced Ceramics. Credit 3 3(0-6)
Advanced studio problems and projects in ceramics with emphasis on independent creative work. Opportunities for original research. Prerequisite: Art 338.

506. Printmaking. Credit 3 3(0-6)
Investigation of traditional and experimental methods in printmaking. Advanced studio problems in woodcutting, etching, lithography, and serigraphy. Prerequisite: Art 330, 331.

507. Sculpture. Credit 3 3(0-6)
Exploring methods of using various materials such as clay, plaster, and metals with emphasis on the design and prodution of sculpture. Prerequisite: Art 338.

508. Project Seminar. Credit 3 3(0-6)
Advanced specialized studies in creative painting, design, and sculpture. By means of discussion and suggestions this seminar intends to solve various problems which might arise in each work. Prerequisite: Consent of the instructor.

BIOLOGY

Artis P. Graves, Chairman
Office: 306 Noble Hall

COURSES FOR ADVANCED UNDERGRADUATES AND GRADUATES

Bacteriology

501. Principles and Practices of Immunology. Credit 3(3-0)
In this course the fundamental mechanism of immunological reactions and their theoretical foundations will be studied. Selected lectures will deal with antigenic and chemical composition of certain microorganisms and methods of laboratory practice, including some clinical applications. Prerequisite: Bacteriology 123.

Botany

504. Special Problems in Botany. Credit 3(3-0)
Open to advanced students in botany for investigation of specific problems.

505. Plant Biology. Credit 4(3-2)
A presentation of fundamental botanical concepts to broaden the background of high school biology teachers. Bacteria, fungi and other microscopic plants will be considered as well as certain higher forms of plants. This course will consist of lectures, laboratory projects and field trips.

General Science

506. General Science for Elementary Teachers. Credit 3(3-0)
This course will consider some of the fundamental principles of the life and physical sciences in an integrated manner in the light of present society needs.

Zoology

501. Special Problems in Zoology. Credit 3(2-2)
Open to advanced students in biology for investigation of specific problems. Consent of instructor required.

502. Mammalian Biology. Credit 3(3-0)
Study of the evolutionary history, classification, adaption and variation of representative mammals with special emphasis on the prenatal variations in prototherian, metatherian and eutherian types. Prerequisites: Zoology 111 and Botany 111.

503. Biology of Sex. Credit 3(3-0)
Lectures on the origin and development of the germ cells and reproductive systems in selected animal forms. Prerequisites: Zoology 111, 112 or equivalent.

504. Cytology. Credit 3(3-0)
Study of the cell with lectures and periodic student reports on modern advances in cellular biology. Prerequisite: 132 or special consent of instructor.

505. General Microtechnique. Credit 4(2-4)
Designed to develop skills in the preparation of cells, tissues and organs for microscopic observation and study. Prerequisites: Zoology 111, 112 or equivalent.

507. Experimental Embryology. Credit 3(3-0)
A comprehensive lecture-seminar course covering the literature of experimental embryology and developmental physiology. Studies treating with amphibian, chick and rodent development are designed laboratory projects. Consent of instructor required.

508. Animal Biology. Credit 4(3-2)
A lecture-laboratory course stressing fundamental concepts and principles of biology with the aim of strengthening the background of high school science teachers. Emphasis is placed on the principles of animal origin, structure, function, development, and ecological relationships.

COURSES FOR GRADUATES ONLY

Biology

601. Projects in Biology. Credit 2(0-4)
This course will consist of student-participation in project developments, some of the experimental nature, that might be utilized by High School Biology Teachers in classroom activities.

602. Seminar in Biology. Credit 1(1-0)
Discussion of concepts and research in animal and plant biology.

Botany

611. Essentials of Plant Anatomy. Credit 4(3-4)
A study of the growth, development and organization of roots, stems leaves, and reproductive organs of higher plants. Lectures, discussions, field trips, and the laboratories are employed in the presentation of this course.

612. Applied Plant Ecology. Credit 4(3-4)
Relations of plants to their environment with emphasis on climate and soil factors influencing their structure, behavior and distribution. Prerequisite: Botany 505, 611 or equivalent.

Zoology

606. Nature Study. Credit 3(2-2)
(Formerly Zoology 506.)
A study of diversified organisms, their habitat, life histories, defenses, sex relationships, periodic activities and economic values designed to acquaint the student with fundamental knowledge that should lead to a fuller appreciation of nature.

611. Applied Invertebrate Zoology. Credit 4(3-4)
A study of the lower groups of animals, especially insects and their economic importance to the southeastern region. Lectures, field trips, and experimental work with local animals are stressed, as well as factors affecting growth, development and behavior. Prerequisite: Zoology 508 or equivalent.

612. Fundamentals of Vertebrate Morphology. Credit 4(3-4)
A study of the morphological evolution of the chordate animals from a comparative aspect, with lecture-demonstrations of dissected organ systems of the frog and cat. Reference to man is made to give this course a human approach. Prerequisite: Zoology 508 or equivalent.

613. Basic Protozoology. Credit 4(3-4)
The biology of free-living and parasitic protozoa with special emphasis on structure, behavior, life histories and classification. Special attention will be given to free-living forms from such local animals as fish, frogs and wild rodents. Prerequisite: Zoology 508.

614. Introductory Experimental Zoology. Credit 4(3-4)
Studies on fertilization, breeding habits, regeneration, growth and differentiation of certain invertebrates and vertebrates from the experimental approach. Emphasis will be placed on laboratory procedures on the frog and the chick.

615. Invertebrate Biology for Elementary and Secondary School Teachers. Credit 3(3-0)
A study of representative invertebrate groups with emphasis on origin, structure, function, classification, and ecological relationships.

CHEMISTRY

Gerald A. Edwards, Chairman
Office: Hines Hall Annex

FOR ADVANCED UNDERGRADUATES AND GRADUATES

501. **Inorganic Chemistry.** Credit 3(3-0)
(Formerly 511.)
A lecture course covering selected topics in Inorganic Chemistry; designed for science teachers having a limited background in Chemistry. Prerequisite; Chemistry 103. Not accepted for credit toward a degree in Chemistry.

502. **Organic Chemistry.** Credit 3(3-0)
(Formerly 512.)
A lecture course covering selected topics in Organic Chemistry; designed for science teachers with a limited background in chemistry. Prerequisite: Chemistry 103. Not accepted for credit toward a degree in Chemistry.

503. **Advanced General Chemistry.** Credit 5(4-2)
(Formerly 513.)
A lecture-laboratory course in which the laws and concepts of chemistry are presented with greater depth and clarity than in customary general chemistry courses.

504. **Recent Advances in Chemistry.** Credit 3(3-0)
(Formerly 514.)
A lecture-demonstration course in which recent occurrences in the major branches of chemistry and chemical education are presented. The course includes a series of student seminars resulting from library research on topics considered in the class.

505. **Industrial Chemistry.** Credit 5(5-0)
(Formerly Chem. 641.)
A review of the industrial production of chemical substances and the application of chemistry to various industrial processes.

510. **Inorganic Synthesis.** Credit 1-3(0-2 to 6)
(Formerly 153.)
Discussion of theoretical principles of synthesis and development of manipulative skills. Prerequisites: One year of Organic Chemistry and two quarters of Quantitative Analysis.

511. **Advanced Inorganic Chemistry.** Credit 3(3-0)
(Formerly 151, 551.)
A sequence course in the theoretical approach to the systematization of inorganic chemistry. Prerequisite: Two quarters of Physical Chemistry.

512. **Advanced Inorganic Chemistry.** Credit 3(3-0)
(Formerly Chem. 152 and 552.)
A continuation of Chemistry 511.

524. **Qualitative Organic Chemistry.** Credit 5(3-4)
A course in the systematic identification of organic compounds, Prerequisite: One year of Organic Chemistry.

531. **Instrumental Methods of Analysis.** Credit 5(2-6)
A study of the theory and the operational features of some of the more important instruments that are currently being used as analytical tools such

as U.V., visible-light, and infrared spectrophotometers, electroanalytical instruments, thermometric titrators, fluorimeters, etc. Prerequisite: Chemistry 431 or equivalent.

541. Radiochemistry. Credit 5(3-4)
(Formerly 155 or 555.)
A study of the fundamental concepts, processes, and applications of nuclear chemistry, including natural and artificial radioactivty, sources, and chemistry of the radioelements. Open to advanced majors and others with sufficient background in chemistry and physics. Prerequisites: Chemistry 442 or Physics 380.

542. Radioisotope Techniques and Applications. Credit 3(1-4)
(Formerly 156 or 556.)
The techniques of measuring and handling radioisotopes and their use in chemistry, biology, and other fields. Open to majors and non-majors. Prerequisite: Chemistry 103 or 104.

543. Introduction to Quantum Mechanics
Discussion of Quantum theory wave mechanics and its application to simple systems; the variation method; valence bond and molecular orbital methods. Prerequisite: Math. 223, Physics 203, and Chemistry 442 prior or concurrent.

551. General Biochemistry. Credit 5(3-4)
(Formerly 148)
A lecture and laboratory course describing the chemical composition, reactions, and metabolic significance of lipids, carbohydrates, proteins, vitamins, hormones, enzymes, minerals and water. Prerequisite: Chemistry 223, 332, and 442.

COURSES FOR GRADUATES ONLY

601. Seminar Credit 1(1-0)
(Formerly Chemistry 645.)
Presentation and discussion of library or laboratory research problems.

602. Chemical Research Credit 1-15
(Formerly Chemistry 646.)
A course designed to permit qualified students to do original research in chemistry under the supervision of a senior staff member.

611. Structural Inorganic Chemistry Credit 3(3-0)
A study of the stereochemistry of inorganic substances; the relationship of structure to properties; and a discussion of experimental methods. Prerequisite: Chemistry 512.

615. Special Problems in Inorganic Chemistry Credit 2-5
(Formerly Chemistry 640)
A laboratory course designed to introduce the student to the techniques of chemical research by solving minor problems in inorganic chemistry. May be repeated to total six credit hours.

616. Selected Topics in Inorganic Chemistry Credit 3(3-0)
A lecture course on advanced topics in inorganic chemistry. Prerequisite: Chemistry 512 or permission of the instructor.

621. Elements of Organic Chemistry Credit 5(4-2)
A systematic study of the classes of aliphatic and aromatic compounds and individual examples of each. Structure, nomenclature, synthesis, and characteristic reactions will be considered. Illustration of the familiarity

of organic substances in every day life will be included. In the laboratory preparation and characterization reaction will be performed.

622. Advanced Organic Chemistry Credit 3(3-0)
Recent developments in the areas of structural theory, stereochemistry, molecular rearrangement and mechanism of reactions of selected classes of organic compounds. Prerequisite: One year of organic chemistry.

623. Advanced Organic Chemistry Credit 3(3-0)
Continuation of Chemistry 622.
Prerequisite: Chemistry 622.

624. Organic Reactions Credit 2-5
An advanced treatment of organic reactions designed to give the student a working knowledge of the scope and limitations of the important synthetic methods of organic chemistry. Prerequisite: Two quarters of Advanced Organic Chemistry.

625. Special Problems in Organic Chemistry Credit 2-5
(Formerly Chemistry 643.)
A laboratory course designed to introduce the student to the techniques of chemical research by solving minor problems in Organic Chemistry. May be repeated to total five credit hours.

626. Selected Topics in Organic Chemistry Credit 3(3-0)
A lecture course on advanced topics in organic chemistry.

627. Organic Preparations Credit 1-3
An advanced laboratory course. Emphasis is placed on the preparation and purification of more complex organic compounds. Prerequisite: One year of organic chemistry. May be repeated to total three credit hours.

631. Modern Analytical Chemistry Credit 5(4-1)
(Formerly Chemistry 611)
The theoretical bases of analytical chemistry are presented in detail. In the laboratory these principles together with a knowledge of chemical properties are used to identify substances and estimate quantities in unknown samples.

632. Advanced Analytical Chemistry Credit 3(3-0)
(Formerly Chemistry 613)
A two quarter lecture course in which the theoretical bases of analytical chemistry and their application in analysis will be reviewed with greater depth than is possible in the customary undergraduate course. Equilibrium processes including proton and electron transfer reactions and matter-energy interactions will be considered. Prerequisite: One year of analytical chemistry.

633. Advanced Analytical Chemistry Credit 3(3-0)
Continuation of Chemistry 632.

634. Electrometric Measurements Credit 3(1-4)
(Formerly Chemistry 614)
An advanced laboratory course designed to accompany or follow the courses in advanced analytical chemistry. It will include pH measurements, potentiometric conductometric, and amperometric titrations and polarographic measurements. Prerequisites: One year of analytical chemistry or permission of the Chemistry Department.

635. Special Problems in Analytical Chemistry Credit 2-5
(Formerly Chemistry 642.)
A laboratory course designed to introduce the student to the techniques of chemical research by solving minor problems in analytical chemistry. May be repeated to total six credit hours.

636. Selected Topics in Analytical Chemistry Credit 3(3-0)
A lecture course on advanced topics in analytical chemistry.

641. Principles of Physical Chemistry Credit 5(4-3)
(Formerly Chemistry 631)
A review of the fundamental principles of physical chemistry, including the derivation of the more important equations and their application to the solution of problems.

642. Principles of Physical Chemistry Credit 5(4-3)
Continuation of Chemistry 641. May be taken concurrently with Chemistry 641.

643. Chemical Thermodynamics Credit 3(3-0)
(Formerly Chemistry 633.)
An advanced course in which the laws of thermodynamics will be considered in their application to chemical processes. Prerequisite: Two quarters of Physical chemistry.

644. Chemical Spectroscopy Credit 4(3-2)
(Formerly Chemistry 635)
An advanced course in which the principles and applications of spectroscopy will be considered. Prerequisite: One year of physical chemistry.

645. Special Problems in Physical Chemistry Credit 2-5
(Formerly Chemistry 644)
A laboratory course designed to introduce the student to the techniques of chemical research by solving minor problems in physical chemistry. May be repeated to total six credit hours.

646. Selected Topics in Physical Chemistry Credit 3(3-0)
A lecture course on advanced topics in Physical chemistry.

647. Electrochemistry Credit 3(3-0)
A study of the principles and applications of electrochemistry. Prerequisite: One year of physical chemistry.

648. Colloid Chemistry Credit 3(3-0)
(Formerly Chemistry 637.)
A study of the types of colloidal systems and the fundamental principles governing their preparation and behavior. Prerequisite: One year of physical chemistry.

649. Chemical Kinetics. Credit 3(3-0)
Theory of rate processes; application to study of reaction mechanisms. Prerequisite: Math 223 and Chemistry 443.

655. Special Problems in Biochemistry Credit 2-5
(Formerly Chemistry 639.)
A laboratory course designed to introduce the student to the techniques of chemical research by solving minor problems in Biochemistry. May be repeated to total 6 hours.

656. Selected Topics in Biochemistry Credit 3(3-0)
A lecture course on advanced topics in Biochemistry.

699. Thesis Research Credit 3-5

Physical Science

Advanced Undergraduate and Graduate

501. Seminar in Physical Science for Elementary School Teachers. Credit 3(0-6)
Preparation, presentation, and demonstration of subject matter for elementary school science. This course provides opportunity for full discussion and for student participation. Prerequisite: Minimum of three years teaching experience in upper elementary grades.

EDUCATION AND PSYCHOLOGY

Charles L. Hayes, Chairman
Office: 201 Hodgin Hall

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Education

504. Materials and Methods in Teaching Reading Credit 3

This course deals with the application of principles of learning and child development to the teaching of reading and the related language arts.

505. Introduction to Adult Education Credit 3

History, philosophy, and general organization and administrational problems of adult education.

506. Methods in Adult Education Credit 3

Methods of informal instruction, group leadership, conference planning, and techniques in handling various issues of interest to adults. For persons preparing to conduct adult education programs as well as those preparing to serve as instructors or leaders in the public schools and/or in various agencies serving adults.

507. Principles of School Law Credit 3

Problems in school administration which may give rise to court action. North Carolina school law will be emphasized.

510. Library Usage for Classroom Teachers Credit 3(2-2)

A course designed to meet the needs of pre-service and in-service teachers in the study, collection, organization and graduation of instructional materials for educational materials centers at all grade levels. The course also included methods and techniques for library organization, library requisition practices, and library-classroom coordination of the instructional program.

Guidance

501. Introduction to Guidance Credit 3

(Formerly Guidance 601.)

An introductory course in guidance services designed for both guidance workers and classroom teachers. Special consideration given to the following topics: nature, scope, and principles of guidance services; techniques for appraising the traits and abilities of individuals; techniques for collecting information about the requirements for various educational, vocational, and avocational activities; counseling; group guidance; and evaluation of guidance services.

Psychology

501. Theory of Personality Development and Adjustment Credit 3

A course devoted to discussion of structional theories of personality and major theories of personality development from biological, cultural, and social points of view.

502. Digital Computer Programming. Credit 3(1-4)

A course for non-mathematics majors which provides both theory and practical experience in block programming, Programming, and computer operation. Permission of instructor required.

Special Education

501. Theory of Personality Development. Credit 3

An introductory course designed especially for classroom teachers. An over-view of the educational needs of exceptional or "different" children in the regular classroom situation. Emphasis will be placed on classroom techniques known to be most helpful to children having hearing losses, speech disorders, visual problems, emotional, social handicaps and intelli-

gence deviation, including slow-learners and gifted children. The course serves as an introduction to the area of special education.

502. Psychology of the Exceptional Child Credit 3
Analysis of psychological factors affecting identification and development of mentally retarded children, physically handicapped children, and emotionally or socially maladjusted children.

503. Teaching the Slower Learner in the Regular Classroom Credit 3
Materials and methods for adjusting instruction in arithmetic, spelling, language, reading to the slower learning child in heterogeneous classes. Consideration will be given to discussion and study of the unit and activity program and the drill and skill program in relation to it.

504. Measurement and Evaluation in Special Education Credit 3
Selection, administration, and interpretation of individual tests; intensive study of problems in testing exceptional and extremely deviate children. Consideration will be given to measurements and evaluation of children that are mentally, physically, and emotionally or socially handicapped. Emphasis will be placed upon the selection and use of group tests of intelligence and the interpretation of their results.

505. Mental Deficiency Credit 3
Survey of types and characteristics of mental defectives. Classification and diagnosis. Criteria for institutional placement. Social control of mental deficiency.

506. Materials, Methods, and Problems in Teaching Mentally Retarded Children Credit 3
Basic organization of programs for the education of the mentally retarded. Classification and testing of mental defectives. Curriculum development and principles of teaching intellectually slow children. Attention is also given to the provision of opportunities for observing and working with children who have been classified as mentally retarded.

FOR GRADUATE STUDENTS ONLY

Education

601. Theory of American Public Education Credit 3
Objectives, organization, development, administration, support and control of public education in the State.

604. Introduction to Graduate Study Credit 3
Methods of research, interpretation of printed research data, and use of bibliographical tools will be introduced. Emphasis will be placed on Graduate-study expectations.

605. Principles of Teaching Credit 3
A study of the status of teaching as a profession in the United States; teacher obligations, responsibilities and opportunities for leadership in the classroom and community with special emphasis on principles of and procedures in teaching.

606. Curriculum in the Elementary School Credit 3
A fundamental course in curriculum development designed to prepare the student for effective participation in cooperative efforts to improve the curriculum. Attention is directed to curriculum issues and to desirable instructional practices in the major areas of curriculum.

607. History of American Education Credit 3
A study of the historical development of education in the United States emphasizing educational concepts and practices as they relate to political,

social, and cultural developments in the growth of a system of public education.

608. Philosophy of Education Credit 3
A critical study of and a philosophic approach to educational problems. The nature and aims of education in a democratic society, relation of the individual to society, interests and disciplines, play and work, freedom and control, subject matter and method.

609. School Planning Credit 3
An examination of the principles governing the selection and landscaping of school grounds, location and design of buildings, and care of plant from standpoint of use, sanitation, health, and attractiveness.

610. Curriculum in the Secondary School Credit 3
A fundamental course in curriculum development designed to prepare the student for effective participation in cooperative efforts to improve the curriculum. Attention is directed to curriculum issues and to desirable instructional practices in the major curriculum areas.

611. Audio-Visual Aids Programs Credit 3
Recognizing, planning and organizing for the possible use of audio-visual aids as enriching experiences for students as participants in the informal type of classroom program evolving out of a unit of instruction.

612. Methods and Techniques of Research Credit 3
Careful analysis and study of research problems; techniques and methods of approach.

613. Organization of Audio-Visual Programs Credit 3
The overall aim of this course is to develop in the persons enrolled competence in the utilization and administration of audiovisual programs in individual schools, school systems, colleges and universities, non-academic organizations, community, and adult groups. The course is designed for persons who are or plan to become coordinators of audiovisual programs, school administrators, adult and or community group leaders, and classroom teachers.

614. Workshop in Audio-Visual Aids Credit 3
Designed for elementary and secondary school teachers, principals and supervisors in the resolution of problems associated with Audio-Visual Education. Offered in the 4th quarter of the year.

615. Problems and Trends in Teaching Social Sciences Credit 3
Survey of major problems in the broad field of Social Studies and consideration of improved ways of presentation and class economy, including lesson plans, assignments, visual aids, and other means of facilitating learning.

616. Problems and Trends in Teaching Science Credit 3
Attention to major problems of the high school teacher of Science. Lessons plans, assignments, tests, etc., constructed and administered by each student in class. Visual aids, demonstrations and laboratory techniques carried out.

619. School Publicity and Public Relations Credit 3
Study of the interrelationships between the lay community and the schools. Appraisal and procedures, actual or proposed for improvement of the relationships.

623. Educational Sociology Credit 3
The school as a social institution, school-community relations, social control of education, and structure of school society.

624. Administration of The Elementary School Credit 3
Role of the elementary school principal; administrative structure and policies, curriculum development, guidance, and in-service education of teachers.

625. Supervision of the Elementary School Credit 3
The nature, theory and practice of supervision, and the supervisor's role in improvement of instruction.

626. High School Administration Credit 3
A basic professional course for the principalship and for other administrative positions in junior high schools, senior high schools, and junior colleges. The materials adapted to the needs of those holding positions of these types and to experienced teachers who desire to prepare for such positions.

627. High School Supervision Credit 3
A study of problems, techniques, and materials in the improvement of instruction in secondary schools. A course for principals, heads of departments, and supervisors.

628. Introduction to Adult Education Credit 3
A basic course dealing with the history, purpose, and scope; problems of administration, legislation; and need developments in adult education.

629. Methods in Adult Education Credit 3
(Formerly 628b)
Methods of informal instruction, group leadership, conference planning, and techniques in handling various issues of interest to adults.

630. Pupil Personnel Administration Credit 3
(Formerly Ed. 629)
Pupil accounting, records and reports, financial reports, school census, special school records, pupil adjustment and progress, health and safety and legal aspects of pupil administration.

631. Educational Statistics Credit 3
A course designed to develop the student's command of the essential vocabulary, concepts, and techniques of descriptive statistics as applied to problems in education and psychology.

632. Seminar in Educational Problems Credit 3
Intensive study, investigation, or research in selected areas of education; reports and constructive criticism. Prerequisites: A minimum of 39 hours in prescribed graduate courses, and consent of instructor.

633. The Community College and Post-secondary Education Credit 3
Philosophy, organization, and character of school programs needed to meet educational needs of individuals who desire to continue their education on the post-secondary level. Special attention is given to the trends in developing community colleges. Prerequisites: Ed. 605, 606; Psy. 621 or three or more years of teaching experience.

634. Principles of College Teaching Credit 3
Principles involved in teaching at the college level; techniques of teaching aids; criteria used in evaluation. Prerequisite: Phy. 621.

635. Supervision of Student Teachers Credit 3

A basic professional course for classroom teachers, principals, and supervisors who serve in an official capacity directing the field-laboratory experiences of student teachers.

639. Issues in Elementary Education Credit 3

A critical review of the background and functions of the elementary school as a social institution. Attention is given to increasing the ability to formulate the generalizations of development and learning into a meaningful framework for appraising current educational thinking and practice and predicting the direction in which these must move if elementary school programs are to continue to improve.

640. Issues in Secondary Education Credit 3

(Formerly Ed. 639S)

An analysis of the role of the high school as an educational agency in a democracy. Attention is given to: (1) philosophical, Psychological, and sociological bases for the selection of learning erperiences; (2) contrasting approaches to curriculum construction; (3) teaching methods and materials; (4) evaluation procedures; and, (5) school-community relationships.

641. Research in Elementary Education Credit 3

(Formerly Ed. 640E)

A critical analysis of the current research in elementary education and the implications of such for elementary school educative experiences.

642. Research in Secondary Education Credit 3

A critical analysis of the current research in secondary education and the implications of such for high school educative experiences.

643. Workshop in Methods of Teaching Arithmetic Credit 3

Modern concepts concerning the teaching of arithmetic will be discussed. Offered in the 4th quarter.

644. Workshop in Methods of Teaching Language Arts Credit 3

Designed for teachers of English in the elementary and secondary schools in which instruction in Language Arts, Literature, Grammar, Composition, etc., are considered. Offered in the 4th quarter.

699. Thesis Research Credit 3-5

Guidance

602. Techniques of Individual Analysis Credit 3

A course designed to develop understandings and skills in collecting and interpreting data concerning the individual, and the use of such data in case studies and follow-up procedures.

603. Measurement for Guidance Credit 3

A study of educational and vocational testing with reference on a general frame work for using statistical information in several types of counseling problems. Statistics necessary for the evaluation of psychological and educational measurement will be considered. This course also includes the measurement of aptitude including special aptitude with reference to prediction of proficiency in various occupations and curricula.

604. Educational and Occupational Information Credit 3

Where and how to get facts and assemble information about occupations and education. To learn the methods of using collected information.

605. Introduction to Counseling Credit 3

A course designed to give information regarding the background and theories of counseling. Consideration will be given to the counselor's function, counseling interview, use of records, and the school counselor's place in a total personnel program.

606. Case Studies in Counseling Credit 3
Development of a basic understanding of the case study technique as used in counseling. Compilation, analysis, diagnosis and treatment of theoretical and actual counseling case histories.

607. Guidance Practicum Credit 5(2-6)
The course provides practice in the job of the high school counselor with students of high school age. Primary emphasis will be placed on counseling but all phases of the work of the counselor will be covered.

608. Organization and Administration of Guidance Services Credit 3
This course is designed to afford the student an understanding of methods by which guidance policies and services may be properly implemented through organizational framework; consequently, leading to more effective organization of current guidance programs.

Psychology

617. Psychology of Adjustment. Credit 3
An analysis of the function of mental hygiene in the total educative process. Attention is given to the basic principles of mental health as these apply to pupils and teachers alike; to the types of adjustment; to the development of personality; and to psychotherapeutic techniques for the restoration of mental health. Prerequisite: Psychology 621.

618. Child Growth and Develoment Credit 3
A comprehensive analysis of physical, mental, emotional, and social growth and development from birth through adolescence.

621. Educational Psychology Credit 3
A study of the applications of psychological principles to educational practices.

622. Measurement and Evaluation Credit 3(2-2)
Measurement techniques and interpretation of group surveys and individual pupil diagnosis will be considered.

ENGLISH

Darwin T. Turner, Chairman
Office: 316 Hodgin Hall

In order to be accepted as a candidate for the degree Master of Science in Education with concentration in English, the student must have earned the following in undergraduate studies:

Twenty-four (24) semester hours in English courses above freshman composition. The hours must include at least three semester hours of Shakespeare, three of American literature, three of English literature, three of world literature or contemporary literature, and three of advanced grammar and composition.

A student who fails to meet these qualifications will be expected to satisfy the requirements by enrolling in undergraduate courses before beginning his graduate studies in English.

The student who writes a thesis must complete the following requirements in courses in addition to the core curriculum in Education: English 505, 607, 610, 611, and 650; Education 699 (thesis research); 15 quarter hours selected from the following: English 525, 540, 541, 606, 621, 625, 626, 627, 632, and 640; and one three-hour elective.

The student not writing a thesis must complete the following requirements in courses in addition to the core curriculum in Education: Eng-

lish 505, 607, 610, 650, and 515 or 520; Education 632 (Seminar); 21 quarter hours selected from the following: English 525, 540, 541, 606, 611, 621, 625, 626, 627, 631, 632, and 640; and 6 hours of electives.

COURSES FOR ADVANCED UNDERGRADUATES AND GRADUATES

500. Grammar and Composition. Credit 3(3-0)
A course designed to provide a review of fundamentals of grammar and composition for the elementary or secondary school teacher.

501. Language Arts Workshop for Elementary Teachers. Credit 3(3-0)
A course designed to provide elementary school teachers with an opportunity to discuss problems related to the language arts taught in the elementary school.

505. Literary Research and Bibliography. Credit 3(3-0)
(Not open to those who have completed English 401.)
An introduction to tools and techniques used in investigation of literary subjects.

510. Problems in Voice and Speech. Credit 3(3-0)
A course designed to provide a review of the fundamental skills of oral communication and instruction in public speaking.

515. Community and Creative Dramatics. Credit 3(3-0)
An introduction to basic elements and techniques of play production: acting, direction, stagecraft, lighting, costuming, play selection.

520. Children's Literature. Credit 3(3-0)
A study of the types of literature designed especially for students in the upper levels of elementary school and in junior high school.

525. Mythology. Credit 3(3-0)
A study of the myths which form the basis for allusions in the literature of Western civilization.

530. Shakespeare. Credit 5(5-0)
An introduction to Shakespeare's works through an intensive study of representative comedies, tragedies, and history plays. The graduate student will be expected to demonstrate his ability to teach one of the plays. Prerequisite: English 225 or 610.

540. The American Novel. Credit 3(3-0)
A history of the American novel from Cooper to Faulkner.
Melville, Twain, Howells, James, Dreiser, Lewis, Hawthorne, Faulkner, Hemingway will be included. Prerequisite: English 225 or 610.

541. Literature by American Negroes. Credit 3(3-0)
A study of prose, poetry, and drama by American authors of Negro ancestry. Their works will be studied in relation to the cultural and literary traditions of their times. Dunbar, Chestnutt, Johnson, Cullen, Bontemps, Hughes, Wright, Ellison, Baldwin, and Yerby will be included.

625. Eighteenth Century English Literature. Credit 3(3-0)
A study of the major prose and poetry writers of the eighteenth century in relation to the cultural and literary trends. Defoe, Swift, Fielding, Addison, Pope, Johnson, and Blake will be included.

626. Romantic Prose and Poetry. Credit 3(3-0)
A study of nineteenth century British and American authors whose works reveal characteristics of Romanticism. Wordsworth, Coleridge, Shelley, Keats, Byron, Lamb, Carlyle, De Quincey, Emerson, Thoreau, Poe, and Whitman will be included.

627. Studies in American Literature. Credit 3(3-0)
A study of major American prose and poetry writers.

631. Restoration and 18th Century Drama. Credit 3(3-0)
A study of the theatre and drama in relation to the cultural trends of the period. Etherege, Farquhar, Vanbrugh, Congreve, Fielding, Gay, Steele, Goldsmith, and Sheridan will be included.

632. American Drama. Credit 3(3-0)
A study of the development of drama in America with emphasis upon the twentieth century drama of O'Neill, Wilder, Rice, Green, Williams, Miller, and Inge.

640. Modern British and Continental Fiction. Credit 3(3-0)
A study of British and European novelists from 1914 until the present. Included in the study are Joyce, Kafka, Gide, Mann, and Camus.

650. Seminar. Credit 1(1-0)
Provides an opportunity for presentation and discussion of thesis, as well as selected library or original research projects from non-thesis candidates.

COURSES FOR GRADUATES ONLY

(English 610 is a prerequisite for all courses numbered above 610)

606. A History of the English Language. Credit 3(3-0)
A study of the changes in the English language—syntax, vocabulary, spelling, pronunciation, and usage—from the fourteenth century through the twentieth century.

607. Contemporary Grammar.
A study of contemporary princ'ples of form and function with emphasis upon descriptive linquistics.

610. Literary Analysis. Credit 3(3-0)
An introduction to intensive textual analysis of poetry, prose fiction, prose non-fiction, and drama.

611. Literary Criticism. Credit 3(3-0)
A study of basic principles and practices in literary criticism and of the various schools of criticism for Plato to Eliot.

621. Milton. Credit 3(3-0)
A study of the works of Milton in relation to the cultural and literary trends of seventeenth century England. Emphasis is placed upon Milton's poetry.

FOREIGN LANGUAGES

Waverlyn N. Rice, Chairman
Office: 312 Hodgin

COURSES IN FRENCH

COURSES FOR ADVANCED UNDERGRADUATES AND GRADUATES

501. Problems and Trends in Foreign Languages. Credit 3
Problems encountered by teachers given consideration. Place and purpose of foreign language in curriculum today.

502. Oral Course for Teachers of Foreign Languages Credit 3(2-2)
Designed for teachers of foreign languages to improve pronunciation and spelling.

503. Research in the Teaching of Foreign Language. Credit 3
Open to students who are interested in undertaking the study of a special problem in the teaching of a foreign language.

504. The French Theatre. Credit 3
A thorough study of the French theatre from the Middle Ages to the present.

505. The French Novel. Credit 3
A study of the novel from the Seventeenth Century to the present.

506. French Syntax. Credit 3
Designed for teachers of foreign languages who plan to teach French grammar on the more advanced level.

COURSES FOR GRADUATES ONLY

French

601. Advanced Reading and Composition. Credit 3
A composition course with emphasis on idiomatic expressions.

602. Romantic Movement in France (1820-1848) Credit 3
Background study of Chateaubriand and Madame de Stael. Emphasis will be placed on Lamartine, Hugo, Vigny, and Mussett in poetry. Other genres e.g., the theatre, novel, etc. will be studied.

603. Seminar in Foreign Languages. Credit 1
Scholarly papers from students, faculty, and guest lecturers will be presented. Scholarly papers are required of all candidates for a degree with concentration in French.

604. Contemporary Literary Criticism. Credit 3
Methods and purposes of literary criticism and of French literary critics.

605. Independent Study in Foreign Languages. Credit 3-5

INDUSTRIAL EDUCATION

Charles W. Pinckney, Chairman
Office: 123 Graham

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Industrial Arts

506. Plastic Craft. Credit 3(2-2)
For teachers of industrial arts, arts and crafts and those interested in plastics as a hobby. Operations in plastics analyzed and demonstrated; design, color, kinds, and uses of plastics, how plastics are made and sold; vocational information. Projects suitable for class use constructed.

507. Advanced Plastic Craft. Credit 3(2-2)
A continuation of 506, including blow forming and internal carving.

508. Handicrafts. Credit 3(2-2)
For teachers of Industrial Arts, arts and crafts and those interested in craft work as a hobby. Covers the materials, tools and processes used in, and craft activities carried on in elementary and junior high schools that do not have specialized shops. Also of value to grade teachers who feel the necessity for more information regarding the materials, tools, and processes frequently employed in an activity-type program.

509. Advanced Handicrafts. Credit 3(2-2)
A continuation of 508. Instruction in advanced handicraft techniques.

510. Advanced General Metals. Credit 3(2-2)
An advanced course in metal work for teachers of industrial arts and others interested in metalwork as a hobby. Emphasis will center on art metal (including plating, finishes, etc.), advanced bench metal and sheet metal operations. Specifications of equipment, organization of instruction sheets, special problems, and materials will be covered as well as shop organization. Prerequisite: I. A. 336 or equivalent.

511. Advanced General Metals. Credit 3(2-2)
An advanced course in machine tool operation for the industrial arts teacher who may want more specialization in one area of metalwork. Advanced operations on the lathe, shaper, milling machine, etc. Specifications of equipment, materials and organization of instruction materials. Prerequisite: I. A. 336 or equivalent.

512. Advanced General Metals. Credit 3(2-2)
Special problems in metalwork. With the necessary prerequisites, the student may select problems in any area of general metals for special study. Construction of projects, special assignments, etc. will be made after the area of work is selected and after consultation with the instructor. Prerequisite: I. A. 510.

Industrial Education

502. Teaching Problems in Industrial Education. Credit 3(2-2)
A general methods course for industrial education students. Problems involve analysis of objectives, curriculum content, text and reference books, teaching aids, and devices, remedial instructions, cumulative records, storage systems, organizing class, teaching plans, safety programs, storage systems information about students, demonstration.

504. History and Philosophy of Industrial Education Credit 3(2-2)
Chronological and philosophical development of industrial education with special emphasis of its growth and function in American schools.

520. Industrial Cooperative Training Programs. Credit 3
A course designed to give the prospective teachers of vocational education a knowledge of the basic concepts and processes of co-operative work in general, with special attention to diversified occupations.

521. Organization of Related Study Material. Credit 3
The principles of selecting and organizing both technical and general related instructional material for trade extension and Industrial Cooperative Training programs.

FOR GRADUATE STUDENTS ONLY

Industrial Arts

600. Workshop in Arts and Crafts for Teachers. Credit 3
A course designed to give practical experience in dealing and working with plastics, handicrafts and other media. Offered during summer school sessions. Cannot be used to satisfy degree requirements in Industrial Arts Education.

608. Advanced Furniture Design and Construction. Credit 3(2-2)
Laws, theories and principles of aesthetic and structural design, planning, designing, pictorial sketching and furniture drawing. Laboratory work involving setting up, operating, and maintaining furniture production equipment, plus forms, requisitions, orders, invoices, stock bills, buring and professional problems. Permission from instructor required.

609. Electricity for Industrial Arts Teachers. Credit 3(2-2)
For teachers and prospective teachers of Industrial Arts. Emphasis placed on the selection and construction of projects useful in school shops, development of related information. Theory and fundamentals of electricity and radio communication, selecting equipment and supplies, course organization and instructional materials.

611. Graphic Arts Projects. Credit 3(2-2)
A course in general bookbinding and silk screen printing.

612. Laboratory problems in Industrial Arts. Credit 3(2-2)
A course designed to develop problem-solving ability through research activities in industrial arts subject-matter content. Individual students will investigate, solve and report on problems arising out of teaching activities that involve materials, processes or products of industry.

613. Comprehensive General Shop. Credit 3(1-4)
Problems involving experimentation in woodwork, electricity, bookbinding, metal work, leather and plastics will be considered. General shop organization, equipment, instructional materials and procedures will also be emphasized.

614. Advanced Drafting Techniques. Credit 3(2-2)
For teachers with undergraduate preparation or trade experience. School techniques, standards, conventions, devices, experimentation in advance of opportunities offered in regular courses. Use of literature and research expected.

623. Construction and Use of Instructional Aids. Credit 3(2-2)
The analysis of various instructional aids useful in shop teaching, planning, designing, and construction of various teaching aids. Facilities for laboratory work provided.

Industrial Education

604. Supervision and Administration of Industrial Education. Credit 3
Relation of industrial education to the general curriculum and the administration responsibilities entailed. Courses of study, relative costs, coordination problems, class and shop organization, and the development of an effective program of supervision will be emphasized.

605. Curriculum Laboratory in Industrial Education. Credit 3
Review of basic principles of the preparation of instructional materials for classroom use. Students select and develop some significant area of instruction for use in a shop or related subject class. Courses of study that function in teaching situations are prepared. Opportunity afforded to analyze existing courses of study.

606. Research and Literature in Industrial Education. Credit 3
Survey of printed reports; critical analysis; acquaintance with types of literature. Study of techniques of research and reporting of the results of research.

624. Laboratory Planning for Industrial Shops. Credit 3
Study of the principles involved in the design, selection, location, installation, and care of equipment suitable for high school industrial arts laboratories or vocational industrial departments.

Industrial Education

631. General Industrial Education Programs. Credit 3
Development on local, state, and national levels of day industrial schools, evening industrial schools, part-time day and evening schools. Their or-

ganization types, courses of study, scope of movement, study of special student groups, fees and charges, buildings and equipment.

632. Test in Industrial Subjects. Credit 3
Study and application of principles of achievement test construction to shop and drawing subjects; evaluation of results.

699. Thesis research in Industrial Education. Credit 3-5

HEALTH AND PHYSICAL EDUCATION

William M. Bell, Chairman
Office: Moore Gymnasium

COURSES IN HEALTH EDUCATION FOR ADVANCED UNDERGRADUATES AND GRADUATES

501. Current Problems and Trends in Physical Education. Credit 3(3-0)
A practical course for experienced teachers. Consideration given to individual problems in physical education with analysis of present trends.

502. Personal, School, and Community Health Problems. Credit 3(3-0)
A study of personal, school and community health problems and resources. Emphasis placed on the control of communicable diseases, healthful school living and the development in individuals of the scientific attitude and a positive philosophy of healthful living.

COURSES IN PHYSICAL EDUCATION FOR ADVANCED UNDERGRADUATES AND GRADUATES

503. Methods and Materials in Health Education for Elementary and Secondary Teachers. Credit 3(3-0)
A study of the fundamentals of the school health program, pupil needs, methods, planning instruction, teaching techniques, selection and evaluation of materials for the elementary and secondary programs, and the use of the community resources.

504. Administration of Interscholastic and Intra-Mural Athletics. Credit 3(3-0)
A study of the relation of athletics to education, and the problems of finance, facilities, scheduling, eligibility, and insurance. Consideration given to the organization and administration of intra-mural activities in the school program.

505. Community Recreation. Credit 3(3-0)
A study of the recreational facilities and problems with consideration being given to the promotion of effective recreational program in rural and urban communities.

506. Current Theories and Practices of Teaching Sports. Credit 3(3-0)
Methodology and practice at various skill levels. Emphasis placed on seasonal activity.

MATHEMATICS

Theodore R. Sykes, Chairman
Office: Graham Bldg.

In order to be accepted as an applicant to the Master's degree program in Education with a concentration in Mathematics, a student must have earned the following undergraduate studies:
Thirty (30) semester hours in mathematics including differential and integral calculus, differential equations, and statistics.

A student who fails to meet these qualifications will be expected to satisfy the requirements by enrolling in undergraduate courses before beginning his graduate studies in mathematics.

The student who writes a thesis must complete the following requirements in courses in addition to the core curriculum in Education: Mathematics 502, 503, 508, 511, and 604; Education 699 (thesis research); 15 quarter hours selected from the following: Mathematics 504, 505, 512, 513, 514, 515, 516, 517, 521, 600, 601, 602, and 607.

The student not writing a thesis must complete the following in courses in addition to the core courses in Education: Mathematics 502, 503, 508, 511, and 604; 12 quarter hours selected from the following: Mathematics 504, 505, 512, 513, 514, 515, 516, 517, 521, 600, 601, 602, and 607; Education 632 (Seminar); 12 hours of electives. A student should elect only those courses in consultation with his advisor.

Advanced Undergraduate and Graduate

500. Integrated Mathematics. Credit 3(3-0)
Definition and properties of elementary function integration theory, sequences and series. Graduate students who do poorly on the admissions examination must schedule this course. No credit toward a degree in mathematics.

501. Algebraic Equations for Teachers. Credit 3(3-0)
Polynominals, linear systems, determinants and matrices methods of solving linear systems. No credit toward a degree in mathematics. Prerequisites: Thirty hours of college mathematics.

502. Modern Mathematics for High School Teachers. Credit 3(3-0)
Elements of mathematical logic and deductive reasoning, the concept of number, ordinal and cardinal numbers, structure of the real number system. Prerequisites: Thirty quarter hours of college mathematics.

503. Intermediate Analysis I. Credit 3(3-0)
A rigorous study of the fundamental principles of the calculus including properties of the real number system, limits, continuity, differentiality, integrability, sequences and series, functions of several variables. Prerequisite: Math. 223.

504. Intermediate Analysis II. Credit 3(3-0)
Continuation of Mathematics 503. Prerequisite: Math. 503.

505. Intermediate Analysis III. Credit 3(3-0)
Continuation of Mathematics 504. Prerequisite: Math. 504.

506. Mathematical Methods in Science and Engineering I. Credit 5(5-0)
Fourier series and orthogonal functions, integration theory, operational and transform calculi, elements of complex variables, calculus of variation, several variables, special functions, elements of matrix theory. Prerequisite: Math. 231.

507. Mathematical Methods in Science and Engineering II. Credit 5(5-0)
Orthogonal functions, boundary value problems, operational calculus, solution of partial differential equations. Prerequisite: Math. 506.

508. College Geometry. Credit 3(3-0)
Properties of sets, operation on sets, elements of symbolic logic, properties of postulational system, the defects of Euclid's system, the Hilbert axioms, a general survey of the axioms of non-Euclidean systems. Prerequisite: High school geometry and thirty hours of college mathematics.

509. Mathematics for Chemists. Credit 5(5-0)
This course will review those principles of mathematics which are involved in chemical computations and derivations from general through physical chemistry. It will include a study of significant figures, methods of expressing large and small numbers, algebraic operations, trigonometric functions, and an introduction to calculus.

510. Arithmetic for Elementary Teachers. Credit 3(3-0)
This course affords a background of the beginning numbers, concepts and counting, a study of various number bases, and fundamental processes and their application and problem solving. No credit toward a degree in mathematics.

511. Abstract Algebra I. Credit 3(3-0)
Elementary properties of sets, Peano axioms and the construction of the natural number system, properties of the integers, integral domains, groups, rings, fields, vector spaces, lattices and partially ordered sets. Prerequisite: Math. 501.

512. Abstract Algebra II. Credit 3(3-0)
Continuation of Mathematics 511. Prerequisite: Math. 511.

513. Linear Algebra and Matrix Theory I. Credit 3(3-0)
Real and complex finite dimensional vector spaces, conjugate spaces, theory of linear transformation, linear operations, matrices, canonical representations, infinite dimensional space with an introduction to functional analysis. Prerequisite: Math. 223.

514. Linear Algebra and Matrix Theory I. Credit 3(3-0)
Continuation of Mathematics 513. Prerequisite: Math. 513.

515. Elements of Set Theory and Topology. Credit 3(3-0)
Operations on sets, relations, correspondences, comparison of sets, functions, ordered sets, general topological spaces, matric spaces, continuity, connectivity, compactness, homeomorphic spaces, general properties of T_1-spaces. Prerequisite: Math. 223, 511.

516. Mathematical Statistics. Credit 3 hrs. 3(3-0)
Introduction to probability, distribution functions and moment-generating functions, frequency distribution of two variables, development of chi-square, student's "t" and "F" distributions. Prerequisite: Math. 223.

517. Methods of Applied Statistics. Credit 3 hrs. 3(3-0)
Presents the bases of various statistical procedures. Applications of normal, binomial, Poisson, chi-square, student's "t" and "f" distributions. Tests of hypotheses, power of tests, statistical inference, regression and correlation analysis and analysis of variance. Prerequisite: Math. 218.

518. Mathematics of Life Insurance. Credit 3(3-0)
Probability, mortality table, life insurance, annuities, endowments, computation of net premiums, evaluation of policies, construction and use of tables. Prerequisite: Math. 218.

519. Numerical Computation. Credit 3(3-0)
(Formerly 504.)
Interpolation, numerical solution of equations, approximations, numerical integration, construction of tables.

520. Vector Analysis. Credit 5(5-0)
A study of the processes of vector analysis, with a treatment of the vector functions and operations as applied in theoretical work. Prerequisite: Math. 506.

521. Theory of Numbers. Credit 3 hrs. 3(3-0)
Euclid algorithm, factorization, congruences, diophantine equations, number-theoretic functions. Prerequisite: Thirty hours of college mathematics.

COURSES FOR GRADUATES ONLY

600. Theory of Functions of A Real Variable I. Credit 3(3-0)
Point set theory, metric spaces, measurable sets, measurable functions, Lebesque integral of a bounded function. L_2-spaces. Prerequisites: Math. 503, 504, 515.

601. Theory of Functions of A Real Variable II. Credit 3(3-0)
Continuation of Mathematics 600.

602. Theory of Function of Complex Variable I. Credit 3(3-0)
Complex numbers, elementary functions, analytic functions, residue calculus, conformal mapping. Taylor and Laurent expansions. Prerequisites: Math. 503, 504.

603. Theory of Function of A Complex Variable II Credit 3(3-0)
Continuation of Mathematics 602.

604. Projective Geometry. Credit 3(3-0)
Homogenous coordinates, linearly dependent points and lines, principle of duality, harmonic points, harmonic lines, conics, projective and affine transformations. Prerequisites: Math. 501, 508, or 513.

605. Special Topics in Algebra. Credit 3(3-0)
This course treats advance topics in algebra which do not receive full development in the prerequisite courses. Prerequisites: Math. 511-512 or Math. 513-514.

606. Special Topics in Analysis. Credit 3(3-0)
Advance topics in analysis. Prerequisites: Math. 503, 504, 515.

607. Seminar. Credit 1(1-0)
Scholarly papers from students, faculty, or guest lecturers will be presented.

MUSIC

Howard T. Pearsall, Chairman
Office: Frazier Hall

FOR ADVANCED UNDERGRADUATES AND GRADUATES

534. Music in the Elementary School Today. Credit 3(3-0)

535. Music in the Secondary School Today. Credit 3(3-0)

536. Choral Conducting of School Music Groups. Credit 3(1-4)
The skills of conducting, with literature for mixed, female, and male groups. Permission of instructor required.

538. Psychology of Music. Credit 3(3-0)
The use of psychology in the learning and teaching of music.

FOR GRADUATE STUDENTS ONLY

601. Class Piano for Elementary Teachers. Credit (3(1-4)
A comprehensive course of piano skills necessary for accompanying songs in music texts in the elementary schools.

603. Advanced Music Appreciation. Credit 2(1-2)
Emphasis on large music forms—opera, oratorio, Bach's Six Brandenburg Concertos, Beethoven's Symphony No. 9, Schubert's Symphony No. 8, Sumphonies of Bruckner and Mahler, works of Bartok, Hindemith, and Copland.

PHYSICS

Donald A. Edwards, Chairman
Office: 109 Cherry Hall

FOR ADVANCED UNDERGRADUATES AND GRADUATES

501. General Physics for Science Teachers I. Credit 3(2-2)

For persons engaged in the teaching of science. Includes two hours of lecture-demonstration and one two-hour laboratory period per week. For science teachers only.

502. General Physics for Science Teachers II. Credit 3(2-2)

A continuation of Physics 501.

540. Electricity for Science Teachers. Credit 3(3-0)

Includes electric fields, potentials, direct current circuits, chemical and thermal emf's electric meters, and alternating currents. For science teachers only. Prerequisites: Physics 501, 502 or equivalent.

580. Modern Physics for Science Teachers I. Credit 3(3-0)

An introductory course covering the usual areas of modern physics. For Science teachers only. Prerequisite: General Physics.

581. Modern Physics for Science Teachers II. Credit 3(3-0)

A continuation of Physics 580.

PLANT SCIENCE AND TECHNOLOGY

Samuel J. Dunn, Chairman
Office: 235 Carver Hall

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Agricultural Engineering

500. Conservation, Drainage, and Irrigation. Credit 3(1-4)

Improvement of soil by use of the study of conservation practices, engineering structures, drainage and irrigation systems. Prerequisite: Ag. Engr. 331.

502. Advanced Farm Shop. Credit 3(0-6)

Care, operation, and maintenance of farm shop power equipment. Prerequisite: Ag. Engr. 122.

503. Special Problems in Agricultural Engineering. Credit 3(3-0)

Special work in agricultural engineering on problems of special interest to the student. Open to seniors in Agricultural Engineering.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Crop Science

**500. Plant Chemicals. Credit 3(2-2)
A study of the important chemical pesticides and growth regulators used in the production of economic plants. Prerequisite: Chem. 102.

*501. Crop Ecology. Credit 3(3-0)
(Formerly Agron. 501.)
The physical environment and its influence on crops; geographical distribution of crops.

**502. Breeding of Crop Plants. Credit 3(2-2)
(Formerly Agron. 502.)
Significance of crop improvements in the maintenance of crop yields; application of genetic principles and techniques used in the improvement of crops; the place of seed certification in the maintenance of varietal purity and production of quality seed. Prerequisite: Zoology 303 or consent of instructor.

503. Special Problems in Crops. Credit 3 to 5 hours
(Formerly Agron. 503.)
Designed for students who desire to study special problems in crops. By consent of instructor.

505. Research Design and Analysis. Credit 3(2-2)
Experimental designs, methods and techniques of experimentation; application of experimental design to plant and animal research; interpretation of experimental data. Prerequisite: Ag. Econ. 532 or Math. 218.

FOR GRADUATE STUDENTS ONLY

634. Grass-Land Ecology. Credit 3(3-0)
.The use of grasses and legumes in a dynamic approach to the theory and practice of grass-land agriculture, dealing with the fundamental ecological principles and their application to management practices.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Soil Science

504. Special Problems in Soils. Credit 3 to 5
(Formerly Agron. 504.)
Research problems in soils for advanced students. By consent of instructor.

FOR GRADUATE STUDENTS ONLY

631. Soils of North Carolina. Credit 3(3-0)
A study of the factors basic to the understanding of the soils of North Carolina, their classification and properties as related to sound land-use and management.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Earth Science

501. Principles of Astronomy for Elementary and Secondary School Teachers. Credit 3(3-0)
The earth as an astronomical body, relationship between earth and sky, the nature of the sun and stars, and the tools and methods of the astronomer. Lectures will be supplemented by night observations.

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* Courses to be taught during odd numbered years.
** Courses to be taught during even numbered years.

540. Introduction to Earth Science. Credit 3(3-0)
Forces of nature and their interaction on soil formation, its distribution and deterioration. The role of physical properties on conservation measures will be considered. Prerequisite: Ea. Sci. 211, Soil Sci. 223 or consent of instructor.

FOR GRADUATE STUDENTS ONLY

601. The Earth in the Physical Universe. Credit 3(3-0)
This course is designed to give the student a broad general background in the earth's physical environment, its lithosphere, hydrosphere and atmosphere and their interaction on weather and climate. The physical nature of the stars, the sun and planets will also be studied in the light of modern concepts of space.

602. Physical Geology. Credit 3(3-0)
The development of the earth's surface, its material composition and forces acting upon its surface will be considered. Specific topics include origin of mountains and volcanos, causes of earthquakes, work of rivers, wind, waves, and glaciers. Prerequisite: Ea. Sci. 211, 501 or consent of instructor.

604. Conservation of Natural Resources. Credit 3(3-0)
A descriptive course dealing with conservation and development of renewable natural resources encompassing soil, water and air, cropland, grassland and forests; livestock, fish, and wildlife; and recreational, aesthetic and scenic values. Attention will be given to protection and development of the nation's renewable natural resources base as an essential part of the national security, defense, and welfare.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Horticulture

501. Special Problems. Credit 2 to 5
Work along special lines given largely by the project method for advanced undergraduate and graduate students who have the necessary preparation.

SOCIAL SCIENCES

Frenise A. Logan, Chairman
Office: 308 Hodgin

FOR ADVANCED UNDERGRADUATES AND GRADUATES

Economics

501. Economic Understanding. Credit 3(3-0)
An analysis of the institutional organization and functions of the American economy. Special reference will be made to the State of North Carolina.

Geography

501. World Geography. Credit 3(3-0)
This course will consider man's relation to soil, minerals, and climate. Emphasis will be placed on physiography and human progress.

History

501. The British Colonies and the American Revolution. Credit 3(3-0)
The evolution of colonial institutions, growth of the American colonies, the American Revolution and its aftermath.

503. Economic History of the United States, 1787-1865. Credit 3(3-0)
A study of pre-industrial America with special emphasis on agriculture, commerce, transportation, banking and industry.

504. Economic History of the United States Since 1865. Credit 3(3-0)
A treatment of the American economy in the industrial capitalism, finance capitalism, business organization and the relationship between government and business.

505. History of Nineteenth Century Europe. Credit 3(3-0)
This course treats the history of Europe between the Congress of Vienna and the outbreak of World War I. Special attention is given to the growth of ideologies such as nationalism, liberalism, and socialism. Due attention is also paid to economic growth, scientific progress, colonial expansion, and international conflict.

506. Europe Since 1914. Credit 3(3-0)
An account of Europe's history in the twentieth century. Special consideration is given to attempts at reconstruction, 1919 to 1939, the conflict of ideologies, World War II, and the issues and crises between East and West.

Political Science

501. Federal Government. Credit 3(3-0)
An intensive study of the federal government and its operations, federal organization, departments, independent offices, legislation, regulations, control and encouragement of enterprises by educational programs and research.

502. State and Local Governments. Credit 3(3-0)
A study of state and local governments and their power to regulate, control and promote the general welfare, labor and health laws, educational programs and other services.

506. Research and Current Problems. Credit 3(3-0)
Considered are: Fundamental concepts of Scientific Method of research; Effective research procedures; techniques and sources used in research and government; investigation of some current and recurrent problems inherent in Federalism and "States Rights"; individualism and collective action, free interprise and governmental regulations.

508. Comparative Government. Credit 3(3-0)
Comparative analysis underlying the American system of government and selected foreign governments. Administration, organization and processes in these systems of government will also be considered.

Sociology

500. Crime and Delinquency. Credit 5(5-0)
Nature and development of crime and delinquency; theories and research in the etiology of juvenile delinquency and criminal behavior; the treatment of offenders; rehabilitation programs. Open to seniors by permission.

501. Socialization and Culture. Credit 3(3-0)
A comparison of ethnographic and other research materials in the fields of psychology, sociology and anthropology on child rearing, personality development, and the learning of social roles. Examination of hypotheses relating early experiences to cultural behavior. Structure and ideological determinants of childhood experiences. Open to seniors by permission.

502. Current Economic and Social Problems. Credit 3(3-0)
A practical course in applied economics and sociology dealing with analysis of present trends in government, economics, industry, agriculture, and the social implications of these trends.

503. History of Social Thought. Credit 3(3-0)
Treatment of social thought from early Greeks to the twentieth century; treats thought in terms of periods such as pre-Christian, Christian, Middle Ages and Rennaisance.

505. Advanced Readings in American Sociology. Credit 3(3-0)
This course is designed to give special attention to American scholars in the area of sociology. The work of one attention will be given to Negro sociologists such as E. Franklin Frazier and Charles S. Johnson, and their contributions to the field of sociology. Open to seniors by permission.

506. Population Problems. Credit 3(3-0)
Introduction to population study; the development of official population data; principal sources of information; methods of analysis; survey of contemporary population movements.

COURSES FOR GRADUATES ONLY

Economics

601. Labor and Industrial Relations. Credit 3(3-0)
Development and structure of American unions; theories of union growth, economics of collective bargaining and wage determination; and survey of labor legislation.

602. Government Economic Problems. Credit 3(3-0)
This course will consider the growth of public expenditures, revenues, and debt of the United States; theories of taxation, and tax incidence; and the effects of public expenditures and taxes on economic growth.

Geography

603. Geography of North America. Credit 3(3-0)
A Regional study of North America. A study of climates, landforms, soils, flora and fauna, ocean and coast lines of North America.

History

602. The French Revolution and Napoleon. Credit 3(3-0)
A study of the causes, course and major consequences of the revolutionary movement; also the program and role of Napoleon.

605. Recent United States Diplomatic History. Credit 3(3-0)
A survey of recent diplomatic history of the United States to the present time, with special reference to the development of basic as well as contemporary policies.

606. Social and Political History of England from 1714 to 1832 Credit 3(3-0)
Particular attention is given to political, social, cultural, and diplomatic aspects of England during the Eighteenth Century.

607. Reconstruction, 1875-1877. Credit 3(3-0)
This course is preceded by a summary of the Civil War. It then treats the historiography of the Reconstruction period, the reconstruction of the South and restoration of the Union.

608. United States in the Twentieth Century. Credit 3(3-0)
An integrated account of social, political, cultural and economic aspects of contemporary American history.

610. The Soviet Union Since 1917. Credit 3(3-0)
A theoretical discussion of the ideological background of the Soviet Union with emphasis on the doctrines of Marx, Engeles and Lenin. This is followed by events leading up to the revolution of 1917 and the establishment of Communist autocracy, the New Economic policy, the First Five Year Plan, Stalin's doctrine, and Soviet Communism since the death of Stalin.

612. Contemporary History of the United States. Credit 3(3-0)
An intensive study and analysis of important problems in American history since 1928. Emphasis will be placed on methods of historical research and writings.

613. Independent Study in History. Credit 3

Political Science

603. Government Finances. Credit 3(3-0)
A study at the graduate level of Government finances. It will (a) cover the pattern and methods of taxation from a direct poll tax to a withholding system, (b) cover the use of revenues from "Funding the debt" to foreign aid. A parallel study of local and state financial systems will be made. The political implications of government finances will be considered. The course will also consider a newer concept of government finances, "Taxes as an investment." Intensive readings and reports required.

Social Science

650. Independent Study in Social Science. Credit 3

Sociology

600. Theories of Human Development and Interaction. Credit 3(3-0)
Primarily an advanced course in Social Psychology, of interest to those in the field of Behavioral Science.

607. Race and Ethnic Relations. Credit 3(3-0)
A study of race relations in America with specific emphasis upon the Negro in American society; a comparative analysis of human relations in America with those in selected countries.

608. Methods of Research Seminar. Credit 3

609. Contemporary American Sociology. Credit 3(3-0)