CLEMSON UNIVERSITY

RECORD



Clemson University Announcements 1978/79



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UNIVERSITY CALENDAR

First Summer Session 1977

May 16	Registration
May 17	Classes begin
June 22-23	Examinations

Second Summer Session 1977

June 27	Orientation, new students
June 28	Registration
June 29	Classes begin
July 4	Classes suspended
July 9	Classes meet
July 30	Classes meet
August 3-4	Examinations
August 6	Graduation

Fall Semester 1977

August 22-23 August 24 August 25 August 26	Orientation, new students Registration, all students Late registration Classes begin regular schedule; late registration fee applies
September 1	Last day for registration; last day to add a subject
September 15	Last day to order diploma for midyear graduation
September 22	Last day to drop a subject without record
October 17	Preliminary reports due
November 2	Last day to drop a subject or withdraw from the University without receiving final grades
November 14-18	Preregistration
November 23	Thanksgiving holidays begin after last class
November 28	Classes resume
December 12	Examinations begin
December 22	Midyear graduation

Spring Semester 1978

January 9	Orientation, new students
January 10	Registration, all students
January 11	Late registration
January 12	Classes begin regular schedule; late registration
	fee applies
January 18	Last day for registration; last day to add a subject
February 1	Last day to order diploma for May graduation
February 8	Last day to drop a subject without record
March 6	Preliminary reports due

March 17	Last day to drop a subject or withdraw from the
	University without receiving final grades; spring
	holidays begin after last class
March 27	Classes resume
April 12	Honors and Awards Day; classes suspended at
	12 noon
April 17-21	Preregistration
May 1	Examinations begin
May 12	Commencement

First Summer Session 1978

May 22	Registration
May 23	Classes begin
June 28-29	Examinations

Second Summer Session 1978

July 5	Orientation, new students
July 6	Registration
July 7	Classes begin
July 8	Classes meet
August 5	Classes meet
August 9-10	Examinations
August 12	Graduation

Fall Semester 1978

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August 21-22	Orientation, new students
August 23	Registration, all students
August 24	Late registration
August 25	Classes begin regular schedule; late registration
	fee applies
August 31	Last day for registration; last day to add a subject
September 14	Last day to order diploma for midyear graduation
September 21	Last day to drop a subject without record
October 16	Preliminary reports due
November 1	Last day to drop a subject or withdraw from the
	University without receiving final grades
November 7	Election Day; classes suspended
ovember 13-17	Preregistration
November 22	Thanksgiving holidays begin after last class
November 27	Classes resume
December 11	Examinations begin
December 21	Midyear graduation

Spring Semester 1979

January 8 January 9	Orientation, new students Registration, all students
January 10	Late registration
January 11	Classes begin regular schedule; late registration fee applies
January 17	Last day for registration; last day to add a subject
January 31	Last day to order diploma for May graduation
February 7	Last day to drop a subject without record
March 5	Preliminary reports due
March 16	Last day to drop a subject or withdraw from the University without receiving final grades; spring holidays begin after last class
March 26	Classes resume
April 11	Honors and Awards Day; classes suspended at 12 noon
April 16-20	Preregistration
April 30	Examinations begin
May 11	Commencement

First Summer Session 1979

May 21	Registration
May 22	Classes begin
June 27-28	Examinations

Second Summer Session 1979

A

July 5	Orientation, new students
July 6	Registration
July 7	Classes begin
July 21	Classes meet
August 4	Classes meet
ugust 8-9	Examinations
August 11	Graduation

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- WILLIAM BERDELL BARLAGE, JR., Ph.D., Head, Department of Chemical Engineering
- JAMES EDWIN CLARK, Ph.D., Acting Head, Department of Civil Engineering

¹ Agricultural Education curriculum is jointly administered by the College of Agricultural

² Agricultural Education curriculum is jointly administered by the College of Agricultural Sciences and the College of Education. ² Agricultural Engineering curriculum is jointly administered by the College of Agricul-tural Sciences and the College of Engineering.

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General Information

Clemson is a land-grant, state-supported university, fully accredited by the Southern Association of Colleges and Schools. Curricula are accredited by Engineers' Council for Professional Development, American Assembly of Collegiate Schools of Business, National Architectural Accrediting Board, National League for Nursing, and Society of American Foresters.

The seventy-six undergraduate curricula and fifty-six graduate degree programs under the colleges of Agricultural Sciences, Architecture, Education, Engineering, Forest and Recreation Resources, Industrial Management and Textile Science, Liberal Arts, Nursing, Sciences, and the Graduate School form a background of training for the hundreds of occupations and professions in which Clemson graduates engage. The University is organized on a basis whereby it retains a clear entity through the interrelationships of colleges and departments providing a well-balanced fundamental and general educational program.

The enrollment of Clemson has grown from 446 students at the opening of the University in 1893 to 11,274 for the first semester, 1977-78. Since the opening of the University, through the first semester, 1977-78, 81,958 students have attended Clemson, and of this number, 31,635 have been awarded the bachelor's degree. During this same period 273 associate degrees, 5,567 master's degrees, 476 Doctor of Philosophy degrees, and 50 Education Specialist degrees have been awarded.

ADMINISTRATIVE ORGANIZATION

The government of the University is vested in a Board of thirteen members, including six elected by the Legislature and seven life and self-perpetuating members, in accord with the Clemson will. The President of the University is the chief executive and administrative officer elected by the Board of Trustees; and under the President there are five areas of administration, each headed by a chief administrative officer responsible to the President. The organizational units under each of these officers are outlined as follows:

14 General Information

- I. Vice President for Academic Affairs and Dean of the University
 - A. Undergraduate Studies
 - 1. Summer Sessions
 - 2. University Library
 - B. Graduate Studies and University Research
 - 1. Computer Center
 - 2. Division of Administrative Programming Services
 - 3. Division of Information Systems Development
 - 4. Graduate School
 - 5. Office of University Research
 - C. University Extension
 - D. Colleges
 - 1. Agricultural Sciences
 - 2. Architecture
 - 3. Education
 - 4. Engineering
 - 5. Forest and Recreation Resources
 - 6. Industrial Management and Textile Science
 - 7. Liberal Arts
 - 8. Nursing
 - 9. Sciences
 - E. Institutes
 - 1. The Belle W. Baruch Forest Science Institute
 - 2. Housing Institute
 - 3. Water Resources Research Institute
- II. Vice President for Business and Finance
 - A. Budgets and Systems
 - **B.** Facilitating Services
 - C. Financial Management
 - D. Internal Audit
 - E. Physical Plant
 - F. Special Projects and Planning Coordination

III. Vice President for Development

- A. Alumni Relations
- B. Campus Master Plan
- C. Communications Center
- D. Deferred Gifts and Estate Planning
- E. Planning and Corporate Relations
- F. Public Relations

IV. Vice President for Executive Affairs and University Counsel

V. Vice President for Student Affairs and Dean of Students

- A. Athletic Department
- B. Career Services (Placement and Cooperative Education)
- C. Counseling Center
- D. Housing Office
- E. Littlejohn Coliseum
- F. Music Activities
- G. Office of Admissions, Registration and Financial Aid
- H. Offices of the Associate Deans of Students
- I. Student Health Service
- J. University Bookstore
- K. University Canteens
- L. University Union

REQUIREMENTS FOR ADMISSION

Beginning Freshmen. To receive consideration for admission to Clemson the applicant must present a transcript of his high school record and have an official copy of his Scholastic Aptitude Test scores sent directly from the College Entrance Examination Board Office in Princeton, New Jersey. The examination scores along with the student's academic preparation, rank in class, and the recommendation of the high school counselor will be weighed carefully in the admissions decision process. The applicant's acceptance will be confirmed upon presentation of a final high school transcript indicating a continuation of progress and graduation.

In addition, students who have not graduated and will not graduate from high school may qualify for entrance by:

1. Achieving satisfactory scores on the College Board examinations and by presenting a high school certificate (awarded by certificate examination) from the state in which they reside. This provision applies only to candidates 19-or-more years of age.

2. Demonstrating unusual academic ability as an applicant who does not intend to graduate from high school. In special cases consideration may be given to younger candidates who possess superior high school records and whose College Board scores are above average for the freshman class. The typical student admitted under this provision ranks in the upper tenth of his class and has SAT scores which total 1100 or more.

Transfer Candidates. Entrance examinations are required of many transfer students, but a number may omit this step. Details regarding these requirements are outlined in the subsection dealing with entrance examinations. Regardless of status relative to entrance examination requirements, all transfer applicants must have an original transcript of their records sent to Clemson directly from each college or university attended. Also, unless so stated on the transcript, the candidate will need to present statements of honorable dismissal and of eligibility to return to the institution last attended.

Applicants meeting the requirements outlined above will be considered carefully with regard to the quality of their credentials. If accepted, work completed at other institutions with a grade of C or higher may be evaluated for transfer in terms of equivalent courses in the Clemson curriculum of one's choice. Those who desire an admissions decision prior to completing a year of full-time study at an accredited college must also submit a high school transcript.

Nursing Applicants. The award of advanced standing for accepted transfer students is a joint decision by personnel in the Registrar's Office and faculty members in the colleges concerned. In nursing, however, the differences in courses at other institutions with that of the four-year program at Clemson University often necessitate attendance at one or more summer sessions. Thus, we recommend that students contact an adviser in the College of Nursing at an early date. In this way, should articulation be so poor from the student's point of view as to make attendance undesirable, one would have the opportunity to determine a course of action before having to make a nonrefundable deposit.

Evaluation personnel in the Registrar's Office are notified at the time a transfer student is accepted for the College of Nursing, and initial coordination begins at that point. Different advisers in the College of Nursing are assigned to those who are transferring from other bachelor degree programs and those who have completed a two- or three-year program in technical nursing or have otherwise completed requirements for the R.N. Accordingly, when writing or calling the College of Nursing, one should clearly point out his/her specific situation.

All Applicants. Various nonintellective factors will be considered in a few cases where it is impossible to make a positive decision on the strength of aptitude and previous academic performance alone.

Application Forms and Dates. Forms to be used in applying for admission to the University may be obtained by writing to the Office of Admissions, Clemson University, Clemson, South Carolina 29631.

Applications for entrance in August may be submitted beginning in September of the previous year, and processing will begin in October or November. Candidates who desire residence halls accommodations should apply and submit all credentials no later than the date Clemson receives the November SAT scores, usually about mid-December. Necessary credentials include high school and/or college transcript, as applicable, as well as SAT scores sent directly to Clemson by the testing company. As indicated in the Entrance Examination section, some transfer students may omit SAT requirements.

There is no fixed closing date for applicants who will live off campus, but in recent years virtually all admission has been closed by midspring. The time of application does not specifically control the time one receives a decision; however, the majority of admissions decisions are reached during the November through February period.

Application Fee. Applicants for admission must submit a nonrefundable fee of \$15.00 with their applications. This fee is not applicable toward tuition and/or other University fees. Details concerning the fee are contained in the letter of instructions sent with the application form.

Entrance Examinations. All freshman candidates and many transfer students must submit scores for the College Entrance Examination Board Scholastic Aptitude Test. A student transferring from an accredited college usually need not submit SAT scores if he has earned thirty semester hours with at least a C+ average (based on a system using four passing grades). Those enrolled in technical programs (noncollege parallel) at technical and community colleges usually will be required to submit SAT scores. For August enrollment, one is encouraged to complete the SAT no later than the preceding November.

Candidates who have completed the required tests previously may have their scores reported to Clemson by directing a request to the College Entrance Examination Board together with a fee of \$2.00. Others may secure a College Board Student Bulletin and an application for the tests from their local high school or from the Board's Office, P. O. Box 592, Princeton, New Jersey 08540. Only those scores reported directly to Clemson University from Princeton will be acceptable.

Achievement Tests. Almost all freshmen will find that one or more of the College Board Achievement Tests are required or at least highly desirable for placement purposes. Since a candidate can take one, two, or three tests at the same administration without an increase in the test fee, all are encouraged to sit for three tests. The information provided by these results becomes an extra credential that may enhance the chance for acceptance, especially if one has made marked academic improvement in the last year or two of high school or if in the lower portion of a selective class. Specific requirements or recommendations are as follows:

Mathematics. Candidates whose majors include Mathematics 101, 102, or 106 in the first semester freshman curriculum should take the College Board Achievement Test in Mathematics, Level II unless automatic placement in a review course is desired. This review course does not count toward graduation.

Foreign Language. Applicants who will have completed two or more years of high school French, German, Latin, Russian, or Spanish and who will enroll in a curriculum which includes a foreign language should take the appropriate language achievement test. These candidates may qualify for advanced placement with credit on the basis of a satisfactory score on this test.

English. Test results in English might provide one with an alternate means of gaining advanced placement, as explained below, or serve as an extra credential for the candidate with marginal credentials.

Other Tests. Students taking only two of the tests noted above are encouraged to take another one in a subject of their choice.

August applicants are encouraged to complete all achievement tests at an early date.

Advanced Placement by Examination. In addition to earning credit by the usual method involving classroom attendance, students may receive credit toward their degrees by completing a course successfully by examination only. High school students interested in exempting some of the elementary courses in this manner should participate in the College Board Advanced Placement Program and have examination results sent to Clemson. There is, however, an alternate means of attempting to earn credit and placement in some courses.

Freshmen and transfer applicants whose major includes Mathematics 105 (Algebra and Trigonometry) but who have not taken this course for college credit may wish to take the College-Level Examination Program (CLEP) examinations in these subjects (i.e., separate examinations in each subject or the combined test in both subjects). Other CLEP subject matter examinations recognized by Clemson are in the following subjects: General Chemistry, Economics, English Composition, and Psychology.

In addition, the English Department offers a locally administered writing sample to those who score 600 or more on the verbal section of the Scholastic Aptitude Test and/or the English Achievement Test (CEEB). Students qualifying will receive written invitations to take the writing sample at one of the orientation sessions in the summer. Campus Visits and the Orientation Program. Interviews are not required in considering candidates, nor will the results of interviews affect admissions decisions. A few candidates, however, may be so unfamiliar with Clemson that a visit may be helpful in determining whether to submit an application for admission. Such candidates are welcome to visit the Admissions Office during the normal business day. Office hours are from 8:00 a.m. to 12:00 noon and 1:00 p.m. to 4:30 p.m., Monday through Friday.

The University has scheduled a series of two-day orientation programs during the summer months for entering freshmen, transfer students, and their parents. All new students are expected to attend one of these sessions.

During orientation students will have an opportunity to discuss their educational objectives with an adviser, to preregister for the fall semester, and to learn about student life. Transfer students have their transcripts evaluated and select appropriate courses for their first semester at Clemson. Those transferring may find it difficult to schedule the appropriate courses if they fail to attend one of the first six orientation periods. The dates for orientation in 1978 are as follows:

June 12, 13	July 10, 11
June 14, 15	July 13, 14
June 16, 17	August 21, ¹ 22 ¹
July 5, 6	

Candidates desiring to visit the University prior to summer orientation should write directly to the head of the department in which they expect to major. The faculty of the College of Architecture especially desires to interview prospective students, and these candidates are encouraged to visit, if reasonably convenient, even though it is not a required part of the admissions process. However, visits of this nature will not substitute for attendance at a regular orientation session.

Students from other Countries. A limited number of well-qualified students from other countries are accepted. The first step is to file a preliminary application and take the Scholastic Aptitude Test (SAT) of the College Entrance Examination Board. After one's scores are reported to Clemson, admissions personnel will make a preliminary evaluation and, if appropriate, send a formal application to the candidate. The student should enclose transcripts of his secondary school and college-level records when returning the application.

¹ The program on these dates is an incomplete one, and it is especially inappropriate for transfer students. Only foreign students and American students living great distances from the University should defer orientation until this time.

GRADUATE STUDY

Programs leading to graduate degrees from Clemson University are available in nine colleges—Agricultural Sciences, Architecture, Education, Engineering, Forest and Recreation Resources, Industrial Management and Textile Science, Liberal Arts, Nursing, and Sciences.

For information concerning advanced degrees see *The Graduate School Announcements* which may be obtained from the Office of the Dean of Graduate Studies and University Research.

EXPENSES

Establishment of University Fees. The annual State Appropriation Act imposes the general requirement that student fees be fixed by the University Board of Trustees. The Act imposes two specific requirements on the Board: (1) in fixing fees applicable to academic and general maintenance and operation costs, the Board must maintain a minimum student fee not less than the fee charged the previous year; (2) in fixing fees applicable to dormitory rental, dining halls, laundry, infirmary, and all other personal subsistence expenses, the Board must charge students an amount sufficient to fully cover the cost of providing such facilities and services.

Settlement of University Fees. The Schedule of Semester Charges for all undergraduate students—full- or part-time, and auditing is shown on the pages which follow. The entire semester's expenses are due and payable at the beginning of each semester, and no student is officially enrolled until all semester expenses have been satisfied. In special cases the University will accept, at the beginning of a semester, a noninterest bearing promissory note for a portion of the semester residence-hall rent and semester-plan board fee. Amounts up to \$125.00 for room rent and \$130.00 for board fee may be included in the note. In such cases, a note for the first semester charges will be due October 1, and a note for the second semester charges will be due March 1.

A \$75.00 advance payment of room rent is required for a room reservation for the fall semester. Currently enrolled students who expect to continue enrollment are given an opportunity to make room reservations and pay the \$75.00 during the spring semester at a time designated by the Housing Office. New students who desire residence hall accommodations are to pay the \$75.00 advance payment of room rent and the \$80.00 admissions deposit when they accept the University's offer of admission. The \$75.00 advance payment of room rent is deducted from the amount otherwise due for the first semester's expenses.

All checks and money orders should be made payable to Clemson University. A personal check given in payment of University expenses which is returned unpaid by the bank immediately creates an indebtedness to the University.

SCHEDULES OF SEMESTER CHARGES 1978-79

Actual charges are not known when the catalog is printed; consequently these tentative estimates are subject to change as conditions warrant.

Tuition Matriculation Fee (nonrefundable) University Fee Medical Fee	5.00 290.00 45.00	\$200.00 5.00		
Semester Total (Excluding Room and Board)	\$415.00	\$890.00		
Residence Halls Johnstone (Sections A, B, C, D, E, F Benet, Bowen, Bradley, Cope, Dona stone (Annexes A, F), Norris, Sand Young	ldson, Geer, Jo lers, Wannamal	hn- ker,		
Young Barnett, Byrnes, Lever, Manning, Ma Clemson House Room (two occupants) Apartment with kitchenette (three o	auldin, Smith	\$290.00 \$290.00		
Board Five-Day Plan (Monday through Frid Seven-Day Plan				
Part-time Student. Undergraduate students taking less than 12 semester credit hours will be charged each semester according to the following schedule. These fees do not provide for admission to athletic events, concert series, and other such activities.				
Matriculation Fee (nonrefundable) Tuition (per semester hour) University Fee (per semester hour)	\$ 6.00	\$ 5.00 \$16.00		
Auditing. Charges for auditing are r ing to the following schedule:				
Tuition (per semester hour)	\$ 3.00	\$ 8.00		

runnon (per seme	ester nour).	···· φ 0.00	φ 0.00
University Fee (p	ber semester	hour)\$11.00	\$24.00

Note: For assessing fees, Math 100 is the equivalent of five semester hours.

I

Past Due Student Accounts. Any indebtedness to the University which becomes past due immediately jeopardizes the student's enrollment, and no such student will be permitted to re-enroll for an ensuing semester or summer school term. Further, any student who fails to pay all indebtedness to the University may not be issued an honorable discharge, transcript, or diploma.

Refund of Academic Fees for Students Enrolled for Less than a Full Semester. No adjustments in charges will be made on a semester's tuition and fees after five weeks from the date classes begin for the semester. Charges for periods of attendance of five weeks or less during a semester shall be made on the following basis:

Two weeks or less	20%
More than 2 but not more than 3 weeks	40%
More than 3 but not more than 4 weeks	60%
More than 4 but not more than 5 weeks	80%
More than 5 weeks	100%

Special provision has been made for a student who is required to discontinue his enrollment to report for active duty in the Armed Forces of the United States. Such students shall be charged for tuition, University fee, and medical fee on a daily pro rata basis, holidays excepted, instead of the percentage basis stated above, provided that such discontinuance of enrollment is the result of circumstances, conditions, or actions over which the student has no control.

Refund of Dining Hall and Residence Hall Fees. Specific information relating to living-expense refunds is given in the sections on Housing and Student Food Service.

Late Registration Service Charge. Registration for classes is scheduled for specific days, and certain definite procedures are outlined to prevent or reduce the problems incident to late registration. A student has not completed registration until all required steps have been taken, the final being the return of the matriculation card, the student directory card, and if not preregistered for classes, the properly signed class registration card to the Office of Admissions and Registration. Any student failing to register on the specified class registration days will incur a service charge of \$10.00.

Late Payment Fee. Any student who registers for classes on or before the third day following the day on which classes begin in a semester has five additional days, beyond the third day of classes, Saturday and Sunday excluded, to make satisfactory settlement of all expenses without being charged a late payment fee. A late payment fee of \$5.00 per day, Saturday and Sunday excluded, will be charged for each day thereafter until satisfactory settlement of all fees is made, except that the maximum number of days shall not exceed ten. Any student who has not made satisfactory settlement of all fees within the prescribed period shall suffer termination of enrollment.

Books and Supplies. The cost of books is not included in the Schedule of Semester Charges. Books and supplies at the beginning of the semester will be approximately \$50.00, except for students enrolling in Architecture the cost will be approximately \$75.00.

Optional Expenses. It is not possible to give an estimate of a student's expenditures for such amusements as dancing, motion pictures, and others. This depends largely upon the disposition of the student. The University endeavors to reduce to a minimum the temptation to spend money needlessly, but the authorities cannot be responsible for a student's private expenditures. This must be a matter between the student and his parents.

Transcripts. Requests for transcripts should be directed to the Office of Admissions and Registration. The initial transcript is issued gratis. Thereafter, a minimum fee of \$3.00 is charged for a single copy. A charge of 50 cents will be made for each additional copy on the same order.

Student Depository. For the convenience of students, the University operates a depository in the Bursar's Office where money can be deposited and withdrawn as the occasion may demand. This service is purely local. Students are urged to deposit their money and not to keep it in their rooms.

RESIDENT TUITION AND FEES

Entitlement. Eligibility for payment of resident tuition and fees shall be determined under the provisions of Title 59, Chapter 101, Section 70, Code of Laws of South Carolina 1976, as amended. The Section is set forth in its entirety as follows (subject to further amendment by the General Assembly).

A. The words "State institutions" as hereinafter used shall denote those post-secondary educational institutions under the jurisdiction of the Board of Visitors, The Citadel; the Board of Trustees, Clemson University; the Board of Trustees, Medical University of South Carolina; the State College Board of Trustees; the Board of Trustees, South Carolina State College; the Board of Trustees, University of South Carolina; the Board of Trustees, Winthrop College; and the State Board for Technical and Comprehensive Education. The word "student" shall mean any person enrolled for studies in any State institution. The word "residence" or "resides" shall denote continuous and permanent physical presence within this State: provided, that temporary absence for short periods of time shall not affect the establishment of a resident. The word "domicile" shall denote a person's true, fixed, and permanent home and place of habitation. It is the place where he intends to remain, and to which he expects to return when he leaves without intending to establish a new domicile elsewhere. It is presumed not to include residency in housing provided for students at State institutions, as residency in such housing is by nature temporary. The word "minor" shall mean a person who has not attained the age of eighteen years: the words "emancipated minor" shall mean a minor whose parents have entirely surrendered the right to the care, custody and earnings of such minor and who no longer are under any legal obligation to support or maintain such minor. The word "parent" shall mean an unemancipated minor's father: or if he has no father, his mother: or if one parent has custody of the minor, the parent having custody: or if there is a guardian or legal custodian of his person, then such guardian or legal custodian, provided that there are no circumstances indicating that such guardianship or custodianship was created primarily for the purpose of conferring the status of an in-state student on such unemancipated minor.

B. South Carolina residency shall be established as follows in determinations of tuition and fees to be paid by students entering or attending State institutions:

1. Persons who have been domiciled in South Carolina for a period no less than twelve months with an intention of making a permanent home therein, including persons in their majority, emancipated minors and unemancipated minors whose parents have been domiciled in this State for no less than twelve months with an intention of making a permanent home herein may be considered South Carolina residents for tuition and fee purposes at State institutions; *provided*, *further*, that where the parents of an unemancipated minor are living apart or are separated, divorced, or deceased, the residency of the child shall be determined by the place of domicile of the parent or legal guardian with whom the child normally resides. Students making application for residency status shall have the burden of proving that these requirements are met.

2. Persons who reside in and have been domiciled in South Carolina for less than twelve months but who have full-time employment in the State and the spouse and unemancipated minors of such person may be considered South Carolina residents for tuition and fee purposes at State institutions; *provided*, however, that the provisions of this item shall not apply to any person if such person or his spouse is in South Carolina primarily as a student. *Provided*, *further*, that where such person and his spouse are living apart or are separated, divorced or deceased, the unemancipated minors of such person may only be considered South Carolina residents for tuition and fee purposes if they reside with a parent or legal guardian who resides in and is domiciled in the State. *Provided*, *further*, that officials at State institutions charged with administration may, in their discretion, require unemancipated minors applying for the benefits of this item to furnish proof of the residence, domicile and employment of his parent, parents or guardian and may require the person or his spouse applying for the benefits of this item to furnish such proof as, in the discretion of such officials, is necessary to insure compliance with the provisions of this item.

3. Where the domicile of a student or his parent or legal guardian changes after his enrollment at a State institution, tuition charges shall be adjusted as follows:

a. Except as provided in item (b) of this subsection, when domicile is taken in South Carolina, a student shall not become eligible for residency status for tuition and fee purposes until the beginning of the next semester after expiration of twelve months from date of domicile in this State.

b. When South Carolina domicile is lost, residency status for tuition and fee purposes ends on the last day of the semester in which the loss occurs; however, application of this subsection shall be at the discretion of the institution involved.

c. Except as provided in item (b) of this subsection, marriage shall affect determinations of residency for tuition and fee purposes only insofar as it operates to emancipate minors or to evince an intention by the parties to make permanent home in South Carolina.

C. Where it appears to the satisfaction of officials charged with administration of these provisions that a student has made willful misrepresentations of fact in an attempt to gain residency improperly, tuition and fees past due and unpaid must be repaid, plus interest at a rate of 8% per annum, plus a penalty amounting to 25% of the nonresident tuition and fees for one semester. No student shall be allowed to receive transcripts or graduate from any State institution until these provisions have been met.

D. Full-time faculty and administrative employees of State institutions and the husbands, wives or children of such employees shall be excluded from the operation of this section. The Boards listed in (A) above are authorized to adopt policies for the abatement of any part or all of nonresident fees for students who are recipients of scholarship aid.

26 General Information

E. The State Commission on Higher Education shall prescribe uniform rules for application of the provisions of this section and shall provide for annual review of the same.

Exception. Title 59, Chapter 101, Section 60, Code of Laws of South Carolina 1976, provides: "That the wives and children of members of the Armed Services and Federal employees stationed in South Carolina shall have the privilege of attending the State's educational institutions of higher learning for the fees charged to residents of this State; and where such military personnel or employees are ordered away from the State, their wives and/or children may continue to have this privilege while they attend these institutions."

Proof. Any student or prospective student in doubt concerning entitlement to payment of resident tuition and fees has the responsibility for securing a ruling by providing to the Dean of Admissions and Registration, on special forms provided for the purpose, all relevant information.

HOUSING

University residence halls will accommodate 5,354 students, two residents being assigned to a room. All residence halls are fully air-conditioned, and each bedroom is furnished in a manner that provides maximum comfort. The Clemson House which is located on the campus accommodates an additional 307 students.

Students who are assigned a room in University residence halls will be required to sign a residence hall contract relating to terms and conditions of occupancy for the full academic year. All students, regardless of whether they live in residence halls or off campus, must complete a locator card as part of the registration process and report all changes of address to the Student Locator Office.

Complete information to include application forms, description of residence halls, and contract will be forwarded by the Housing Office to all new students who have been accepted for enrollment. Former students should write directly to the Housing Office for information concerning housing. A \$75.00 advance payment must accompany the residence hall application. This amount is credited to the fall semester's room rent and is refundable only under the conditions outlined in the contract.

MARRIED STUDENT HOUSING

Clemson provides comfortable and economical housing for its married students. There are three housing areas consisting of 100 single Prefab units, 100 East Campus apartments contained in 50 duplex buildings, and 50 Littlejohn apartments in eleven buildings.

All married student housing units have two bedrooms, living room, kitchen, and bath. East Campus apartments are the newest and are equipped with range and refrigerator. The Littlejohn apartments and Prefabs are not equipped with ranges and refrigerators.

Brochures describing married students' housing, and rental-rate listings may be obtained by writing to the Housing Office, Mell Hall, Clemson University, Clemson, South Carolina 29631.

STUDENT FOOD SERVICE

The University dining halls provide food service plans for students as follows:

1. Five-Day Board Plan (15 meals), Monday through Friday holidays excluded. The fee for this plan is \$570 per year and may be paid in two installments—one-half at the beginning of the first semester and the remainder at the beginning of the second semester.

2. Seven-Day Board Plan (21 meals), Monday through Sunday holidays excluded. The fee for this plan is \$680 per year and may be paid in two installments—one-half at the beginning of the first semester and the remainder at the beginning of the second semester.

Both the Five- and Seven-Day Board Plans will begin immediately after the student obtains a meal ticket and will terminate on the day scheduled for graduation. (Five-Day Board Plan tickets will not be issued on Saturdays or Sundays.)

3. Individual Meals. Students who are not on a board plan may purchase individual meals at prevailing prices. A la carte service will be offered in student dining halls only on special occasions.

All students who enter the University for the first time from high school or preparatory school and who live in University residence halls are required to subscribe to either the Five- or Seven-Day Board Plan. Either plan is recommended to upperclassmen who reside in University residence halls.

Upperclassmen and graduate students have the option at the time of their enrollment of electing either the Five- or Seven-Day Board Plan provided they agree to pay a board-plan fee for the period of their enrollment during the academic year.

Students may change from the Five- to the Seven-Day Board Plan at any time during the academic year by paying the added cost. Those desiring to change from the Seven- to the Five-Day Board Plan may do so at the semester-payment period. Refunds, when authorized, will be made on a pro rata basis.

A student having selected a board plan for the academic year may not discontinue the plan as long as he remains enrolled, except in the case of marriage or circumstances which are determined by the University to be beyond his control.

LAUNDRY AND DRY CLEANING

A plant with modern equipment is conveniently located on campus to service the laundry and dry-cleaning requirements of the student. Reasonable prices are charged for individual items on a cash-andcarry basis.

The University will not be liable for lost or damaged items unless reported within two days after the delivery date, and then for not more than the actual depreciated value of such articles as have been lost or damaged.

Coin-operated washing machines and dryers are available in the laundry building and several of the dormitories.

A student linen-rental service is also available. Information regarding this service will be forwarded to students who are accepted for enrollment in the University.

STUDENT HEALTH SERVICE

Student Health Service: Cost per Semester \$45.00. Payment of the Student Health Service fee is required of all students living in University residence halls and all full-time students even though they do not reside in University housing.

The Student Health Service is housed in the Redfern Health Center and is complete with outpatient department and a 34-bed hospital. A full-time staff consists of four physicians, including the director, two psychiatrists (also part-time psychologists), thirteen registered nurses, one registered X-ray technician, two registered laboratory technicians, and a registered pharmacist. In addition, a sufficient number of nurses' aides, secretarial workers, orderlies and maids for 24-hour-a-day operation are employed. The best of modern equipment is available for student use. Regular office hours are maintained, plus the services of the nursing staff for minor ailments after hours. One physician is on call at night for emergencies whenever the school is open. The Health Service is closed between semesters.

The Student Health Service at Clemson University has several important functions. All of these are aimed at keeping the student in good health so that he may effectively pursue his school work. There is, of course, the basic function of medical care for the ill and injured. This is a vital part of its work. In addition to this, the Student Health Service attempts to put strong emphasis on health rather than illness. This begins with the entrance medical form. In laying out this form an attempt is made to get information, examinations, and preventive medical procedures carried out to better equip the staff in protecting the student from illness and to serve as a guide for the care of preexisting medical problems.

As the student progresses through his academic experiences, other procedures may be required or highly recommended. These are primarily an effort to teach the individual self-responsibility for maintenance of his own health, protection of the health of those around him, and location of possible hidden diseases. The Health Service also has the position as the source of medical information as well as responsibility for indicated medical action: diagnostic, therapeutic, and preventive.

The medical fee paid by each student covers the services of the University physicians, the Health Service staff, and equipment for most illnesses and injuries occurring on or around the campus. This coverage is given under conditions similar to that of one's own physician.

The fee does not cover routine physical examinations for employment or transfer to another school, fees for outside physicians when called in for consultation, medical or surgical services performed away from the University, or for accidents occurring off the campus.

A complete pharmacy is maintained and dispenses medication to students as prescribed by the staff physicians.

Ambulance transportation to a general hospital for serious illnesses or injuries occurring on campus will be arranged; however, expenses for this service are the responsibility of the student. Transportation for less urgent ailments and routine visits can be arranged through the Health Service at the expense of the student.

MEDICAL QUESTIONNAIRE

Completion of a medical history questionnaire is required of all new students entering Clemson University for the first time. This is to be completed by the student and mailed directly to Redfern Health Center, Clemson University, Clemson, South Carolina 29631. Some help may be needed from parents or family physician concerning necessary details about early childhood illnesses and immunizations.

It is highly recommended that students have a current tetanus toxoid series or booster within ten years and immunization against poliomyelitis, diptheria, measles, and mumps.

ACCIDENT AND SICKNESS INSURANCE

An accident and sickness insurance plan is available to all full- and part-time students and their dependents. Information concerning the insurance program is sent to students and parents with the fall semester prepayment material. Additional information may be obtained from the Office of Student Affairs. This insurance is designed to cover major medical expenses not covered by the Health Service.

GUIDANCE SERVICE

Guidance has an important role at all levels of education and particularly so during times of transition and articulation. To assist students in this period of emotional and academic adjustment, an orientation and counseling program has been established.

At the beginning of his university career, each student is assigned to a faculty adviser selected from his academic college. The faculty advisers provide information on courses of study, approve class schedules, interpret academic regulations, make requests, and suggest adjustments in making satisfactory progress toward graduation.

The residence hall program is organized to cope with personal problems and questions regarding procedures and policies of college life. Residence hall counselors and supervisors are primarily concerned with maintaining an environment compatible to serious study and with the educational potential of group living.

COUNSELING SERVICES

The Counseling Center is located in Tillman Hall. A basic goal of the Counseling Center is to aid students in their personal development and academic success. Professional counselors offer services to all students and their spouses on a free, voluntary, and confidential basis so that they may attain their own goals as well as to make more meaningful contributions as members of our society. Assistance is offered on a one-to-one basis with personal, social, academic, and vocational concerns. In addition, students may participate in small groups designed to help in various areas including Study Habits, Personal Growth, Weight Control, Assertive Training, and Male-Female Relations. Testing is also available for helping students in vocational, personal, and social areas. Files and books on career information are available at the Counseling Center.

CAREER SERVICES

Career planning and development opportunities are available to students who desire information and assistance concerning their involvement with the world of work. These services are provided by the Office of Cooperative Education and the Office of Placement, located on the eighth level of the Edgar A. Brown University Union.

Cooperative Education Program. The Cooperative Education Program is a planned program in which students at the University combine alternate periods of academic study and periods of related work with a participating business, industry, agency, or organization. The work periods normally take place during the sophomore and junior years (including summers), while the freshman and senior years are spent in full-time study.

Students qualify for participation in the Cooperative Education Program by satisfactory completion of thirty semester hours of academic work. Transfer students may qualify in one semester. Three, four, or five co-op work periods are projected and included in each student referral. Usually two students from the same academic area are paired to fill a full-time work position with a participating employer. While one student is at work, the other is enrolled in classroom study at the University. All co-op student referrals are made by the Office of Cooperative Education to participating employers. Each cooperative education student who has fulfilled the academic requirements for graduation and has successfully completed a minimum of three or more work periods will be awarded a Cooperative Education certificate.

The Cooperative Education Program is offered to students enrolled in academic departments or programs in the Colleges of Agricultural Sciences, Architecture, Education, Engineering, Industrial Management and Textile Science, Liberal Arts, and Sciences.

A continuous enrollment fee of \$15.00 is assessed each cooperative education student for each work period.

All students desiring to enter the program are requested to schedule an interview with officials in the Office of Cooperative Education where application forms and additional information are available.

Placement Service. The University Placement Office provides assistance to students who seek summer or permanent employment. The Office does not place candidates but assists them by providing counseling and seminars on career planning, job search, resume preparation, and interview techniques. Students are also encouraged to utilize the Placement Library consisting of reference books and literature provided by companies and agencies.

The Placement Office coordinates and plans campus interview visits with representatives from business, industry, and government agencies. These interviews are scheduled in the fall and spring semesters for qualified seniors or graduate students who are registered with the Placement Office. Schedules will be published in the *Placement Bulletin* which is posted on all department bulletin boards and in *The Tiger*, the campus newspaper.

Alumni seeking employment are encouraged to utilize the services of the Placement Office. They can be added to the mailing list and receive the *Placement Bulletins* listing career opportunities and/or be referred to prospective employers.

UNDERGRADUATE FINANCIAL AID

The Office of Student Financial Aid, operating in conjunction with the University Honors and Awards Committee, is responsible for coordinating all types of financial assistance administered by the University. Currently available financial aids consist of scholarships, student loans, grants, and part-time employment. Sufficient aid is programmed to meet the requirements of all students meeting the criteria of financial need as determined by College Scholarship Service and academic ability/potential as evidenced by achievement at Clemson or, for entering students, high school records and College Entrance Examination Board Scholastic Aptitude Test scores.

Cutoff dates for Receipt of Applications are February 1 for Grants and Scholarships and June 1 for Loans.

A brochure describing financial aid programs and procedures for making application may be obtained by writing to the Office of Student Financial Aid, Clemson University, Clemson, South Carolina 29631.

EDUCATIONAL BENEFITS FOR VETERANS AND WAR ORPHANS

The Veterans Administration provides educational assistance for veterans and children of deceased or totally disabled veterans who meet requirements of applicable laws and regulations. Any veteran or child of a deceased or totally disabled veteran should communicate with the nearest Veterans Administration Office to determine whether or not he is entitled to any educational benefits.

THE J. E. SIRRINE TEXTILE FOUNDATION

Funds in this foundation were contributed by the members of the textile industry in South Carolina. Income from this fund is administered by the trustees of the J. E. Sirrine Textile Foundation. They have used the income to benefit textile teaching and research at Clemson University. Under the present system it is used to (1) supplement University travel funds for faculty members; (2) sponsor the college library; (3) provide supplement to the salaries for two major professors; (4) provide eight undergraduate scholarships and five graduate fellowships annually, one of which may be held by a faculty member; (5) sponsor annual seminars for South Carolina high school counselors; (6) support special research projects; and (7) sponsor the *Clemson University Review of Industrial Management and Textile Science*—a professional journal.

CLEMSON UNIVERSITY FOUNDATION

The Clemson University Foundation, comprised of twenty-one directors, is an incorporated tax-exempt foundation organized exclusively to help support the educational programs of Clemson University. Presently there are six committees composed of alumni and nonalumni to procure contributions to advance the educational mission of Clemson University. The committees are as follows: Investment Committee, Alumni Liaison Committee, Deferred Gifts Committee, Business and Corporate Committee, Agriculture Committee, and Committee on Foundations. As of December 1976, the total assets of the Clemson University Foundation, including Permanent Endowment, exceeded \$2,700,000. Information concerning the operation of the Clemson University Foundation may be obtained by contacting the Office for Development.

HONORS AND AWARDS

The University offers a number of awards for outstanding achievement in specific fields and endeavors. Recipients are chosen by selection committees and are announced at the annual Honors and Awards Day program or other appropriate ceremonies. Detailed information relating to such awards is available in the offices of the academic deans and department heads.

ALUMNI RELATIONS

The Office of Alumni Relations coordinates all functions and services of the Alumni Association. The director of alumni relations is secretary of the Clemson Alumni Association and the Clemson Foundation through election by the governing boards of these two organizations.

Accurate records of addresses and information concerning alumni are compiled by this office which also publishes a magazine and newspaper for distribution to the alumni and friends.

The purpose of the Alumni Association is to serve the University, its students, and its alumni. The Association holds its regular annual meeting at the University each June. Additional meetings are in January and at Homecoming in the fall. Active membership is made up of former Clemson students and parents of students who participate in the Clemson Alumni Loyalty Fund for the purpose of providing supplementary financial aid to the educational programs of the University.

RESERVE OFFICERS' TRAINING CORPS (ROTC)

The Departments of the Army and the Air Force both maintain ROTC units at Clemson University. The mission of the ROTC is to produce officers having leadership qualities and attributes essential to their progress and continued development as commissioned officers in either the Army or the Air Force of the United States. A four-year program, consisting of the basic course for freshmen and sophomores and the advanced course for juniors and seniors, is offered by both services.

Qualifications for basic ROTC enrollment are good moral character, physical qualification, and signing of a loyalty certificate. Eligibility for Advanced ROTC is determined by a written Officer Qualification Test administered during the basic course.

Advanced course students receive \$100 per month during each academic year. For the summer four-week field training course received by Air Force cadets and the six-week advanced camp received by Army cadets, pay is at the rate of one-half the base pay for a Second Lieutenant. A \$25 refundable uniform deposit is required for basic students.

Basic course credit can be awarded students having one or more years of active military service or two or more years of Junior ROTC. These students should contact the Professor of Military Science (PMS) or Aerospace Studies (PAS) concerning accreditation. A two-year program is also available for those students unable to take the basic course. Scholarships are available to selected ROTC students who are strongly motivated toward a career in the military. Each scholarship pays for tuition, books, and laboratory expenses, in addition to \$100 per month during the school year for the duration of the award.

For selected male Air Force students in the advanced course, flight training at Government expense is available during the senior year.

Ample opportunity for graduate study exists in both services. Those who prefer to attend graduate school immediately upon graduation may do so with approval of their military department.

Active Duty Obligations are as follows: Flying officers—five years from completion of flying training for Air Force, three years for Army; Nonflying officers—four years for Air Force, three years for Army.

All Clemson University graduates who successfully complete the Advanced ROTC program will be commissioned Second Lieutenants in the Army or Air Force.

HISTORY

It was the fall of the year and likely one of those blustery days as the horsedrawn carriage slowly rolled to a stop on a Pendleton road in 1886.

The driver, a tall, distinguished-looking man in his late 70's peered from the carriage as if looking for someone he knew. Soon, another aged man approached the carriage, exchanged greetings with the first, and the two men—Thomas Green Clemson and Senator Benjamin Ryan Tillman—drove away together toward historic Fort Hill, a plantation some four miles away and the former homestead of John C. Calhoun, Clemson's late father-in-law.

Mr. Clemson had invited Senator Tillman to his home to discuss their mutual conviction that South Carolina needed a separate college devoted to industrial and scientific education. At Fort Hill, they met with Colonels D. K. Norris and R. W. Simpson. There the four "spent nearly the whole day in talking over the new project which Mr. Clemson had in mind and which he unfolded to us," Tillman later wrote.

Perhaps the most significant result of this conference was Mr. Clemson's decision to change a will he had made three years earlier and to execute a new will so as to serve better the great purpose which he had had in mind for many years.

Although his will of 1883 sought to provide for establishment of a scientific institution upon the Fort Hill place, Mr. Clemson later decided that his intention and purpose as stated in that will might be misunderstood. In his new will, executed November 6, 1886, Mr. Clemson wrote that he desired to make his purpose plain and to make some other changes in the disposition of his property. He clearly explained the nature and purpose of his proposed institution, the establishment of which "is now the one great desire of my life."

"It should afford thorough instruction in agriculture and the natural sciences connected therewith; it should combine, if practicable, physical and intellectual education, and should be a high seminary of learning in which the graduate of the common schools can commence, pursue and finish the course of studies terminating in thorough, theoretic and practical instruction . . ."

The first item of the new will concerned disposition of the 814 acres of the Fort Hill place and was largely taken from the 1883 will.

The will gave to the State all that part of the Fort Hill Estate inherited by Mrs. Clemson (the former Anna Maria Calhoun who died in 1875, thirteen years before her husband) from her mother and the bulk of Mr. Clemson's other real and personal property. The latter amounted to a sum which, considering the purchasing power at the time, probably has been only a few times exceeded in a public benefaction in South Carolina.

Mr. Clemson's will also provided for a seven-member Board of Trustees that would govern and manage the new institution. Named were Colonels Simpson and Norris, M. L. Donaldson, R. E. Bowen, B. R. Tillman, J. E. Wannamaker, and J. E. Bradley who with those chosen by the General Assembly would constitute a governing board if the State accepted the bequest; but, who, in the event the State declined the bequest, would alone constitute a governing board for a private institution.

These seven trustees, along with other friends of the movement and the agricultural groups in the State, developed and organized a public opinion favorable to the plan.

In November 1889, the South Carolina General Assembly accepted the terms of Mr. Clemson's will and following the decision of the U.S. Supreme Court to uphold the will, the State of South Carolina and the full Board of Trustees proceeded to convert the dream of Thomas G. Clemson into the reality of Clemson College.

The institution formally opened in July 1893, with an enrollment of 446 students. The first graduating exercises were held in December 1896, with a graduating class of 37—15 in the agricultural courses and 22 in engineering courses.

The college was also established under the Morrill Land-Grant Act passed by the National Congress in 1862. Clemson University, therefore, is a member of the national system of Land-Grant Colleges and Universities. In 1964, in recognition of expanded offerings of the institution not only in the areas of agricultural and mechanical arts but also in the sciences and arts, the name of the institution was changed to Clemson University. This change by the legislature, effective July 1, 1964, followed a recommendation to that body by the Board of Trustees.

LOCATION

The University is located on the Fort Hill homestead of John C. Calhoun, in the foothills of the Blue Ridge Mountains. It has an elevation of 800 feet above sea level and commands an excellent view of the mountains to the north and west, some of which attain an altitude of over 5000 feet.

The University is located at Clemson, South Carolina, on the main line of the Southern Railway. U.S. Highways numbers 76 and 123 pass through Clemson, and daily bus service at regular intervals is available.

BUILDINGS AND GROUNDS

Campus architecture is a pleasing blend of the old and new complemented by a beautiful landscape of abundant trees, grassy expanses, and flowering plants and shurbs.

The campus proper consists of 600 acres. The academic buildings, student housing, service facilities and equipment are valued at \$125 million. Basically the campus is the site of Thomas Green Clemson's plantation, willed to South Carolina in 1888 for the establishment of the University. Fort Hill, former home of both Mr. Clemson and his father-in-law, John C. Calhoun, has been preserved at the center of the campus as a national shrine.

Challenges of the present—developing alternate energy sources and better conservation technology, improving agricultural production along with technology transfer, and improved health-care delivery—are symbolized by such buildings as the new multipurpose center for the College of Nursing. Clemson's long, rich tradition of education, scientific research, and public service is brought to mind by historic structures like Tillman Hall and its clock tower, focal point of the campus, whose cornerstone was laid in 1891.

Beyond the main campus, stretching into Oconee, Pickens, and Anderson counties are another 24,000 acres of farm and agricultural and forestry research lands. Throughout the State are 8,300 more acres devoted to Agricultural Experiment Station research and 4-H Club activities.

One of the central features of campus development is the Robert Muldrow Cooper Library with its large reflection pool. This beautiful structure houses some 650,682 volumes, 31,504 microcards, 16,800 reels of microfilm, and 263,874 units of microfiche. Also it is a selective depository for U.S. Government documents. It is the permanent home of papers and souvenirs of State Senator Edgar A. Brown, as well as valuable collections of papers and letters of John C. Calhoun, James F. Byrnes, and other famous South Carolina statesmen.

Facilities completed during the latter 1960's and early seventies include three high-rise residence halls which house 1,296 students, a low-rise dormitory, a 34-bed hospital and outpatient clinic, an East Campus cafeteria, an arts and sciences classroom building and 10-story faculty office tower, and the multipurpose J. C. Littlejohn Coliseum, which seats 10,500 people for basketball games and 12,000 for speaking engagements, concerts and other functions.

Teaching and laboratory facilities of the College of Agricultural Sciences are housed in the R. F. Poole Agricultural Center complex. Another grouping serves the College of Engineering, including Olin Hall for ceramic engineering and Earle Hall for chemical engineering. These two buildings and their excellent equipment represent gifts from the Olin Foundation totaling nearly \$2 million.

A major renovation of Sirrine Hall, home of the College of Industrial Management and Textile Science, was scheduled to begin late in 1977.

The College of Architecture is located in the modern, wellequipped Lee Hall. Other groupings of classrooms and laboratories serve the College of Education, College of Liberal Arts, and College of Sciences.

The newest major additions to the campus are Jordan Hall for biological sciences and a multipurpose center for the College of Nursing. Complete renovation and expansion of McAdams Hall agricultural engineering building was completed in 1976.

Also new is a complex for the College of Forest and Recreation Resources and College of Agricultural Sciences administration.

Other recent additions include Jervey Athletic Center, and expansion of Lee Hall which houses the College of Architecture, Edgar Allan Brown University Union and related facilities, and additions and renovations at Fike Recreation Center, including a natatorium with a standard Amateur Athletic Union size swimming pool with tartan deck and a diving tank.

The University's 17 residence halls for men and women accommodate 5,354 students. An additional 285 coeds are housed at the Clemson House, a multipurpose facility. Living accommodations for married students are provided in 307 individual units and apartments.

Scholastic Regulations

Academic Standards. Proper discharge of all duties is required at Clemson University, and a student's first duty is his scholastic work. All students should be thoroughly acquainted with and cognizant of these basic requirements.

The Credit System. The semester hour is the basis of all credits. Generally, one recitation hour or three laboratory or shop hours a week for a semester constitute a semester hour. Thus, in Engl 101, English Composition, 3 cr. (3,0), as you will find this subject listed in the Degrees and Curricula, the student takes three semester hours. When he completes this course satisfactorily, he is granted three semester credit hours on his record. The notation "3 cr. (3,0)" means that the course carries three credits, has three clock hours of theory or recitation per week, and no laboratory hours. Ch 101, General Chemistry, 4 cr. (3,3), carries four semester hours, has three hours of theory, and a three-hour laboratory period.

Semester Grades. The standing of a student in his work at the end of a semester is based upon daily classwork, tests or other work, and the final examinations. Faculty members may excuse from the final examinations all students having the grade of A on the work of the course prior to the final examination, but for all other students written examinations are required in all subjects at the end of each semester, except in certain laboratory or practical courses in which final examinations are not deemed necessary by the department faculty.

Scholastic reports are mailed to students four times each year, including a preliminary statement of progress near the middle of each semester and a final report at the end of each semester.

The Grading System. The grading system is as follows:

A—*Excellent*. Indicates that the student is doing work of a very high character. The highest grade given.

B—Good. Indicates work that is definitely above average, though not of the highest quality.

C-Fair. Indicates work of average or medium character.

D—Pass. Indicates work below average and unsatisfactory. The lowest passing grade.

F—Failed. Indicates that a student knows so little of the subject that it must be repeated in order that credit may be received.

I—Incomplete Work. Indicates that a relatively small part of the semester's work remains undone. Grade I is not given a student who has made a grade F on his daily work. Students are allowed thirty days after the beginning of the next semester in which the student is enrolled to remove the incomplete grades unless (1) an extension of time is approved by the instructor concerned, or (2) within one year of residence after receiving such a grade, a student repeats the conditional course satisfactorily at Clemson, in which case no credit hours taken shall be recorded for the grade of I. A student who elects to repeat an incomplete course is responsible for notifying the Office of Admissions and Registration of his election during the semester in which the course is taken. This election applies only to the first time that a course is repeated.

In order to make up incomplete work, the student should request the Office of Admissions and Registration to send a makeup card to the instructor concerned for reporting makeup grades.

W—Withdrew. This grade indicates that the student withdrew from the course. No credit hours taken are recorded for the grade of W provided that the course is dropped prior to the last five weeks of classes in the semester. A student enrolled during any part of the last five weeks of classes shall have final grades recorded.

Pass-Fail Option. Juniors or seniors enrolled in a four-year curriculum may take four courses (maximum of 15 credit hours), with not more than two courses in a given semester on a pass-fail basis. Transfer and five-year program students may take pass-fail courses on a pro rata basis.

Required courses or courses that are needed to fulfill departmental requirements may not be taken pass-fail.

Letter-graded courses which have been failed may not be repeated pass-fail.

Honors Program may exercise an option as to acceptance of passfail grading for Honors courses.

Registration in pass-fail courses will be handled in the same manner as for regular enrollment. Departmental approval must be obtained via approval form and returned to the Office of Admissions and Registration in accordance with the University Calendar for adding courses. Instructors will submit letter grades to the Office of Admissions and Registration. These grades will then be converted as follows: A, B, C to P (pass); D, F to F (fail). Only P (minimum letter grade of C) or F will be shown on a student's permanent record and will not affect the grade-point ratio.

If a student changes to a major which requires a previously passed course, and this course has been taken pass-fail, he may request either to take the course on a letter-graded basis, the P be changed to C, or substitution of another course.

In the event limited enrollment in a class is necessary, priority will be given as follows: majors, letter-graded students, pass-fail students, and auditors.

Dropping Classwork. A subject dropped after the first four weeks of classwork and prior to the last five weeks is recorded as W—Withdrew.

Removal of Failures. A student who has failed (made a grade F) in a subject cannot receive credit for that subject until it has been satisfactorily repeated hour for hour in class, except that in the case of correlated laboratory work, the number of hours to be taken shall be determined by the instructor. Where separate grades for class and laboratory work are given, that part of the subject shall be repeated in which the failure occurs.

Rescheduling Courses Failed. A student who wishes to reschedule a course he has failed must do so within his next year of residence, or if the course is not offered during this year of residence, he must reschedule the course the first time it is offered thereafter during his attendance at Clemson.

Rescheduling Courses Passed. A student may repeat a course he has passed with a grade lower than B provided he does so within three semesters of residence after the completion of his original enrollment in the course.

Scheduling Remedial Mathematics. Any student who has passed a course in freshman mathematics is ineligible to enroll in Remedial Mathematics.

Advanced Placement and Credit by Examination. In addition to earning credit by the usual method involving classroom attendance, a student may receive credit toward his degree by completing a course successfully by examination only. Freshmen interested in exempting some of the elementary courses in this manner should participate in the College Board Advanced Placement Examination program and have the results of these tests sent to Clemson. Certain departments will also grant credit for successful completion of College-Level-Examination Programs (CLEP) subject examinations which are administered by the College Board.

Credit may be earned by enrolled students by means of a special examination without the necessity of class attendance subject to the following requirements:

1. The applicant must present evidence which would indicate that he has received training or taken work which is approximately equivalent to that given in the course at Clemson for which an examination is requested and that an examination is warranted.

2. The applicant must not have previously failed or audited the course at Clemson.

3. The applicant must apply in writing for the examination and the request must be approved by the instructor, head of the department in which the course is taught, dean of the college in which the course is taught, and the Dean of Admissions and Registration. Application forms are available in the Office of Admissions and Registration.

4. Credit (CR) will be awarded for acceptable work in lieu of letter grades in recognition of college-level achievement as determined by College Board Advanced Placement Examinations, College-Level-Examination Program subject examinations, institutional special examinations, and similar instruments.

Work Taken at Another Institution. Clemson students may receive credit for work taken at another institution; however approval of the work should be obtained by the student prior to scheduling the work. Information and forms relative to this approval may be obtained in the Office of Admissions and Registration. By obtaining advance approval, the student is assured of receiving proper credit at Clemson provided he passes the work with a grade of C or higher.

Classification. All new students are classified as freshmen unless they have attended another college prior to entrance. Students who have completed college work elsewhere will be classified on the basis of semester hours accepted at Clemson rather than the amount of work presented. In order to be classified as a member of any class other than freshman, students must meet the credit-hour requirements indicated below:

Sophomore—30 credit hours Junior—60 credit hours Senior—95 credit hours

Regular Advancement in Classification. All students are urged to meet the requirements for sophomore classification by the beginning of the second year, for junior classification by the beginning of the third year, and for senior classification by the beginning of the fourth year.

Credit Load. Except for an entering freshman who is restricted to the curriculum requirements of his major course, the credit load for an undergraduate must be approved by his class adviser. The class adviser will approve a credit load deemed in the best interest of the student based on such factors as course requirements, gradepoint ratio, participation in other activities, and expected date of graduation.

Since grades are an important factor in determining credit loads, the student should be guided by the following table in presenting his schedule to his class adviser for approval:

Grade-Point Ratio (Semester or Cumulative, Whichever Is Higher)	Recommended Maximum Number of Semester Hours to Be Scheduled
0.00 to 0.99	15 to 16
1.00 to 1.99	16 to 18
2.00 to 2.99	18 to 20
3.00 to 4.00	20 to 22

ROTC Credit. Ten hours of aerospace studies or military science may be counted toward the baccalaureate degree in any curriculum.

Grade Points. Four grade points are assigned for each credit hour on which the student receives the grade of A, 3 grade points for each credit hour of grade B, 2 grade points for each credit hour of grade C, and 1 grade point for each credit hour of grade D. No grade points are assigned for grades F, I, or W.

Grade-Point Ratio. In calculating a student's grade-point ratio, the total number of grade points accumulated by the student is divided by the total number of credit hours taken by the student at Clemson during the semester, session, or other period for which the grade-point ratio is calculated.

The grade-point ratio of students entering the University for the first time will be determined as follows: Students entering during the summer sessions or fall semester will have only those courses passed for credit during the summer sessions and/or the following fall semester counted toward their grade-point ratio; students entering the spring semester will have only those courses passed for credit during the spring semester and/or the following summer sessions counted toward their grade-point ratio. Although only passing grades are used in calculating grade-point ratios under the provisions of this paragraph, all grades remain a part of the permanent academic record. This policy does not apply to transfer students. This policy concerning the determination of the gradepoint ratio of students entering the University for the first time who have not previously attended another college will not apply to students who enter Clemson University on or after May 21, 1979.

Minimum Requirements for Continuing Enrollment. At the end of the academic year in May, all student records are inspected for quality. At that time in order to be able to continue enrollment after the following summer session, a student is required to achieve a cumulative average on the designated total hours attempted at Clemson as follows:

Hours Attempted	Required Minimum
at Clemson	Cumulative Average
12-59	1.4
60-89	1.6
90 or more	1.8

A student completing a regular session has the privilege of continuing his enrollment through the immediately following summer session at Clemson in an effort to meet the above requirements.

A student who has taken fewer than 90 credit hours at Clemson and who fails to meet the required grade-point ratio, as indicated in the table above, may apply for readmission after a minimum of one semester has elapsed. A student who has taken 90-or-more credit hours and fails to meet the required grade-point ratio is permanently ineligible for readmission. Any exceptions to these minimum requirements for continuing enrollment and readmission must be approved by the Committee on Admissions and Continuing Enrollment.

Withdrawal from the University. A student may withdraw from the University any time before the last five weeks of classes in the semester without having grades recorded. A student enrolled during any part of the last five weeks of classes shall have final semester grades recorded.

After the first withdrawal from the University the student is eligible to continue his enrollment the following semester, provided he meets other applicable regulations. For each succeeding withdrawal, however, the student shall be ineligible to continue his enrollment the following semester unless there are extenuating circumstances approved by the Committee on Admissions and Continuing Enrollment. Ineligibility to continue the following semester also includes any intervening summer school.

A student who has been credited with 90-or-more credit hours of work taken at Clemson shall be permanently ineligible for readmission (regular or summer sessions), if at the time of withdrawal his cumulative grade-point ratio is below the requirement for continuing enrollment. **Class Attendance.** Regular and punctual attendance at all class and laboratory sessions is the responsibility of each student. College work proceeds at such a pace that regular attendance is necessary in order for each student to obtain maximum benefits from instruction. All absences are matters to be resolved between the instructor and the student. In the event that a student finds it necessary to be absent from a class, it is the student's responsibility to make up resulting deficiencies.

In an early class the instructor shall inform the students of the attendance policy for that class. (Departments may establish uniform attendance policies for multiple section courses.) A student who incurs excessive absences may be dropped from a course by the instructor.

Students desiring to withdraw from a class must secure a drop card from the Registrar's Office prior to terminating attendance. A student enrolled in the last five weeks of classes shall have final grades recorded.

Course Prerequisites. Prerequisites for individual courses are enumerated under the course listings in the Description of Courses. In addition to these requirements, colleges and departments may also establish other standards as conditions for enrollment. In the College of Engineering a grade-point ratio of 1.8 or higher is required for registration in all engineering and engineering technology courses numbered 300 or higher. In the College of Nursing, a grade-point ratio of 2.0 or higher is required for registration in all nursing courses numbered 300 or higher. The College of Education requires a cumulative grade-point ratio of 1.6 or higher to enroll in 300-level education courses and a cumulative grade-point ratio of 1.8 for 400-level education courses. Directed teaching and teaching methods courses require a minimum cumulative gradepoint ratio of 2.0. Effective with the fall 1977-78 class of freshmen, students must have a cumulative grade-point average of 1.8 or higher to enroll in 300-level education courses and a cumulative grade-point average of 2.0 or higher for all 400-level education courses.

Auditing Policies. Qualified students may audit courses upon the written approval of the professor, head of the department, and the dean of the college concerned, and must register with the Dean of Admissions and Registration. Auditors are under no obligation of regular attendance, preparation, recitation, or examination and receive no credit. Participation in classroom discussion and laboratory exercises by auditors is at the discretion of the instructor. A student who has previously audited a course is ineligible for credit by examination.

A full-time undergraduate student, with approval, may audit courses at no additional charge as long as the student's credit load, including the course audited, is approved by his class adviser.

A graduate student regularly enrolled for a minimum of six semester hours may, with approval, audit one additional course without charge.

Members of the University teaching staff and the professional staff in research and agricultural extension may, with approval, audit courses without charge. Other full-time University employees may audit without charge with the additional approval of the employee's immediate supervisor and the Comptroller.

Honors and Awards Day. Each spring an Honors and Awards Day is held for students who qualify for the honor list and for special awards. A cumulative grade-point ratio of 3.00 to 3.49 is required for listing with honor, 3.50 to 3.79 for high honor, and 3.80 or above for inclusion with highest honor.

Honors Program. The Honors Program at Clemson University provides for the fuller development of our most able students. They meet with outstanding professors and explore the subject matter of a course in greater depth than other students. To remain in the Honors Program a student must maintain a cumulative grade-point ratio of 3.0.

Admission to Honors work for incoming freshmen is by invitation. All other students are automatically eligible to take Honors classes if they have a grade-point ratio of 3.0 or better.

Planning and supervision of the Honors Program is done by an Honors Council composed of faculty members from each college. *The Honors Program Student Handbook* is available in the Honors Program Office, 416 Strode Tower, or from the Dean of Undergraduate Studies.

Students who graduate in the Honors Program will have this fact indicated on their diplomas.

Dean's List. At the end of the fall and spring semesters of each academic year, a Dean's List shall be compiled of all undergraduate students who have achieved a grade-point ratio of 3.5 or higher on a minimum of twelve semester credit hours of courses taken during the preceding semester. Courses taken on a Pass-Fail basis are excluded from this minimum requirement.

Honor Graduates. Graduates who meet the required qualifications are designated as having graduated with honor. A grade-point ratio of 3.00 to 3.49 is required for graduation with honor, 3.50 to 3.79 for high honor, and 3.80 or above for graduation with highest honor. Effective with the spring graduation of 1980, to be graduated with honors a student must have a minimum cumulative gradepoint ratio as follows: 3.40 for cum laude, 3.70 for magna cum laude, 3.90 for summa cum laude.

Undergraduate Candidate. A candidate for an undergraduate degree is a student who has turned in a completed diploma application by the deadline prescribed in the University Calendar for a particular graduation date.

Residence Requirement for Graduation. In order to qualify for an undergraduate degree, a student must spend at least the last year of residence at Clemson and complete at Clemson a minimum of 30 of the last 36 credits presented for the degree.

Examination on F Received in Last Semester. A candidate for a degree who, in the semester immediately prior to graduation, fails to graduate because of an F on one course taken in that semester may stand a special examination on the course provided:

1. That the candidate can furnish evidence of having done satisfactory study for the examination.

2. That the examination is not given until after the regular degree date.

3. That the candidate has fulfilled, prior to the due date for candidates' grades, all other requirements for his degree except those which can be fulfilled by passing the examination.

4. That the candidate by removing the F by examination will finish all requirements for his degree which will be awarded on the next regular date for award of degrees.

The privileges of this provision will be extended to the candidate who meets the stated requirements above, but fails to graduate because of an F on one course taken the last time the course was offered, and for which no acceptable substitute has been offered since the course was failed as attested to by the candidate's major department head and the head of the department in which the failed course was offered. In no way will this exception be interpreted to permit more than one special reexamination on an F.

Make-up of I's Received in Last Semester. A candidate for a degree who in the semester immediately prior to graduation receives one or more grades of I shall have an opportunity of removing the unsatisfactory grades provided the final grades are received in the Office of Admissions and Registration by the time grades for candidates for graduation are due.

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A candidate who qualifies for graduation under this regulation will be awarded his degree on the regular date for the award of degrees.

Special Graduation Requirements. A cumulative grade-point ratio of 2.0 is required for graduation. Candidates for degrees are required to apply for their diplomas within three weeks following the opening of the final semester or the opening of the summer session prior to the date the degrees are to be awarded. These applications should be filled out in the Office of Admissions and Registration on the regular blanks provided.

All work for a degree must be completed, all financial settlements made, and all government property and library books returned by 5 p.m. on the Tuesday preceding graduation.

A student in line for graduation at the end of this semester who fails to graduate because of an F on one course taken this semester may stand a special examination under certain conditions on the course *after the regular degree date*. A senior who qualifies for graduation under this provision will be awarded his degree on the *next regular date* for the award of degrees. For further information see paragraph Examination on F Received in Last Semester.

A student in line for graduation at the end of a semester or summer term who meets all requirements for graduation except for a deficiency in his grade-point ratio resulting from a deficiency of not more than six grade points shall have the privilege of making up his deficiency by standing special reexaminations under certain conditions.

The examinations shall be taken after the regular degree date and in courses totaling not more than six semester credit hours which were passed during the last year of residence, and only one such examination may be taken on an individual course. When such examinations are taken under the above provision, the credit hours of the course or courses will not be counted as additional credit hours taken. Only the grade points over and above the grade points previously earned in the course may count toward raising the grade-point ratio.

A student who qualifies for graduation under this provision will be awarded his degree on the next regular date for the award of degrees.

If all work toward a degree is not completed within five years after entrance, the student may be required to take additional courses.

Degrees and Curricula

UNDERGRADUATE CURRICULA AND DEGREES OFFERED

Undergraduate curricula are offered under the colleges of Agricultural Sciences, Architecture, Education, Engineering, Forest and Recreation Resources, Industrial Management and Textile Science, Liberal Arts, Nursing, and Sciences.

The University grants the following degrees upon satisfactory completion of the requirements prescribed by the colleges listed:

Curriculum	Degree	Curriculum	Degree
College of Agricultural Science Agricultural Economics Agricultural Education ¹ Agricultural Engineering ²	B.S. B.S. B.S.	Science Teaching Biological Sciences Chemistry Earth Science	B.S.
Agricultural Mechanization ar Business	B.S.	Mathematical Sciences Physical Sciences	
Animal Industries Animal Science Dairy Science Poultry Science	B.S.	Secondary Education Economics English History	B.A.
Community and Rural		Mathematical Sciences	
Development Economic Biology Economic Zoology Entomology Plant Pathology	B.S. B.S.	Modem Languages Natural Sciences Political Science Psychology Sociology	
Food Science Plant Sciences Agronomy—Crops and Soil Horticulture—Fruit and Vegetable Horticulture—Ornamental Horticulture—Turfgrass	B.S. B.S. Is	College of Engineering Agricultural Engineering ² Ceramic Engineering Chemical Engineering Civil Engineering Electrical Engineering Engineering Analysis	B.S. B.S. B.S. B.S. B.S. B.S.
College of Architecture		Engineering Technology	B.S.
Architecture	B.Arch.	Mechanical Engineering	B.S.
Design ³ B. Building Science ³	A., B.S. B.S.	College of Forest and Recreation Resources	
College of Education Agricultural Education ¹	B.S.	Forest Management Recreation and Park	B.S.
Early Childhood Education	B.A.	Administration	B.S.
Elementary Education Industrial Education	B.A. B.S.	Wood Utilization	B.S.

Curriculum	Degree	Curriculum	Degree
College of Industrial Manag and Textile Science Accounting	gement B.S.	College of Nursing Nursing	A.A., B.S.
Administrative Management		College of Sciences	
0	B.A., B.S.	Biochemistry	B.S.
Financial Management	B.S.	Botany	B.S.
Industrial Management	B.S.	Chemistry	B.A., B.S.
Textile Chemistry	B.S.	Geology	B.A., B.S.
Textile Science	B.S.	Mathematical Sciences	B.A., B.S.
Textile Technology	B.T.T.	Medical Technology	B.S.
College of Liberal Arts		Microbiology Physics	B.S. B.A., B.S.
English	B.A.	Prepharmacy	Nondegree
History	B.A.	Prephysical Therapy	Nondegree
Modern Languages	B.A.	Zoology	B.S.
Political Science	B.A.		
Psychology	B.A.		
Sociology	B.A.		

For detailed information concerning the programs of study and requirements in the colleges, the section describing each college should be consulted.

BACHELOR OF ARTS AND BACHELOR OF SCIENCE IN PREPROFESSIONAL STUDIES

Clemson University will award the degree of Bachelor of Arts or Bachelor of Science in Preprofessional Studies to a student who has satisfactorily completed three years of undergraduate work in an appropriate curriculum and the first year of work in an accredited medical, dental, veterinary, law, or other accredited, professional, postgraduate school provided the student fulfills the requirements for the three-year program as follows and the other specified conditions are met.

- 1. At least two of the three years of preprofessional work, including the third year, must be taken in residence at this University.
- 2. A minimum of three years of undergraduate work (*i.e.*, preprofessional school credit) must be presented.
- 3. Normal progress must have been made toward fulfilling the degree requirements of the curriculum in which the student is enrolled at Clemson.
- 4. The student applying for the Bachelor of Arts or Bachelor of Science in Preprofessional Studies must be recommended

¹ Jointly administered by the College of Education and the College of Agricultural Sciences. ² Jointly administered by the College of Agricultural Sciences and the College of Engi-

³ The first degrees with the designations Design in lieu of Prearchitecture and Building Science in lieu of Building Construction will be awarded no earlier than May 1979.

by the college at Clemson in which the curriculum that he is majoring as a Clemson student is located or by the college in which three years of normal progress toward a degree can be identified.

5. If the combination of preprofessional work taken and the work in the first year of professional school is equivalent to that which is required in some other bachelor's degree program at Clemson, the college concerned may recommend the other bachelor's degree.

The above requirements and conditions became effective July 1, 1974, and will apply to all students who satisfy these requirements and conditions after that date.

A Clemson student having left the University before receiving the bachelor's degree (prior to July 1, 1974), and having enrolled immediately in an accredited, professional, postgraduate school may apply for a bachelor's degree from Clemson and have his application considered on an individual basis. The college or colleges at Clemson considering his application are authorized to examine the student's entire record in both preprofessional and professional studies and exercise their own judgment concerning the three-year requirement for preprofessional studies.

GRADUATE DEGREES

The degrees of Doctor of Philosophy, Education Specialist, Master of Arts, Master of Science, Master of Agricultural Education, Master of Agriculture, Master of Architecture, Master of City and Regional Planning, Master of Education, Master of Engineering, Master of Fine Arts, Master of Forestry, Master of Industrial Education, Master of Nutritional Sciences, and Master of Recreation and Park Administration are awarded to those students who satisfactorily complete prescribed graduate programs. The Master of Business Administration degree is available through a joint program with Furman University.

For further information concerning advanced degrees see *The Graduate School Announcements*, which may be obtained from the Office of the Dean of Graduate Studies and University Research.

Course Numbers

In the curricula which follow are given the official titles and number of the courses, the descriptive titles, the number of semester hours credit, and in parentheses, the number of hours per week in class and laboratory, respectively.

COLLEGE OF AGRICULTURAL SCIENCES

Modern agriculture is the science, business, and art of producing, processing, and distributing plant and animal products, including those aspects of economics and human relations connected with these activities. In addition to farm production, the total agricultural industry includes those businesses that provide supplies and services for farmers and process and distribute farm products. This total agricultural industry provides jobs for approximately onethird of the total labor force in this country.

The agricultural sciences are a unique area in education, because they apply the basic sciences to biological materials for economic implications.

The College of Agricultural Sciences offers programs leading to the Bachelor of Science degree in the following areas: Agricultural Economics, Agricultural Education,¹ Agricultural Engineering,² Agricultural Mechanization and Business, Animal Industries (majors in Animal Science, Dairy Science, and Poultry Science), Community and Rural Development, Economic Biology (concentrations in Economic Zoology, Entomology, and Plant Pathology), Food Science, and Plant Sciences (majors in Agronomy—Crops and Soils, Horticulture—Fruit and Vegetable, Horticulture—Ornamental, Horticulture—Turfgrass).

The College also offers programs leading to the Master of Agriculture, Master of Agricultural Education,¹ Master of Nutritional Sciences, and Doctor of Philosophy degrees.

AGRICULTURAL ECONOMICS

The curriculum in Agricultural Economics places emphasis on a strong background in economics with applications to agricultural and agriculturally related businesses. Also included are courses in basic agricultural and biological sciences, liberal arts, and business. Students with a major in Agricultural Economics now have the opportunity to further specialize by selecting a minor in *Business, International Agriculture, Science*, or a *Second Department*.

Employment opportunities open to graduates with degrees in Agricultural Economics are many. They include research and teaching in institutions of higher learning; sales and promotional work for a variety of businesses; management positions in the farm loan departments of private banks or with cooperative farm credit agencies; public relations activities for various firms; market managers and directors; county agents; representatives of government agencies serving agriculture; and operators of numerous enterprises.

¹ Jointly administered by the College of Agricultural Sciences and the College of Edu-² Jointly administered by the College of Agricultural Sciences and the College of Engineering.

FRESHMAN YEAR

First Semester

Second Semester

AGRIC 103 Intro. to Animal Ind. 3 $(2,3)$ AGRIC 104 Intro. to Plant Sci 3 $(2,3)$ BIOL 103 General Biology 1 3 $(3,0)$ BIOL 105 General Biology Lab. I 1 $(0,3)$ CH 101 General Chemistry 4 $(3,3)$ ENGL 101 English Composition 3 $(3,0)$	BIOL 104 General Biology II 3 (3,0) BIOL 106 General Biology Lab. II 1 (0,3) CH 102 or 112 General Chemistry 4 (3,3) ENGL 102 English Composition . 3 (3,0) MATH 105 Algebra and Trigo- nometry 2
	10 10 10 10 10 10 10 10 10 10 10 10 10 1
17	10

SOPHOMORE YEAR

ACCT 201 Principles of Accounting 3 (3,0) AGRON 202 Soils	ACCT 202 Principles of Accounting 3 (3,0) AG EC 202 Agric. Economics 3 (3,0) COMP SC 205 Elem. Comp. Prog. 3 (3,0) ENGL 231 Intro. to Journalism 3 (3,0) or ENGL 301 Pub. Speaking 3 (3,0) or ENGL 304 Adv. Comp 3 (3,0) HIST 102 History of the U.S 3 (3,0) Minor 3
	18

JUNIOR YEAR

AG EC 302 Management of Agri-	AG EC 352 Public Finance 3 (3,0)
cultural Enterprises	AG EC 460 Agricultural Finance and Rural Appraisal
ECON 302 Money and Banking . 3 (3,0) or PHIL 202 Intro. to Logic . 3 (3,0)	LAW 312 Commercial Law 3 (3,0) RS 301 Rural Sociology 3 (3,0)
ECON 314 Inter. Econ. Theory 3 (3,0) EX ST 301 Introductory Statistics 3 (2,2)	Elective
Minor 3	18
18	

SENIOR YEAR

AG EC 402 Econ. of Agric. Prod. 3 (3,0) AG EC 452 Agricultural Policy . 3 (3,0) GEN 302 Genetics 4 (3,3) or RS 401 Human Ecology 3 (3,0) Minor 3	AG EC 406 Seminar 1 (1,0) AG EC 456 Prices 3 (3,0) Minor 3 6 Elective 6 16 16
15	134 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Students who make a satisfactory score on the Mathematics Test, Level II (Standard) may schedule other mathematics courses or electives in lieu of Math 105. ³ See adviser for available minors and course requirements.

AGRICULTURAL EDUCATION

The Agricultural Education curriculum is designed for students who wish to prepare for positions in vocational agriculture, agricultural occupations, and other teaching positions in the secondary schools; engage in other forms of educational work such as agricultural missionary, public relations, and agricultural extension; farming, soil conservation, and other governmental work; business and industry.

The curriculum provides for a broad education in general and professional education including student teaching. In addition to required courses giving a thorough background in the agricultural and biological sciences, a student may minor in *Business, International Agriculture*, or a *Second Department*. Students in other departments in the College of Agricultural Sciences may minor in Agricultural Education and be certified to teach if they meet all requirements.

FRESHMAN YEAR

Second Semaster

First Semester

A list bemester	Second Semester
AGRIC 104 Intro. to Plant Sci 3 (2,3) BIOL 103 General Biology I 3 (3,0) BIOL 105 General Biology Lab. I 1 (0,3) CH 101 General Chemistry 4 (3,3) ENGL 101 English Composition . 3 (3,0) MATH 102 Intro. to Math. Anal.2 3 (3,0) 17	$\begin{array}{llllllllllllllllllllllllllllllllllll$

SOPHOMORE YEAR

AG EC 202 Agric. Economics 3 (3,0) AC ED 201 Intro. to Agric. Ed. 3 (2,3) AGM 205 Principles of Farm Shop 3 (2,3) PHYS 207 General Physics I 4 (3,2) Literature Requirement 1 3 (3,0) Elective	AGM 206 Agric. Mechanization . 3 (2,3)AGRON 202 Soils 3 (2,2)ENGL 231 Intro. to Journalism 3 (3,0)or ENGL 301 Pub. Speaking 3 (3,0)or ENGL 304 Adv. Comp 3 (3,0)FOR 305 Elements of Forestry . 2 (2,0)FOR 307 Elem. of Forestry Lab . 1 (0,3)Social Science Elective 3
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JUNIOR YEAR

AGM 301 Soil and Water	AG EC 302 Management of Agri-
Conserva	
ENT 301 General Entomology 3 (2,3)) or AG EC 402 Econ. of
Approved Agric. Econ. Elective 3	Agric. Prod
Approved Agriculture Elective 3	AGRON 452 Soil Fert. and Mgt. 2 (2,0)
Minor 4 6	AGRON 453 Soil Fert. Lab 1 (0,3)
	AN SC 301 Feeds and Feeding 3 (3,0)
18	Minor 4
	Elective 3

18

16

16

SENIOR YEAR

HORT 407 Landscape Design 3 (2,3) PL PA 401 Plant Pathology 3 (2,3) Minor 4 3 2 Elective 7 16	AG ED 401 Methods in Agricultural Education3 (2,3)AG ED 406 Directed Teaching6(0,18)AG ED 423 Curriculum2 (2,0)AG ED 425 Teach. Agric. Mech. 2 (1,3)ED 302 Educational Psychology3 (3,0)
	134 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Students who make a satisfactory score on the Mathematics Test, Level II (Standard) may schedule other mathematics courses or electives in lieu of Math 102. Students in-eligible for Math 102 will take Math 105. ³ To be selected from the following: Hist 101, 102, 172, 173, Phil 201, 325, Pol Sc 101, Psych 201, RS 301, 401, Soc 201. ⁴ See adviser for available minors and course requirements.

AGRICULTURAL ENGINEERING

The graduate in agricultural engineering, with broad training in mathematics, physics, chemistry, and the biological sciences as well as comprehensive coverage of the engineering sciences, is well equipped to apply engineering to many functions affecting the well-being of mankind. The agricultural engineer is sought by industry and public service organizations primarily for his ability to apply engineering know-how to agricultural production and processing and to the management of land and water resources. Specific areas of interest include power and machinery, soil and water resources engineering, electric power and processing, structures and environment, and food engineering.

The curriculum includes such engineering sciences as mechanics. fluids, thermodynamics, electrical theory, computing devices and systems analyses. The basic agricultural sciences of soils, plants, and animals are included to provide a foundation for agricultural engineering analysis and design. Also included are the important facets of energy conversion, engineering properties of biological materials, research methods, and use of economy and integrity in design.

Graduate programs lead to the Master of Science, Master of Engineering, and the Doctor of Philosophy degrees.

Opportunities for employment of agricultural engineering graduates include design engineers, research engineers, production engineers, or as sales engineers with industry; as teachers, research, extension, or field engineers with state and federal agencies; engineers in the private sector; and others.

FRESHMAN YEAR

First Semester

Second Semester

18

CH 101 General Chemistry 4 ENGL 101 English Composition	(3,0) (2,2) (4,0)	Basic Science 2
14	2	Diective

SOPHOMORE YEAR

AGE 221 Soil and Water Resources Engineering I EG 109 Engr. Graphical Com EM 201 Engr. Mech. (Statics) MATH 206 Calculus of Sev. Var. PHYS 221 Phys. with Cal. II Literature Requirement 1 Elective	$\begin{array}{c} 2 & (0,6) \\ 3 & (3,0) \\ 4 & (4,0) \\ 3 & (2,2) \\ 3 & (3,0) \end{array}$	AGE 212 Fund. of Mechanization 3 (2,3) EM 202 Engr. Mech. (Dynamics) 3 (3,0) MATH 208 Engineering Math. I. 4 (4,0) Humanistic–Social Elective 2 3 Plant Science Elective 2
Elective	1	17

19

IUNIOR YEAR

AGE 353 Computational Systems. 2 (1,3) AGE 355 Engr. Anal. and Creat. 2 (1,3) E&CE 307 Basic Elec. Engr 3 (2,2) EM 304 Mechanics of Materials. 3 (3,0) or EM 320 Fluid Mechanics 3 (3,0) Animal Science Elective 2 3 Engineering Science Elective 2 3	AGE 362 Energy Conv. in Ag. Sys. 3 (2,3) AGE 364 Ag. Waste-Mgt. Sys. 2 (2,0) AGE 433 Design Criteria for Plant and Animal Environment 2 (2,0) AGE 465 Engr. Prop. of Biol. Mat. 2 (1,3) PHYS 222 Phys. with Cal. III 3 (2,2) Engineering Science Elective 2 3 Soils Elective 2 3
16	18
SENIOR	
AGE 431 Agric. Structures Design 3 (2,3) AGE 471 Undergraduate Research 1 (0,3)	AGE 416 Agric. Machinery Design 3 (2,3) AGE 422 Soil and Water
ECON 200 Economic Concepts 3 (3,0) or ECON 201 Prin. of Economics 3 (3,0) Humanistic-Social Elective 2 3	Resources Engineering II 3 (2,3) AGE 442 Agric. Process Engr 3 (2,3) Engineering Science Elective 2 6
Mathematics Elective 2 3 (3,0) Elective	Elective
	18

138 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Electives to be selected in consultation with adviser. *Note:* Agricultural Engineering curriculum is jointly administered by the College of Agricultural Sciences and the College of Engineering.

AGRICULTURAL MECHANIZATION AND BUSINESS

16

The curriculum in Agricultural Mechanization and Business is designed to provide an educational program for undergraduate students who desire training in areas which are relevant to a dynamic agricultural enterprise. It is organized with strength both in the business management area and in nonengineering type support of technical agriculture and agribusiness concepts. In order to produce an individual who is well rounded and capable of communicating, the curriculum includes courses in the humanities, social sciences, English composition, and public speaking.

The graduate in agriculture with a major in Agricultural Mechanization and Business should be able to find meaningful and remunerative employment in a variety of situations directly and indirectly related to agricultural production, processing, marketing, and the many services connected therewith.

(2,3) (2,3) (3,0) (0,3) (3,3) (3,0)

18

Second Semester

FRESHMAN YEAR

First Semester

BIOL 103 General Biology I 3 BIOL 105 General Biology Lab. I 1	(0,3)	AGRIC 103 Intro. to Animal Ind. 3 AGRIC 104 Intro. to Plant Sci 3
CH 101 General Chemistry 4 ENGL 101 English Composition . 3 MATH 105 Algebra and Trigo-	(3,0)	BIOL 104 General Biology II 3 BIOL 106 General Biology Lab. II 1 CH 102 or 112 General Chemistry 4
nometry 2 5	(5,0)	ENGL 102 English Composition . 3
16		17

SOPHOMORE YEAR

AG EC 202 Agric. Economics AGM 205 Principles of Farm Shop EG 109 Engr. Graphical Com PHYS 207 General Physics I Literature Requirement 1 Elective	3 (2,3) 2 (0,6) 4 (3,2) 3 (3,0)	AG EC 302 Management of Agri- cultural Enterprises

JUNIOR YEAR

ACCT 201 Principles of Accounting 3 (3 AGM 303 Cal. for Mech. Agric. 2 (2 AGM 406 Mech. and Hydraulic Systems	(0) Agricultural Marketing 3 (3,0) or AG EC 402 Economics of Agricultural Production 3 (3,0)
	Elective

SENIOR YEAR

AG EC 456 Prices3AGM 452 Farm Power3AGM 460 Farm and Home Utilities 3Economics Elective 43Elective4	(2,3) (2,3)	AGM 404 Farm Structures AGM 408 Equip. Sales and Ser Agriculture Elective 4 Economics Elective 4 Elective	333	(2,3) (3,0)
16		134 Total Semester Hours	16	
		104 Total Semester Hours		

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209.
² Eligible students may enroll in Math 106 in lieu of Math 105.
³ To be selected from the following: Ed 302, Hist 101, 102, 172, 173, Phil 201, 325, Pol Sc 101, Psych 201, RS 301, 401, Soc 201.
⁴ See adviser for list of approved courses.

ANIMAL INDUSTRIES

The Animal Industries curriculum includes three majors—Animal Science, Dairy Science, and Poultry Science.

ANIMAL SCIENCE MAJOR

The Animal Science Department emphasizes subject matter dealing with the application of scientific principles to livestock production and processing.

Students will minor in Business, Environmental Science, International Agriculture, Production, Science, or a Second Department.

Occupations for Animal Science graduates include livestock farming; cattle, swine and sheep breeding; extension livestock specialists; **First Semester**

feed specialists; county agents; teaching and research in animal industry; positions with meat packing companies; feed dealers; freezer locker operators; livestock dealers; and livestock commission brokers.

FRESHMAN YEAR

Second Semester

BIOL 103 General Biology I 3 (3,0) BIOL 105 General Biology Lab. I 1 (0,3) CH 101 General Chemistry 4 (3,3) ENGL 101 English Composition . 3 (3,0) MATH 105 Algebra and Trigonometry 2	AGRIC 103 Intro. to Ani. Ind 3 (2,3) AGRIC 104 Intro. to Plant Sci 3 (2,3) BIOL 104 General Biology II 3 (3,0) BIOL 106 General Biology Lab. II 1 (0,3) CH 102 or 112 General Chemistry 4 (3,3) ENGL 102 English Composition . 3 (3,0)
16	17

SOPHOMORE YEAR

AN SC 202 Intro. to Animal Sci. 3 (2, CH 223 Organic Chemistry 3 (3)	
and CH 227 Org. Chem. Lab 1 (0,	
or BIOCH 210 Elem. Biochem. 4 (3,	
or CH 201 General Chemistry . 4 (3,	3) ENGL 231 Intro. to Journalism 3 (3,0)
Literature Requirement 1 3 (3,	0) or ENGL 301 Pub. Speaking 3 (3,0)
Minor 3 3	or ENGL 304 Adv. Comp 3 (3,0)
Social Science Elective 4 3	PHYS 122 Phys. with Cal. I 3 (2,2)
Elective 1	or PHYS 207 Gen. Phys. I 4 (3,2)
	Minor 3 3
17	Elective 1
	_
	17

JUNIOR YEAR

AN SC 301 Feeds and Feeding. AN SC 303 Livestock Evaluation AN SC 351 Meat Ident. and Util. or AN SC 355 Meats Lab. AN SC 353 Meats GEN 302 Genetics Elective	$\begin{array}{c}2&(1,3)\\1&(0,3)\\1&(0,3)\\2&(2,0)\\4&(3,3)\end{array}$	AN SC 306 Livestock Selection and Judging 2 (1,3) MICRO 305 General Microbiology 4 (3,3) 3 Minor 3 3 Social Science Elective 4 3 Elective 5 17
]	16	

SENIOR YEAR

AN SC 401 Beef Production 3 (3,0) AN SC 403 Beef Production Lab. 1 (0,3) DY SC 453 Animal Reproduction. 3 (3,0) NUTR 401 Fund. of Nutrition 3 (3,0) Minor 3	AN SC 406 Seminar 2 (2,0) AN SC 408 Pork Production 3 (3,0) AN SC 410 Pork Production Lab. 1 (0,3) 3 (3,0) AN SC 452 Animal Breeding 3 (3,0) Minor 3 3 Elective 5 17
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134 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Students who make a satisfactory score on the Mathematics Test, Level II (Standard) may schedule other mathematics courses or electives in lieu of Math 105. Math 102 or 106 can substitute for Math 105. ³ See adviser for available minors and course requirements. ⁴ To be selected from the following: Ed 302, Hist 101, 102, 172, 173, Phil 201, 325, Pol Sc 101, Psych 201, RS 301, 401, Soc 201.

DAIRY SCIENCE MAJOR

The major in Dairy Science is designed to provide the student with an understanding of scientific principles and the application of these principles in the scientific, technical, and business phases of the dairy industry. Completion of required studies in the sciences and humanities and selected courses by the student in areas of personal interest prepares the graduate for a successful chosen profession. A career in the dairy industry is a rewarding one, not only monetarily, but in rendering a service in providing a wholesome, nutritious food for mankind.

Opportunities for dairy science graduates are many. They include the management of production and processing facilities, quality control work for processing units and production organizations, industrial promotion and public relations work in both production and processing fields, dairy and food products engineering, special services, public health service, teaching and research. Special service opportunities are available in state and national breed association work, breeding organizations, industrial supplies, production and processing equipment and supplies. Opportunities in educational activities include positions with industrial associations, state and federal services and federal programs with foreign assignments.

Students majoring in Dairy Science may choose a minor in Business, Environmental Science, International Agriculture, Production, Science, or a Second Department.

FRESHMAN YEAR

First Semester

E E C E N

BIOL 103 General Biology I BIOL 105 General Biology Lab. I			
CH 101 General Chemistry ENGL 101 English Composition			
MATH 105 Algebra and Trigo- nometry 2	5	(5,0)	

16

Second Semester

AGRIC 103 Intro. to Ani. Ind AGRIC 104 Intro. to Plant Sci BIOL 104 General Biology II	3	(2,3)
BIOL 106 General Biology Lab. II CH 102 or 112 General Chemistry	$\frac{1}{4}$	(0,3) (3,3)
ENGL 102 English Composition .	17	(3,0)

(3,0) (3,0) (3,0) (2,2) (3,2)

SOPHOMORE YEAR

AGRON 202 Soils 3 (2,2) or ENGL 301 Pub. Speaking3 or ACCT 201 Prin. of Acct3 (3,0) or ENGL 304 Adv. Comp3 CH 223 Organic Chemistry 3 (3,0) or ENGL 201 Pub. Speaking3 and CH 227 Org. Chem. Lab. 1 (0,3) or PHYS 122 Phys. with Cal. 13 or BIOCH 210 Elem. Bioch4 (3,3) or PHYS 207 Gen. Phys. I4 Minor 4 Social Science Elective 3 3 DY SC 101 Dairy Foods 1 (1,0) Elective 1-2 Literature Requirement 1 3 (3,0) 17		
	AGRON 202 Soils3 (2,2)or ENGL 301 Pub. Sor ACCT 201 Prin. of Acct.3 (3,0)or ENGL 304 Adv. (0)CH 223 Organic Chemistry3 (3,0)or PHYS 122 Phys. with (0,3)and CH 227 Org. Chem. Lab. 1 (0,3)or PHYS 207 Gen. Por BIOCH 210 Elem. Bioch4 (3,3)Social Science Elective 3DY SC 101 Dairy Foods1 (1,0)Elective	Speaking 3 Comp 3 Cal. I 3 Phys. I 4

IUNIOR YEAR

DY SC 307 Market Milk 3 (2,3) DY SC 310 Dairy Cattle Sel 1 (0,3) or FD SC 424 Qual. Assur. and Sens. Eval. Lab 1 (0,3) FD SC 305 Dairy and Food Engr. 3 (2,3) MICRO 305 General Microbiology 4 (3,3) Minor 4	AN SC 301 Feeds and Feeding. 3 (3,0) or MICRO 405 Food and Dairy Micro. 4 (3,3) DY SC 306 Dairy Technology 3 (2,3) GEN 302 Genetics 4 (3,3) Minor 4 3 3 Elective 2-3 16
SENIOR	YEAR
DY SC 401 Special Problems1-2(0,3-6) or DY SC 455 Repro. Mgt 1 (0,3) DY SC 402 Dairy Manufactures 3 (2,3) or DY SC 453 Animal Repro 3 (3,0) DY SC 409 Dairy Sci. Seminar 2 (2,0) DY SC 461 Physiol. of Lacation 2 (2,0) NUTR 401 Fund. of Nutrition 3 (3,0) Elective	AN SC 452 Animal Breeding 3 (3,0) or DY SC 404 Plant Mgt 3 (2,3) DY SC 410 Dairy Sci. Seminar. 1 (1,0) DY SC 452 Dairy Cattle Feeding and Management 3 (2,3) Elective

17

134 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Students who make a satisfactory score on the Mathematics Test, Level II (Standard) may schedule other mathematics courses or electives in lieu of Math 105. ³ To be selected from the following: Ed 302, Hist 101, 102, 172, 173, Phil 201, Pol Sc 101, Psych 201, RS 301, 401, Soc 201. ⁴ See adviser for available minors and course requirements.

POULTRY SCIENCE MAJOR

This major provides the student with a broad education in science and the humanities and specialized knowledge of the biology of the avian species and of the poultry industry. Avian science courses emphasize the nutrition, physiology, genetics, and pathology of domesticated and semidomesticated birds. The environmental requirements for propagating the various species and for handling eggs and meat are covered.

Minors in Business, Environmental Science, International Agriculture, Production, Science, or a Second Department provide for the specialized interests of the student.

Job opportunities include supervisory positions with producers of eggs, broilers, turkeys, or game birds; technical representatives for feed manufacturers, vitamin and mineral suppliers, pharmaceutical and biological houses; extension specialists; teachers or researchers with a college, in government or industry; salesmen or marketing specialists; quality control and poultry products technologists; government graders, inspectors or sanitarians.

FRESHMAN YEAR

First Semester

AGRIC	C 103 Ir	tro. t	o Ani	mal	Ind.	3	(2,3)
and	AGRIC	104	Intro.	to	Plant		
Sei						2	(03)

JCI		
or MATH 105 Alg. and Trig.2	5	(5,0)
BIOL 103 General Biology I		
BIOL 105 General Biology Lab. I	1	(0,3)
CH 101 General Chemistry	4	(3,3)
ENCL 101 English Composition	3	(30)

16 - 17

Second Semester

AGRIC 104 Intro. to Plant Sci		(2,3)
and AGRIC 103 Intro. to Ani.		
Ind	3	(2,3)
on MATH 105 Alg. and Trig 9.	=	(50)

or MAIN 105 Alg. and 111g.2 5 (3),0)
BIOL 104 General Biology II 3 (3	3,0)
BIOL 106 General Biology Lab. II 1 (0),3)
CH 102 or 112 General Chemistry 4 (3	3,3)
ENGL 102 English Composition . 3 (3	3,0)

16-17

SOPHOMORE YEAR

AG EC 202 Agric. Economics 3 (3,0) GEN 302 Genetics 4 (3,3) PHYS 207 General Physics I 4 (3,2) PS 202 Avian Science 3 (2,3) Literature Requirement 1 3 (3,0)
17

CH 223 Organic Chemistry 3 3 (3,0) and CH 227 Org. Chem. Lab. 1 (0,3) or BIOCH 210 Elem. Bioch. 4 (3,3) or CH 201 General Chemistry 4 (3,3) ENGL 231 Intro. to Journalism 3 (3,0) or ENGL 304 Advanced Comp. 3 (3,0) MICRO 305 General Microbiology 4 (3,3) PS 322 Poultry Breeding and Gen. 3 (2,3) Social Science Elective 4 3	
17	

JUNIOR YEAR

AN SC 301 Feeds and Feeding. 3 (3,0) ENGL 301 Public Speaking 3 (3,0) PS 321 Incubation and Hatchery Management 2 (1,3) PS 355 Poultry Products Grading and Technology 3 (2,3) PS 451 Poultry Nutrition 2 (2,0) Minor 5 3	AN PH 301 Physiology and Ana- tomy of Domestic Animals 3 (2,3) PS 359 Management of Egg, Broiler and Turkey Enterprises 3 (2,3) Minor 5
$\overline{16}$	

SENIOR YEAR

PS 401 Animal Environ. Tech. 2 (2,0) PS 403 Ani. Environ. Tech. Lab. 1 (0,3) PS 458 Avian Micro. and Parasit. Minor 5 Social Science Elective 4 Elective 4	PS 454 Least Cost Feed Form 2 (1,2) PS 460 Seminar
17	134 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209.
² Students who make a satisfactory score on the Mathematics Test, Level II (Standard) may schedule other mathematics courses or electives in lieu of Math 105.
³ Science minors should schedule Ch 223, 227; Business minors may substitute Acct 201.
⁴ To be selected from the following: Ed 302, Geog 101, 301, 302, Hist 101, 102, 172, 173, Phil 201, 325, Pol Sc 101, Psych 201, RS 301, 401, Soc 201.
⁵ See adviser for available minors and course requirements.

COMMUNITY AND RURAL DEVELOPMENT

The curriculum in Community and Rural Development provides for a broad, interdisciplinary education. Courses in economics, agricultural economics, sociology and rural sociology, political science, conservation, and agriculture are included. Students in Community and Rural Development have an opportunity to specialize by selecting a minor in Business, International Agriculture, Science, or a Second Department.

Employment opportunities for graduates with degrees in Community and Rural Development include planning positions with state and regional planning councils, university extension positions, development leaders with private and public firms, and civil service positions with federal agencies.

FRESHMAN YEAR

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First Semester

AGRIC 103 Intro. to Animal Ind. AGRIC 104 Intro. to Plant Sci BIOL 103 General Biology I BIOL 105 General Biology Lab. I CH 101 General Chemistry ENGL 101 English Composition	$3 \\ 3 \\ 1 \\ 4$	(2,3 (3,0 (0,3 (3,3
ENGL 101 English Composition	3	(3,0
	_	

17

Second Semester

BIOL 104 General Biology II	3	(3,0)
BIOL 106 General Biology Lab. II	1	(0,3)
CH 102 or 112 General Chemistry	4	(3,3)
ENGL 102 English Composition	3	(3,0)
MATH 105 Algebra and		
Trigonometry 2	5	(5,0)
	16	

SOPHOMORE YEAR

ACCT 201 Principles of Accounting 3 (3,0) ECON 201 Principles of Economics 3 (3,0) HIST 102 History of the U.S 3 (3,0) RS 301 Rural Sociology 3 (3,0) Literature Requirement 1 3 (3,0) 15	AG EC 202 Agric. Economics 3 (3,0)CRD 357 Natural Res. Econ 3 (3,0)ENGL 231 Intro. to Journalism 3 (3,0)or ENGL 304 Advanced Comp. 3 (3,0)ENGL 301 Public Speaking 3 (3,0)POL SC 302 State and LocalGovernment
	18

IUNIOR YEAR

AGRON 404 Soils and Luse 2 (1,3) ECON 314 Inter. Economic Theory 3 (3,0) EX ST 301 Intro. Statistics 3 (2,2) RS 359 The Community 3 (3,0) Minor 4	AG EC 352 Public Finance 3 (3,0) ECON 407 National Income and Employment Analysis 3 (3,0) EX ST 462 Stat. Applied to Econ. 3 (3,0) POL SC 321 Gen. Public Admin. 3 (3,0)
Elective	Minor 4 6
17	18

SENIOR YEAR

CRD 411 Regional Impact Anal. 3 (2,3) CRP 412 City and Regional Plan- ning Theory 3 (3,0) RS 401 Human Ecology 3 (3,0) Minor 4 3 Elective 4	AG EC 403 Land Economics 3 (3,0) CRD 412 Reg. Econ. Dev. Pol 3 (3,0) CRP 472 Implementation of the Local Planning Process 3 (3,0) Minor 4 Elective 5
16	134 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Students who make a satisfactory score on the Mathematics Test, Level II (Standard) may schedule other mathematics courses or electives in lieu of Math 105. ³ To be selected from Hist 304, 305, 306. ⁴ See adviser for available minors and course requirements.

ECONOMIC BIOLOGY

First Semester

The Economic Biology curriculum includes areas of concentration in Economic Zoology, Entomology, and Plant Pathology.

FRESHMAN YEAR

Second Semester

BIOL 110 Prin. of Biology I 5 (4,3) CH 101 General Chemistry 4 (3,3) ENGL 101 English Composition . 3 (3,0) MATH 105 Algebra and Trigo- nometry 2	BIOL 111 Prin. of Biology II 5 (4,3) CH 112 General Chemistry 4 (3,3) ENGL 102 English Composition 3 (3,0) MATH 106 Cal. of One Var. I 4 (4,0) or MATH 102 Intro. to Math. 3 (3,0) Elective 1 17-16 17-16

SOPHOMORE YEAR

AGRON 202 Soils 3 (2,2) CH 223 Organic Chemistry 3 (3,0) CH 227 Organic Chemistry Lab. 1 (0,3) ENT 301 General Entomology 3 (2,3) English Requirement 1 3 (3,0) Elective 3 16	AG EC 202 Agric. Economics 3 (3,0) CH 224 Organic Chemistry 3 3 (3,0) GEN 302 Genetics
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¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. Zoology and Entomology majors are required to take Engl 304 during the second semester. ² Students who make a satisfactory score on the Mathematics Test, Level II (Standard) may schedule other mathematics courses or electives in lieu of Math 105. ³ Ch 228 is suggested as an elective.

ECONOMIC ZOOLOGY CONCENTRATION

This concentration is designed for the student interested in careers in applied animal biology. With increased interest and concern for conservation of natural resources and the environment, this area is becoming increasingly technical and will require large numbers of highly trained animal biologists. It is possible for the student in this concentration to elect courses to fit specific needs or interests.

Greatest demands for graduates are in the following areas: research, survey and regulatory positions with state and federal environmental protection, fish, wildlife, and public health agencies; in public relations and sales positions with commercial companies; industrial research and quality control laboratories; conservational, recreational and other public service agencies; and private enterprises.

See page 63 for Freshman and Sophomore Years.

IUNIOR YEAR

First Semester

Second Semester

ENGL 301 Public Speaking 3 (3,0) EX ST 301 Intro. Statistics 3 (2,2) PHYS 208 General Physics II 4 (3,2) or PHYS 221 Phys. with Cal. II 3 (2,2) and PHYS 223 Physics Lab. I 1 (0,3) ZOOL 201 Invertebrate Zoology 4 (3,3) or ZOOL 202 Vertebrate Zoology 4 (3,3) Elective 1	BIOCH 301 Molecular Biology 3 (3,0) MICRO 305 General Microbiology 4 (3,3) ZOOL 202 Vertebrate Zoology 4 (3,3) or ZOOL 201 Invert, Zoology 4 (3,3) Wildlife Biology Elective 2 3 Elective 1
SENIOR	YEAR
ENT 468 Intro. to Research 2 (1,3) ZOOL 340 Cell Biology 3 (3,0) ZOOL 456 Parasitology 4 (3,3) Social Science Elective 3 3 Elective 1 5 17	ZOOL 411 Animal Ecology 4 (3,3) Social Science Elective 3 3 Wildlife Biology Elective 2 3 Elective 1
	134 Total Semester Hours

¹Electives shall be determined by each individual student in consultation with his adviser to complement and reinforce the student's planned area of study. ² To be selected from any wildlife biology courses except WB 306. ³ To be selected from the following: Ed 302, Hist 101, 102, 172, 173, Phil 201, Pol Sc 101, Psych 201, RS 301, 401, Soc 201.

ENTOMOLOGY CONCENTRATION

Entomology is a unique scientific discipline which has its basic roots in biology. It is the study of insects, their biology and control. Insects form the largest and most widely distributed class of animals in the world. They affect the lives of everyone and are man's greatest competitors. However, not everything about insects is bad. Some, such as bees, are essential for pollination while others serve as parasites and predators in natural control of pest species.

There are exciting opportunities for professional entomologists in basic and applied areas of work such as (1) development of new and more selective methods of insect control involving both chemical and biological agents; (2) pest management practice and consulting; (3) perform services as quarantine and regulatory officials; (4) carry information to the public as extension entomologists; (5) apply knowledge in teaching programs; (6) insect control in the pest control industry; and (7) entomologists in the armed forces.

See page 63 for Freshman and Sophomore Years.

JUNIOR YEAR

First Semester

Second Semester

ENGL 301 Public Speaking 3 (3,0) ENT 405 Insect Morphology 4 (3,3) ENT 468 Intro. to Research 2 (1,3) PHYS 208 General Physics II 4 (3,2) or PHYS 221 Phys. with Cal. II 3 (2,2) and PHYS 223 Physics Lab. I . 1 (0,3) ZOOL 201 Invertebrate Zoology 4 (3,3)	ACCT 201 Principles of Accounting 3 (3,0) or EX ST 301 Intro. Statistics 3 (2,2) ENT 410 Insect Taxonomy 3 (1,6) MICRO 305 General Microbiology 4 (3,3) Entomology Elective 1
17	

SENIOR YEAR

ENT 461 Special Problems in Entomology and Econ. Zool 1 (1,0) PL PA 401 Plant Pathology 3 (2,3) ZOOL 411 Animal Ecology 4 (3,3) Entomology Elective 1	ENT 420 Toxicology of Insecticides3 (2,3)ENT 462 Seminar1 (1,0)ENT 470 Insect Physiology3 (2,3)Entomology Elective 13Social Science Elective 23Elective4
17	17
	134 Total Semester Hours

1 At least 6 credits must be selected from the following: Ent 401, 402, 403, 404, 455. 2 To be selected from the following: Ed 302, Hist 101, 102, 172, 173, Phil 201, Pol Sc 101, Psych 201, RS 301, 401, Soc 201.

PLANT PATHOLOGY CONCENTRATION

Plant pathology is that branch of science that deals with the nature and control of the diseases of plants. Since man began to cultivate plants for food and fiber production, plant diseases have been a constant threat to the health and productivity of these plants. They have caused severe famines and mass migrations of people from one area to another since the dawn of recorded history. The current annual economic loss to plants from diseases in the United States has been estimated to be in excess of three billion dollars. In 1970 one disease alone on corn caused a loss of approximately one billion dollars in the eastern half of the United States.

Opportunities for graduates in Plant Pathology are dependent upon the level of training, experience, and interest of the graduate. These job opportunities include research with federal, state, industrial, or private agencies; inspection, quarantine, and other regulatory work with federal and state agencies; sales and technical service work with industry, especially those industries involved with agricultural pesticides; agricultural extension work, both in the United States and in foreign countries; and teaching at the college or university level. See page 63 for Freshman and Sophomore Years.

IUNIOR YEAR

First Semester

Second Semester

MICRO 305 General Microbiology 4 (3,3) PHYS 208 General Physics II 4 (3,2) or PHYS 221 Phys. with Cal. II 3 (2,2) and PHYS 223 Physics Lab. I . 1 (0,3) PL PA 401 Plant Pathology 3 (2,3) or PL PA 405 Forest Pathology 3 (2,3) Group A Elective 1 3 Social Science Elective 2 3	BOT 331 Intro. Plant Taxonomy . 3 (2,3) BOT 421 Plant Physiology 4 (3,3) ENGL 301 Public Speaking 3 Plant Pathology Elective 3 3 Elective
17	

SENIOR YEAR

EX ST 301 Introductory Statistics 3 (2,5) Group A Elective 1 3 Plant Pathology Elective 3 3 Elective 4 8	 Croup A Elective 1 3 Plant Pathology Elective 3 3 Social Science Elective 2 3 Elective 4
17	134 Total Semester Hours

1 Group A Electives. At least 9 credits must be selected from the following: Agron 405, 407, 452, Bioch 301, 423, 424, 425, 426, Bot 411, 441, 451 461, Ch 313, 317, Ent 401, 402, 403, Micro 416, Pl Pa 401, 405, 451, 456, 458. 2 To be selected from the following: Ed 302, Hist 101, 102, 172, 173, Phil 201, 325, Pol Sc 101, Psych 201, RS 301, 401, Soc 201. 3 At least 9 credits must be selected from Bot 411, Micro 416, Pl Pa 451, 456, 458. 4 Electives shall be determined by each individual student in consultation with his adviser to complement and reinforce the students planned area of study.

FOOD SCIENCE

The Food Science curriculum is designed to prepare students for the many career opportunities in technical and management areas of the food industry. The food industry, being the nation's largest industry, is becoming increasingly technical and requires large numbers of professional food scientists. World food supplies, particularly those rich in protein, are becoming increasingly critical in many parts of the globe. This situation is expected to accelerate the demand for food scientists.

Opportunities for graduates in Food Science include research positions in government organizations and state experiment stations; supervisory, administrative, research, and quality control positions in food processing industries; inspection and grading work with state and federal agencies; consulting, teaching and extension activities with universities and colleges. Students graduating in Food Science are well prepared to pursue postgraduate training in areas such as microbiology, biochemistry, and nutrition, as well as in food science.

The student majoring in Food Science will select a minor in Business, Environmental Science, International Agriculture, Science, or a Second Department which will emphasize training in an area other than food science and which is designed to supplement the major course of study.

FRESHMAN YEAR

First Semester

Second Semester

BIOL 103 General Biology I 3 (3,0) BIOL 105 General Biology Lab. I (0,3) CH 101 General Biology Lab. I (0,3) CH 101 General Chemistry	BIOL 104 General Biology II 3 (3,0) BIOL 106 General Biology Lab, II 1 (0,3) CH 102 or 112 General Chemistry 4 (3,3) ENGL 102 English Composition 3 (3,0) MATH 106 Cal, of One Var. I 4 (4,0) Elective 2 2
17	17
17	

SOPHOMORE YEAR

AG EC 202 Agric. Economics 3 (3,0)	BIOCH 210 Elem. Biochemistry 4 (3,3)
CH 223 Organic Chemistry 3 (3,0)	ENGL 231 Intro. to Journalism 3 (3,0)
and CH 227 Organic Chem. Lab. 1 (0,3)	or ENGL 304 Adv. Comp 3 (3,0)
or CH 201 General Chemistry . 4 (3,3)	FD SC 212 Man's Food Resources 2 (2,0)
PHYS 122 Phys. with Cal. I 3 (2,2)	PHYS 208 General Physics I 4 (3,2)
or PHYS 207 Gen. Phys. I 4 (3,2)	or PHYS 221 Phys. with Cal. II 3 (2,2)
Literature Requirement 1 3 (3,0)	and PHYS 223 Physics Lab. I 1 (0,3)
Social Science Elective 3	Social Science Elective 3
16-17	16

IUNIOR YEAR

EX ST 301 Introductory Statistics 3 (2,2) FD SC 305 Dairy and Food Engr. 3 (2,3) MICRO 305 General Microbiology 4 (3,3) NUTR 451 Human Nutrition 3 Minor 4 Belective 17	ENGL 301 Public Speaking 3 (3,0) FD SC 422 Quality Assurance and Sensory Evaluation
	17-16

SENIOR YEAR

FD SC 401 Food Chemistry I 4 (3,3) FD SC 403 Food Preservation	FD SC 402 Food Chemistry II 4 (3,3) FD SC 404 Food Preservation
and Processing I	and Processing II
and Processing Lab. I 1 (0,3) FD SC 417 Seminar 1 (1,0)	and Processing Lab. II 1 (0,3) FD SC 418 Seminar
Minor 4 6 Elective 2	Minor 4
17	17
1.	134 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209, 2 Students who make a satisfactory score on the Mathematics Test, Level II (Standard) may schedule other mathematics courses or electives in lieu of Math 105.
3 To be selected from the following: Ed 302, Hist 101, 102, 172, 173, Phil 201, 325, Pol Sc 101, Psych 201, RS 301, 401, Soc 201.
4 See adviser for available minors and course requirements.

PLANT SCIENCES

The Plant Sciences curriculum includes four majors—Agronomy (Crops and Soils), Horticulture (Fruit and Vegetable), Horticulture (Ornamental), and Horticulture (Turfgrass).

AGRONOMY (CROPS AND SOILS) MAJOR

Agronomy is the science that deals with crops and soils. Crop science includes plant breeding and genetics as related to crop improvement and variety introductions. Soil science is concerned with land use, soil physics, chemistry, microbiology, management, and fertility. Emphasis is placed on the science of weed control and management for field forage, and pasture crops.

The science of agronomy is basic to all agriculture, and the graduate may find employment opportunities available with federal, state, and private agencies. Agronomists are employed with agrichemical, seed, and other industries in technical, supervisory, and sales positions, while some agronomists return to the farm either as manager or owner-manager.

Students majoring in Agronomy (Crops and Soils) will declare a minor in *Business*, *International Agriculture*, *Production*, *Science*, or a *Second Department*.

FRESHMAN YEAR

First Semester

AGRIC 103 Intro. to Animal Ind.	3	(2,3)
or AGRIC 104 Intro. to Plant Sci.	3	(2,3)
CH 101 General Chemistry	4	(3,3)
ENGL 101 English Composition .		
MATH 105 Algebra and Trig. 2	5	(5,0)
	15	

Second Semester

AG EC 202 Agric. Economics 3 (3,0) AGRIC 104 Intro. to Plant Sci 3 (2,3)
or AGRIC 103 Intro. to Animal Ind
ENGL 102 English Composition . 3 (3,0) Social Science Elective 4 3
16

SOPHOMORE YEAR

 BIOL 103 General Biology I 3 (3,0) BIOL 105 General Biology Lab. I 1 (0,3) CH 223 Organic Chemistry 3 (3,0) and CH 227 Organic Chem. Lab 1 (0,3) or BIOCH 210 Elem. Biochem. 4 (3,3) or CH 201 General Chemistry 3 (2,2) or PHYS 122 Phys. with Cal. I 3 (2,2) or PHYS 207 General Phys. I 4 (3,2) Literature Requirement 1 3 (3,0) 	AGRON 202 Soils
	18

18

JUNIOR YEAR

AGRON 301 Fertilizers 5 3	(3,0)	AGRON 422 Fie
AGRON 421 Field Crops-Mono-		Dicots 5
cots and Specialty Crops 5 3	(3,0)	AGRON 423 Fie
BOT 421 Plant Physiology 4	(3,3)	Forages 5
GEN 302 Genetics 4	(3,3)	AGRON 424 Ad
MICRO 305 General Microbiology 4	(3,3)	Lab.5
or PL PA 401 Plant Pathology 3	(2,3)	AGRON 475 Soil
		Minor 3
18-17		Social Science E

AGRON 422 Field Crops-		
Dicots 5	3	(3,0)
AGRON 423 Field Crops-		
Forages 5	3	(3,0)
AGRON 424 Adv. Field Crops		
Lab.5	1	(0,2)
AGRON 475 Soil Phys. and Chem.		(2,3)
Minor 3		
Social Science Elective 4	3	
	16	

	YEAR

AGRON 403 Soil Genesis and Classification 5 2 (1,3) AGRON 407 Prin, of Weed Control 5 3 (2,2) AGRON 455 Seminar 1 (1,0) AGRON 450 Soil Organisms in Crop Production 5 3 (2,3) Minor 3 4 Elective 3-4	AGRON 452 Soil Fert. and Mgt.5 2 (2,0) AGRON 453 Soil Fert. Lab. 1 (0,3) AGRON 456 Seminar 1 (1,0) Minor 3
16-17	134 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Students who make a satisfactory score on the Mathematics Test. Level II (Standard) may schedule other mathematics courses or mathematics-related courses in lieu of Math 105. (See adviser for electives.)

105. (See adviser for electives.)
3 See adviser for available minors and course requirements.
4 To be selected from the following: Ed 302, Geog 101, 301, 302, Hist 101, 102, 172,
173, Phil 201, 325, Pol Sc 102, Psych 201, RS 301, 401, Soc 201.
5 Required for all students except Science minors. Science minors select 13 credits from these courses. Students other than Science minors select 6 courses from the following: Agron 301, 403, 405, 407, 423, 475, 490.

HORTICULTURE (FRUIT AND VEGETABLE) MAJOR

This major provides the student with a basic education in science and the humanities, and the application of both in the scientific, technical, and business phases of the fruit and vegetable industry.

Opportunities in this field of study include vegetable and fruit farm management; inspection of fresh fruit, vegetable and other food products as well as nursery stock. There are many other opportunities as in plant breeding, agricultural extension service work, horticultural research, horticultural teaching and writing, and fruit and vegetable processing. Other occupations include sales and fieldwork with seedsmen and nurservmen, and manufacturers of food, fertilizer, and pesticide products.

Students majoring in the fruit and vegetable phase of Horticulture may choose a minor in Business, Environmental Science, International Agriculture, Production, Science, or a Second Department.

FRESHMAN YEAR

First Semester

AGRIC 103 Intro, to Animal Ind.	3	(2.3)
AGRIC 104 Intro. to Plant Sci	3	(2,3)
BIOL 103 General Biology I		
BIOL 105 General Biology Lab. I		
CH 101 General Chemistry		
ENGL 101 English Composition .	3	(3,0)
	_	

17

Second Semester

BIOL 104 General Biology II	3	(3,0)
BIOL 106 General Biology Lab. II	1	(0,3)
CH 102 or 112 General Chemistry		
ENGL 102 English Composition .		
MATH 105 Algebra and Trig.2	5	(5,0)

SOPHOMORE YEAR

AG EC 202 Agric. Economics AGROV 202 Soils CH 223 Organic Chemistry and CH 227 Organic Chem. Lab. or FIOCH 210 Elem. Biochem. or CH 201 General Chemistry HORT 201 General Horticulture . Literature Requirement 1	$\begin{array}{c} 3 & (2,2) \\ 3 & (3,0) \\ 1 & (0,3) \\ 4 & (3,3) \\ 4 & (3,3) \\ 3 & (2,2) \end{array}$	ENGL 231 Intro. to Journalism 3 (3,0) or ENGL 301 Pub. Speaking 3 (3,0) or ENGL 304 Adv. Comp. 3 (3,0) ENT 301 General Entomology 3 (3,2) PHYS 207 General Physics 1 4 (3,2) Social Science Elective 3 3 16
_		

HORT 305 Plant Propagation 3 (2,3) G HORT 352 Commercial Pomology 3 (2,3) F Minor 4 3 Social Science Elective 3	BOT 421 Plant Physiology 4 (3,3) GEN 302 Genetics 4 (3,3) HORT 455 Small Fruit and Nut (3,3) Horticulture Elective 5 3 Minor 4 3 18 18
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IUNIOR YEAR

SENIOR YEAR

HORT 409 Seminar 1 (1,0) HORT 464 Postharvest Hort. 3 (2,2) PL PA 401 Plant Pathology 3 (2,3) Minor 4 6 Elective 4	HORT 410 Seminar 1 (1,0) HORT 456 Vegetable Crops 3 (3,0) Horticulture Elective 5 6 Minor 4 3 Elective 4
17	17
	134 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Students who make a satisfactory score on the Mathematics Test, Level II (Standard) may schedule other mathematics courses or electives in lieu of Math 105. ³ To be selected from the following: Ed 302, Geog 101, 301, 302, Hist 101, 102, 172, 173, Phil 201, 325, Pol Sc 101, Psych 201, RS 301, 401, Soc 201. ⁴ See adviser for available minors and course requirements. ⁵ To be selected from the following: Hort 303, 304, 308, 310, 406, 407, 412, 413, 414, 416, 454, 461, 470, 471.

HORTICULTURE (ORNAMENTAL) MAJOR

This major is designed to give students a scientific background and technical facilities in the field of ornamental horticulture. Subject matter covers plant materials culture, uses, and planning of ground spaces.

Graduates find careers in nursery work, floriculture, landscape designing, landscape contracting, and park supervision. Other occupations are research personnel, teachers, extension workers, and representatives of fertilizer, machinery, and chemical companies.

Students desiring to major in Ornamental Horticulture may choose a minor in Business. International Agriculture, Production, Science, or a Second Department.

FRESHMAN YEAR

First Semester

BIOL 103 General Biology I BIOL 105 General Biology Lab. 1 CH 101 General Chemistry	1	(0,3)
ENGL 101 English Composition . MATH 105 Algebra and Trigo-	3	
nometry 2		(5,0)

16

Second Semester

$\begin{array}{llllllllllllllllllllllllllllllllllll$

15

Agricultural Sciences 71

SOPHOMORE YEAR

AGM 301 Soil and Water Cons 3 (2,3) CH 223 Organic Chemistry 3 (3,0) and CH 227 Organic Chem. Lab. 1 (0,3) or BIOCH 210 Elem. Biochem. 4 (3,3) or CH 201 General Chemistry 4 (3,3) HORT 201 General Horticulture . 3 (2,2) HORT 303 Plant Materials I 3 (2,3) Literature Requirement 1 3 (3,0)	AG EC 202 Agric. Economics 3 (3,0) AGRON 202 Soils
16	19

IUNIOR YEAR

BOT 421 Plant Physiology4 (3,3)HORT 305 Plant Propagation3 (2,3)HORT 308 Landscape Design3 (2,3)Horticulture Elective 33Social Science Elective 43Elective2	CEN 302 Genetics 4 (3,3) HORT 310 Floriculture 3 (2,3) Horticulture Elective 3 3 Minor 5 3 Social Science Elective 4 3 Elective 2
18	18

SENIOR YEAR

HORT 409 Seminar 1 (1,0) HORT 412 Turfgrass Management 3 (2,3) Horticulture Elective 3 3 Minor 5 6 Elective 3	HORT 406 Nursery Technology 3 (2,3) HORT 410 Seminar 1 (1,0) PL PA 401 Plant Pathology 3 (2,3) Minor 5 6 Elective 3
16	16
	134 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Students who make a satisfactory score on the Mathematics Test, Level II (Standard) may schedule other mathematics courses or electives in lieu of Math 105. ³ To be selected from the following: Hort 302, 352, 413, 414, 416, 454, 455, 456, 451, 452, 470, 473, 414, 416, 454, 455, 456,

3 To be selected from the following: Alex each field of the selected from the following: Ed 302, Geog 101, 301, 302, Hist 101, 102, 172, 4 To be selected from the following: Ed 302, Geog 101, 301, 302, Hist 101, 102, 172, 173, Phil 201, 325, Pol Sc 101, Psych 201, RS 301, 401, Soc 201. 5 See adviser for available minors and course requirements.

HORTICULTURE (TURFGRASS) MAJOR

The Turfgrass major is designed to prepare the student for a career in the turfgrass industry. The major course of study is supported by a complement of courses to provide the student with a strong background in plant and soil sciences and broad training in the basic sciences and humanities.

Employment opportunities include positions in the design, establishment, and maintenance of fine turf areas for functional. recreational, and ornamental uses. Turfgrass graduates also find rewarding careers as teachers, extension agents, and research technicians. Other opportunities are available in the servicing and sale of specialized turfgrass equipment, fertilizers, chemicals, seed, and sod.

Students majoring in Turfgrass may choose a minor in Business, Environmental Science, International Agriculture, Production, Science, or a Second Department.

FRESHMAN YEAR

First Semester

Second Semester

BIOL 103 General Biology I 3 (3,0) BIOL 105 General Biology Lab. I 1 (0,3) CH 101 General Chemistry 4 (3,3) ENGL 101 English Composition 3 (3,0) MATH 105 Algebra and Trigonometry 2 5 (5,0)	AGRIC 104 Intro. to Plant Sci 3 (2,3) BIOL 104 General Biology II 3 (3,0) BIOL 106 General Biology Lab. II 1 (0,3) CH 102 or 112 General Chemistry 4 (3,3) ENGL 102 English Composition 3 (3,0) Elective
16	15

SOPHOMOBE YEAR

16 19	AGM 205 Principles of Farm Shop 3 (2,3) CH 223 Organic Chemistry 3 (3,0) and CH 227 Org. Chem. Lab. 1 (0,3) or BIOCH 210 Elem. Biochem. 4 (3,3) or CH 201 General Chemistry 4 (3,3) HORT 201 General Horticulture . 3 (2,2) HORT 303 Plant Materials I 3 (2,3) Literature Requirement 1 3 (3,0)	AG EC 202 Agric. Economics 3 (3,0) AGM 301 Soil and Water Cons 3 (2,3) AGRON 202 Soils
	16	10

IUNIOR YEAR

AGRON 407 Principles of Weed	BOT 421 Plant Physiology 4 (3,3)
Control	HORT 413 Adv. Turfgrass Culture 3 (3,0)
HORT 305 Plant Propagation 3 (2,3)	Minor 4 3
HORT 412 Turfgrass Management 3 (2,3)	Social Science Elective 3 3
Social Science Elective 3 3	Elective
Elective	
	18
18	

SENIOR YEAR

GEN 302 Genetics 4 HORT 409 Seminar 1 Hortcuthure Elective 5 6 Minor 4 6	(1,0) HORT 410 Seminar 1 (1,0) PL PA 401 Plant Pathology 3 (2,3) Minor 4)
	Elective 3	
17		
	15	

134 Total Semester Hours

1 To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. 2 Students who make a satisfactory score on the Mathematics Test, Level II (Standard) may schedule other mathematics courses or electives in lieu of Math 105. 3 To be selected from the following: Ed 302, Geog 101, 301, 302, Hist 101, 102, 172, 173, Phil 201, 325, Pol Sc 101, Psych 201, RS 301, 401, Soc 201. 4 See adviser for available minors and course requirements. 5 To be selected from the following: Hort 302, 304, 308, 310, 352, 406, 407, 414, 416, 454, 455, 456, 461, 462, 470, 471.

PREVETERINARY MEDICINE

Under a regional plan, the South Carolina Preveterinary Advisory Committee coordinates a program for all South Carolina residents who are interested in pursuing a career in veterinary medicine. South Carolina residents attending any college or university may apply through the South Carolina Advisory Committee to the University of Georgia College of Veterinary Medicine. Currently, the University of Georgia admits twelve students each year through arrangements with the Southern Regional Education Board.

Tuskegee Institute in Alabama also has an excellent program in Veterinary Medicine. Applicants to Tuskegee Institute may apply directly to the Institute. Tuskegee currently admits four South Carolina students each year.

Minimum requirements for admission to a college of veterinary medicine generally include the satisfactory completion of a minimum of two years of college in a well-rounded undergraduate degree program. Specific requirements for admission to the University of Georgia College of Veterinary Medicine include the following undergraduate courses: eight semester credits each of English and physics, twelve semester credits of biology, and sixteen semester credits of chemistry (inorganic and organic). Chemistry and physics courses must be at the premedical level. They may not be survey courses.

In addition, the South Carolina Preveterinary Committee recommends that in order to be in the best possible competitive position, the applicant complete courses in animal agriculture, genetics, nutrition, biochemistry, and advanced biology subjects. Considerations for selection are character, scholastic achievements, personality, health, experience with animals, general knowledge, and motivation. In the past, competition has been very keen and only those applicants who have shown exceptional ability have been admitted. Specific considerations may include a minimal gradepoint average and completion of standardized tests such as the Graduate Record Examination and the Veterinary Aptitude Test.

Since out-of-state students attending Clemson University are ineligible to apply to Georgia or Tuskegee under the South Carolina quota, they should contact and subsequently satisfy the entrance requirements of the specific college(s) of veterinary medicine to which they plan to apply.

Veterinary schools accept students with a broad range of academic backgrounds; therefore, it is recommended that the beginning university student select any undergraduate major and simultaneously complete the courses required for veterinary school entrance and those required for completion of a B.S. or B.A. degree. For students selecting Animal Science, Dairy Science, Economic Zoology, or Poultry Science in the College of Agricultural Sciences and Zoology in the College of Sciences at Clemson University, the basic curricula have been designed to satisfy Georgia's entrance requirements.

COLLEGE OF ARCHITECTURE

The Clemson University College of Architecture provides coordinated preprofessional and professional degree programs at undergraduate and graduate levels in preparation for careers in Architecture, City and Regional Planning, Visual Studies, and Building Science. These curricula are not offered elsewhere in the State. The preprofessional offerings of the College also provide an excellent basis for graduate studies in Landscape Architecture and Art and Architectural History.

The College enjoys contracts for creative research and public service in several areas and receives an annual support budget from the Clemson Architectural Foundation to enrich its programs. It is a member of the Association of Collegiate Schools of Architecture, the Associated Schools of Construction, American Institute of Planners, and is accredited by the National Architectural Accrediting Board and the Association of Collegiate Schools of Planning.

The Architectural Foundation, a nonprofit corporation, was established in January 1956 under the Laws of the State of South Carolina and under the sponsorship of the South Carolina Chapter of the American Institute of Architects to facilitate the continuous improvement of architectural and planning education and of the art and technology of building in South Carolina by providing financial and other assistance to the College of Architecture at Clemson University. By this means students in the College of Architecture at Clemson have been able to enjoy instruction, facilities, and conditions of superior quality.

The advantages to the students evolving from the Clemson Architectural Foundation are many. Among these are the programs of celebrated guest critics and lecturers, excellent exhibits of many types—paintings, sculpture, architecture, construction, furniture, ceramics, textiles and other allied arts and crafts—traveling expenses for student field trips and professional activities, and student loans and grants. Visual-aid facilities and gifts to the library are examples of permanent assets provided through Foundation support.

The Clemson Architectural Foundation sponsors an Overseas Center for Building Research and Urban Study in Genoa, Italy. Fifth-year students in Architecture, City and Regional Planning, and Visual Studies and fourth-year students in Building Science are involved in an intensive one-semester program in the center annually.

The College of Architecture is housed in a modern building complex constructed for its program in 1958 with a major addition

completed in 1974. The requisite functions are provided on four levels and arranged around two landscaped courts. The physical facilities reflect the teaching philosophy of the College with working studios related to the Resource Center and the Rudolph Lee Gallery at the building core. The Resource Center houses the rapidly expanding art and architectural library, encompassing a collection of approximately 85,000 slides, over 18,000 volumes, and subscribes to 225 periodicals on art, architecture, building technology, and planning, along with additional materials for student reference, urban and rural maps, manufacturers' samples, and videotape equipment. The Rudolph Lee Gallerv, open to the public, offers fifteen or more exhibitions annually. These include international shows, as well as works of faculty and students in the College of Architecture. Studios for printmaking, sculpture, painting, photography, and graphic design are appropriately equipped. Building science studios are designed for the production of related studies including critical path diagrams and the construction and display of structural models, microfilm viewing, and other graphic aids. A large shop has excellent power tools, hand tools, and benches for the construction of light architectural design models and for heavier work related to the curriculum in visual arts. The College has access to a pilot plant for the construction of full-scale building prototypes or their components.

ENTRANCE REQUIREMENTS

In the interest of both students and the conservation of University resources and to maintain a program on the highest level, admission to the College of Architecture must necessarily be on a selective basis. Annual enrollment quotas are established consistent with space available. Selection considerations include secondary school record and performance in the College Board examination (SAT Test).

Students wishing admission are advised to make application to the University early in the fall of their senior year in high school and to make arrangements for a personal interview with the Dean of the College or department head as early as possible in the year before admission. The Admissions Committee of the College will further interview entering students during freshman matriculation week of each academic year.

PROGRAMS OF STUDY

ARCHITECTURE

The architect as a practicing professional has the creative responsibility of designing the buildings which shape our physical environment. To understand the humanistic, economic and technological nature of environmental problems, he must have a sound general education. His subsequent professional education must prepare him for a life of continuing change, in which problems to be solved will be large and small, for every sort of function, in every type of climate and for every condition of budget.

The curriculum in Architecture is six years in length, embracing both a four-year Bachelor of Arts in the Design¹ program and a four-year Bachelor of Science in the Design¹ sequence, with a balance of general education. The Design sequences include a minimum of 134 credit hours of study, and an additional 60 hours in the graduate program for a total of 194 credits leading to the first professional degree, Master of Architecture.

The Bachelor of Architecture program is available to a limited number of students who have completed a first degree in Design¹ or its equivalent and who show professional promise. Admission to this program will be with the approval of the College of Architecture Admissions Committee.

BUILDING SCIENCE

The nation's leading industry in terms of annual dollar volume is building construction. Building contracting is a dynamic field and although organizations vary considerably in type, size, and complexity, those in leadership positions must invariably have capability (education) in management, construction science, relevant technical disciplines, and the humanities. The curriculum in Building Science¹ has been structured to provide young people with the unique balance of studies needed to equip them for key roles in the industry. The course is four years in length and leads to the Bachelor of Science degree in Building Science.¹

CITY AND REGIONAL PLANNING

The city planner is a member of an essential and complex profession concerned with the programming and guiding of urban and regional development. Our expanding society presents unusual opportunities for Planning graduates in private firms and on public agency staffs. When asked what made a good planner, a leading British professional replied, "A sensitive, creative leader who has lived a bit." He must be able to integrate recommendations of a wide range of specialists. The sociologist, economist, traffic engineer, and ecologist play significant roles in urban growth and change, but the city planner and urban designer must bring the city to physical form with balance and imagination.

¹ The first degrees with the designations Design in lieu of Prearchitecture and Building Science in lieu of Building Construction will be awarded no earlier than May 1979.

Students admitted as candidates for the Master of City and Regional Planning degree must have the following qualifications:

- (a) meet the admissions requirements for the University Graduate School;
- (b) have a baccalaureate degree approved by the school in such fields as architecture, civil engineering, economics, land-scape architecture, law, political science, or sociology.

Candidates entering the curriculum from a nondesign discipline will be required to take a special parallel course designed for their needs, and accordingly may be excused from courses in which they have achieved proficiency.

HISTORY AND VISUAL STUDIES

The Department of History and Visual Studies provides required undergraduate courses in architectural and art history and visual arts. The Department also offers a two-year graduate program leading to the Master of Fine Arts degree in Ceramics, Painting, Sculpture, Printmaking, Graphic Design, Photography, and Multimedia. Each of these programs requires a minimum of 60 credit hours. The graduate curricula have an emphasis in creative professional work of high standard. Maximum flexibility is provided in the management of these courses to foster innovative and imaginative solutions to fine arts problems.

BACHELOR OF ARTS IN DESIGN

FIRST YEAR

First Semester	Second Semester
ARCH 101 Architectural Analysis3 (1,6)ENGL 101 English Composition3 (3,0)MATH 106 Cal. of One Var.14 (4,0)Modern Language4 (3,1)Elective3	ARCH 102 Architectural Analysis. 3 (1,6)ENGL 102 English Composition. 3 (3,0)MATH 301 Stat. Theory and Meth. 1 3 (3,0)Modern Language
17	17

SECOND YEAR

AAH 215 Arch. History I 3 (3,0) ARCH 253 Arch. Design I 5 (0,15) BLDSC 201 Building Science I 3 (3,0) Modern Language 3 3 (3,0) Visual Studies 1 3 (1,6)	AAH 216 Arch. History II 3 (3,0) ARCH 254 Arch. Design II 5 (0,15) BLDSC 202 Building Science II 3 (2,2) Modern Language 3 (3,0) Visual Studies 1 3 (1,6)
17	17

THIRD YEAR

AAH 315 Arch. History III 3 (3,0) ARCH 353 Arch. Design III 5 (0,15) BLDSC 301 Building Science III 3 (3,0) Elective 6	AAH 316 Arch. History IV 3 (3,0) ARCH 354 Arch. Design IV 5 (0,15) BLDSC 302 Building Science IV. 3 (3,0) 3 (3,0) Elective 6 6
—	_
17	17

FOURTH YEAR

ARCH 421 Arch. Seminar 3 (3,0) ARCH 453 Arch. Design V 5(0,15) BLDSC 401 Building Science V 3 (3,0)	ARCH 454 Arch. Design VI5(0,15)BLDSC 402 Building Science VI3 (3,0)Elective9
Elective	_
	17
17	136 Total Semester Hours

1 Vis 205, 207, 209, 211, 213, 215, 217. Elective Policy:

Elective Policy: Thirty-three elective credit hours are required for graduation. A minimum of 9 credits shall be selected from major study areas within the College of Architecture, and a minimum of 15 credits, including 6 hours in literature (Engl 202, 203, 204, 205, 206, 207, 208, 209) shall be selected from minor study areas outside the College. All elective courses shall be selected in consultation with the student's adviser. Note: The first degrees with the designation Design in lieu of Prearchitecture will be awarded no earlier than May 1979.

BACHELOB OF SCIENCE IN DESIGN

FIRST YEAR

Second Semester

First Semester

ARCH 101 Architectural Analysis3 (1,6)ENGL 101 English Composition3 (3,0)MATH 106 Cal. of One Var, I 4 (4,0)PHYS 115 Classical Physics I3 (3,0)Elective	ARCH 102 Architectural Analysis. 3 (1,6) ENGL 102 English Composition 3 (3,0) MATH 301 Stat. Theory and Meth. I 3 (3,0) PHYS 116 Classical Physics II 3 (3,0) Elective
16	16

SECOND YEAR

AAH 215 Arch. History I 3 (3,0) ARCH 253 Arch. Design I 5 (0,15) BLDSC 201 Building Science I 3 (3,0) ECON 201 Prin. of Economics 1 3 (3,0) Visual Studies 2 3 (1,6)	AAH 216 Arch. History II
17	17

THIRD YEAR

AAH 315 Arch. History III	AAH 316 Arch. History IV 3 (3,0) ARCH 354 Arch. Design IV 5 (0,15) BLDSC 302 Building Science IV. 3 (3,0) Elective
17	17

FOURTH YEAR

ARCH 421 Arch. Seminar 3 (3,0) ARCH 453 Arch. Design V 5 (0,15) BLDSC 401 Building Science V 3 (3,0)	ARCH 454 Arch. Design VI 5(0,15) BLDSC 402 Building Science VI 3 (3,0) Elective 9
Elective	
_	17
17	134 Total Semester Hours

1 Econ 200 and a 300-level economics course may be substituted for Econ 201 and 202. 2 Vis 205, 207, 209, 211, 213, 215, 217. Elective Policy:

Thirty-three elective credit hours are required for graduation. A minimum of 9 credits shall be selected from major study areas within the College of Architecture, and a minimum of 15 credits, including 6 hours in literature (Engl 202, 203, 204, 205, 206, 207, 208, 209) shall be selected from minor study areas outside the College. All elective courses shall be selected in consultation with the student's adviser. *Note:* The first degrees with the designation Design in lieu of Prearchitecture will be awarded no earlier than May 1979.

awarded no earlier than May 1979.

BACHELOR OF ARCHITECTURE

See Design curricula (Bachelor of Arts or Bachelor of Science)

FIFTH YEAR

First Semester Second Semester	
ARCH 553 Arch. Design VII 9(3,18) CRP 441 History of Planning 3 (3,0) Elective 1 3	ARCH 481 Arch. Office Practice . 3 (3,0) ARCH 554 Arch. Design VIII 9(3,18) Elective 1 S
16	15

SIXTH YEAR

First Semester

ARCH 403 Seminar in Analysis and Criticism of Architectural and Town Building Works 3 (3,0) ARCH 559 Terminal Project in Architecture 9(1,24) Elective 1 . 3

¹ Electives shall be determined by each individual student in consultation with his major adviser to complement and reinforce the student's planned area of study,

15

Second Semester

BACHELOR OF SCIENCE IN BUILDING SCIENCE

FIRST YEAR

First Semester

SECOND YEAR

BLDSC 201 Building Science I 3 (3,0) BLDSC 241 Construction Mgt. I 5 (3,6) COMP SC 205 Elem. Comp. Prog. 3 (3,0)	AAH 216 Arch, History II 3 (3,0) ACCT 200 Basic Accounting 3 (3,0) BLDSC 202 Building Science II 3 (2,2) BLDSC 242 Construction Mgt. II 5 (3,6) ECON 202 Prin. of Economics 1 . 3 (3,0) 17
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THIRD YEAR

AAH 315 Arch. History III 3 (3,0) BLDSC 301 Building Science III. 3 (3,0) BLDSC 341 Construction Mgt. III. 5 (3,6) CE 201 Surveying	AAH 316 Arch. History IV
17	17

FOURTH YEAR

ARCH 421 Arch. Seminar 3 (3,0) BLDSC 401 Building Science V. 3 (3,0) BLDSC 441 Construction Mgt. VI 5 (3,6) 5 (3,6) Elective 6	BLDSC 432 Construction Mgt. V. 3 (3,0) BLDSC 442 Construction Mgt. VII 5 (3,6) Elective
	17
17	134 Total Semester Hours

134 Total Semester Hours

¹ Econ 200 and a 300-level economics course may be substituted for Econ 201 and 202.

Elective Policy: Major: To fulfill the requirements for a major in Building Science students must take, in addition to specified courses, a minimum of 8 credits above the sophomore level in the areas of Accounting, Economics, Industrial Management, Building Science, or Planning Studies.

English: Six elective credits are required; 3 of which may be in oral expression and the remainder from Engl 202, 203, 204, 205, 206, 207, 208, 209. *Note:* The first degrees with the designation Building Science in lieu of Building Construction will be awarded no earlier than May 1979.

COLLEGE OF EDUCATION

The purpose of the College of Education is to prepare teachers, special services personnel, and school leaders; to provide professional services to education in South Carolina; and to carry out basic and applied research in education. Curricula are organized to give students the opportunities to (1) acquire a broad general education through liberal arts and science courses; (2) develop depth of knowledge in the teaching area; (3) gain an understanding of the historical, philosophical and psychological backgrounds of American education; and (4) acquire knowledge of and skill and experience in using effective teaching techniques.

Curricula for those preparing to teach have been especially designed by committees from each department offering a teaching major and the College of Education.

ADMISSION

Admission to programs in the College of Education is accomplished in three phases: preprofessional, professional, and directed teaching.

Preprofessional. Individuals who show an interest in teaching and related areas and who have met the general admission requirements of Clemson University must complete and submit form CED03 to be considered for admission to a preprofessional program.

Professional. During the term in which a student is to complete 60 semester hours of work, he must have a minimum cumulative grade-point average of 1.6 and apply on form CED03 for admission to a professional program in the College of Education. This application is to be submitted to his department head by November 10, March 1, or at the beginning of the summer school term in which he will have completed 60 semester hours. Effective with the fall of 1977-78 class of freshmen, students will be required to have a minimum cumulative grade-point average of 1.8 or higher for admission to a professional program.

Directed Teaching. A student who is in a professional program and who has completed at least 95 semester hours is eligible to register for the appropriate directed teaching program. A student should apply to the head of his department prior to May 1 of the academic year preceding the school year in which directed teaching is to be scheduled. The cumulative grade-point average necessary for graduation is required prior to being permitted to register for directed teaching and the related methods courses. The College of Education *Student Handbook* contains complete information concerning admissions requirements.

CONTINUING ENROLLMENT

A student must maintain the grade-point average for admission to the program and that required by Clemson University for continuing enrollment. Grade-point averages may be checked at the end of a semester or summer term. A student must have a cumulative grade-point average of 1.6 to enroll in 300-level and 1.8 to enroll in 400-level education courses, except directed teaching and the related methods course which require a minimum of 2.0. Effective with the fall of 1977-78 class of freshmen, students will be required to have a cumulative grade-point average of 1.8 or higher to enroll in 300-level education courses and 2.0 or higher to register in all 400-level education courses.

Any student who desires to enroll in education courses must meet the cumulative grade-point requirements established for Education majors.

A student who is denied admission may appeal to the College of Education Admissions Committee.

A comprehensive statement of the activities, services, and programs of the College of Education is published in the *Student Handbook* which is distributed by faculty advisers to Education majors and students interested in education.

GRADUATE STUDY

The College of Education offers programs leading to the Master of Agricultural Education, Master of Education, Master of Industrial Education, and the Specialist in Education degrees.

BACHELOR OF ARTS CURRICULA

EARLY CHILDHOOD EDUCATION AND ELEMENTARY EDUCATION PROGRAMS

A total of 130 semester hours is required for the Bachelor of Arts degree in either the Early Childhood Education or the Elementary Education curriculum. The Early Childhood Education curriculum prepares the student for teaching positions in kindergarten or grades one through three. The Elementary Education curriculum prepares the student for teaching on the elementary school level.

Application to Directed Teaching (Ed 481 for Elementary Education and Ed 484 for Early Childhood Education) should be made in writing no later than May 1, prior to the school year in which student teaching is to be scheduled. A student whose cumulative grade-point ratio is lower than the requirement for graduation will not be permitted to register for Directed Teaching.

EARLY CHILDHOOD EDUCATION

FRESHMAN YEAR

First Semester

Second Se	emester
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ED 100 Orientation 1 (1,0) ENGL 101 English Composition 3 (3,0) Foreign Language 4 (3,1) Science/Mathematics Requirement 2 7 Elective 1	ENGL 102 English Composition 3 (3,0) HIST 101 History of the U.S 3 (3,0) Foreign Language
16	18

SOPHOMORE YEAR

HIST 102 History of the U.S. 3 (3,0) Foreign Language 3 (3,0) Literature Requirement 1 3 (3,0) Science/Mathematics Requirement 2 7 Elective 1 17	HIST 172 Western Civilization 3 (3,0) MUS 210 Music Appreciation 3 (3,0) Foreign Language
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JUNIOR YEAR

ED 301 Prin. of American Ed 3 (3,0) ED 302 Educational Psychology . 3 (3,0) ED 466 Curriculum for Early Childhood Education 3 (2,2) ENGL 351 Children's Literature . 3 (3,0) HIST 173 Western Civilization 3 (3,0) Elective	ED 334 Child Growth and Dev. 3 (3,0) ED 459 Fund. of Basic Reading 3 (2,2) IN ED 372 Arts and Crafts 3 (2,3) Social Science Elective 3 Elective
18	

SENIOR YEAR

AAH 303 Evol. of Visual Arts I. 3 (3,0) or AAH 304 Evol. of Vis. Arts II 3 (3,0) ED 458 Health Education 3 (3,0) MUS 400 Music in the Elementary School Classroom	ED 336 Behavior of the Preschool Child
15	130 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² A total of 24 hours is required in mathematics and science (and courses in both biological and physical sciences must be taken) with a minimum of 9 hours in mathematics and a minimum of 12 hours in science. The additional three hours may be taken in either mathematics or science and are to be selected from the courses listed below. Mathematics to be selected from the following: Math 115, 116, 215, 216. Science to be selected from the following: Math 115, 106, 105, 106; and physical science—astronomy, chemistry, geology, physical science, and physics. ³ Select from economics, philosophy, political science, psychology, religion, sociology. ⁴ Block schedule must be taken as shown in either semester of the senior year.

ELEMENTARY EDUCATION

FRESHMAN YEAR

First Semester

Second Semester

ENGL 102 English Composition . HIST 101 History of the U.S Foreign Language	$\frac{3}{4}$	(3,0)
-	7	

SOPHOMORE YEAR

HIST 102 History of the U.S 3 (3,0) Foreign Language 3 (3,0) Literature Requirement 1 3 (3,0) Science/Mathematics Requirement 2 7 16	HIST 172 West. Civilization 3 (3,0) MUS 210 Music Appreciation 3 (3,0) Foreign Language
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IUNIOR YEAR

ED 301 Prin. of American Ed 3 (3,0) ED 302 Educational Psychology . 3 (3,0) ENGL 351 Children's Literature . 3 (3,0) HIST 173 Western Civilization 3 (3,0) Interest Area 3	ED 334 Child Growth and Dev. 3 (3,0) MUS 400 Music in the Elementary School Classroom	
	18	
SENIOR YEAR		

AAH 303 Evol. of Visual Arts I . 3 (3,0) or AAH 304 Evol. of Vis. Arts II 3 (3,0) ED 458 Health Education 3 (3,0) Interest Area 3	ED 461 Teaching Reading in the Elementary School
Social Science Elective 4 3 Elective 3	Mathematics and Science 3 (2,3) ED 486 Meth. and Cur. in Elem.
—	Social Studies and Language
15	Arts 3 (2,3)
	15
	130 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209, ² A total of 24 hours is required in mathematics and science (and courses in both biological and physical sciences must be taken) with a minimum of 9 hours in mathematics and a minimum of 12 hours in science. The additional three hours may be taken in either mathematics or science and are to be selected from the courses listed below. Mathematics to be selected from the following: Math 115, 116, 215, 216. Science—astronomy, chemistry, geology, physical science, and physics. ³ Nine semester hours in one of these areas: English, fine arts, mathematics, modern languages, natural sciences, social science, special education. ⁴ Select from economics, philosophy, political science, psychology, religion, sociology. ⁵ Block schedule must be taken as shown in either semester of the senior year.

SECONDARY EDUCATION CURRICULA

Programs leading to a Bachelor of Arts degree in Secondary Education are available to students preparing to teach economics, English, history, mathematical sciences, French, German, Spanish, natural sciences, political science, psychology, or sociology on the secondary school level. The teaching field should be selected as early as possible in order that appropriate freshman and sophomore courses may be taken.

Each curriculum requires a major concentration in the teaching field. Specific courses and sequences have been designated by teacher education committees to meet requirements for those planning to teach. Students who have elective courses in the teaching area should consult the departmental adviser prior to scheduling these courses.

The professional education courses should be completed in sequence prior to registering for the block schedule. Application to Directed Teaching (Ed 412) should be made in writing no later

than May 1 preceding the school year in which student teaching is to be scheduled. A student whose cumulative grade-point ratio is lower than the requirement for graduation will not be permitted to register for Directed Teaching.

Education 412 is conducted on a full-day basis, "block schedule," for one-half semester. Students taking Ed 412 will register for Ed 335, 424, and 498, these three courses being taught on a five-day basis during the first half of the semester.

TEACHING AREA: ECONOMICS

FRESHMAN YEAR

First Semester

Second Semester

ED 100 Orientation 1 (1,0) ENGL 101 English Composition 3 (3,0) HIST 172 Western Civilization 3 (3,0) MATH 101 Finite Probability 3 (3,0) Foreign Language 4 (3,1) Science 2 3-4	ENGL 102 English Composition. 3 (3,0) HIST 173 Western Civilization 3 (3,0) MATH 102 Intro. to Math. Anal. 3 (3,0) Foreign Language
Elective 1	
	17–18

18 - 19

SOPHOMORE YEAR

ECON 201 Principles of Economics 3 (3,0) MATH 203 Elem. Stat. Inference. 3 (3,0) Foreign Language	ACCT 201 Principles of Accounting 3 (3,0) ECON 202 Principles of Economics 3 (3,0) Foreign Language Literature Requirement 1 Science 2 Literature Requirement 1 Literature Requirement 1 <td< th=""></td<>
17-16	17–16

JUNIOR YEAR

ED 301 Principles of American Ed. ED 302 Educational Psychology Teaching Major	3	(3,0)	Major	6

SENIOR YEAR

(Block Schedule-Either Semester)

AAH 303 Evol. of Visual Arts I 3 (3,0) ED 458 Health Education 3 (3,0) MUS 210 Music Appreciation 3 (3,0) Teaching Major 6 (3,0)	ED 335 Adol. Growth and Dev. 3 (3,0) ED 412 Directed Teaching 3 6(1,15) ED 424 Methods and Materials in Secondary School Instruction 3 (3,0)
15	ED 498 Teaching Secondary School Reading
	15
	129 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. 2 Biol 103, 104, 105, 106 and a two-semester sequence in astronomy, chemistry, geology, physical science, or physics.

³ This semester is a block schedule and must be taken as listed. Note: The teaching major requires twenty-four semester hours of junior and senior courses consisting of Econ 314, 407; nine semester hours from Econ 302, 403, 404, 410, 412, and 420 distributed as follows:

420 distributed as follows:
 Group A: Econ 314, 407.
 Group B: Three courses from the following: Econ 302, 403, 404, 410, 412, 420.
 Group C: The remaining hours selected from Ag Ec 456, Econ 301, 302, 305, 306, 308, 309, 403, 404, 410, 412, 420, 422, Ex St 462, IM 404, 405, 406, Mgt Sc 311.

Second Semester

TEACHING AREA: ENGLISH

FRESHMAN YEAR

First Semester

1 100 000000	
ED 100 Orientation 1 (1,0) ENGL 101 English Composition 3 (3,0) MATH 101 Finite Probability 3 (3,0) Foreign Language 4 (3,1) Science 2 4 Elective 1	ENGL 102 English Composition 3 (3,0) HIST 172 Western Civilization 3 (3,0) MATH 102 Intro. to Math. Anal. 3 (3,0) Foreign Language Science 2 Lective
10	10

SOPHOMORE YEAR

HIST 173 Western Civilization 3 (3,0) Foreign Language 3 (3,0) Literature Requirement 1 3 (3,0) Science 2 4 Social Science Elective 3 3	Foreign Language 3 (3,0) Literature Requirement 1 3 (3,0) Science 2 4 4 Social Science 2 3 Elective 3 4
Elective 1	_
_	17
17	

JUNIOR YEAR

ED 301 Principles of American Ed. 3 (3,0)	ED 302 Educational Psychology 3 (3,0)
HIST 361 History of England 3 (3,0)	HIST 363 History of England 3 (3,0)
Teaching Major	Teaching Major
$\overline{18}$	15

SENIOR YEAR

(Block Schedule-Either Semester)

AAH 303 Evol. of Visual Arts I 3 (3,0) ED 458 Health Education 3 (3,0) MUS 210 Music Appreciation 3 (3,0)	ED 335 Adol. Growth and Dev. 3 $(3,0)$ ED 412 Directed Teaching 4 $6(1,15)$ ED 424 Methods and Materials in
Teaching Major	Secondary School Instruction 3 (3,0) ED 498 Teaching Secondary
15	School Reading 3 (1,4)
	15

131 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Biol 103, 104, 105, 106 and a two-semester sequence in astronomy, chemistry, geology, physical science, or physics.

3 Economics, philosophy, political science, psychology, religion, sociology. 4 This semester is a block schedule and must be taken as listed. Note: The teaching major requires twenty-four semester hours of junior and senior English courses and must include Engl 304, 352, 402, 405, 422 or 423, 440, 461 or 462. Those receiving departmental certification for Engl 304 are required to complete Engl 403.

TEACHING AREA: HISTORY

FRESHMAN YEAR

First Semester

Second Semester

ED 100 Orientation 1 (1,0) ENGL 101 English Composition 3 (3,0) MATH 101 Finite Probability 3 (3,0) Foreign Language 4 (3,1) Science 2 4 Elective 1	ENGL 102 English Composition 3 (3,0)HIST 172 Western Civilization 3 (3,0)MATH 102 Intro. to Math. Anal. 3 (3,0)Foreign Language
16	18

SOPHOMORE YEAR

HIST 173 Western Civilization 3 (3,0) Forei Foreign Language 3 (3,0) Liter Literature Requirement 1 3 (3,0) Scien Science 2 4 Social	I 102 History of the U.S. 3 (3,0) ign Language 3 (3,0) 'ature Requirement 1 3 (3,0) nce 2 4 al Science Elective 3 3 tive 1 17
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JUNIOR YEAR

ED 301 Principles of American Ed. 3 (3,0)	ED 302 Educational Psychology 3 (3,0)
Teaching Major	Teaching Major

SENIOR YEAR

DI alla	Schod	lo_Fither	Coursester)
INIOCK	Schedi	le-Fither	Semester)

AAH 303 Evol. of Visual Arts I 3 (3,0) ED 458 Health Education 3 (3,0) MUS 210 Music Appreciation 3 (3,0)	ED 335 Adol. Growth and Dev. 3 $(3,0)$ ED 412 Directed Teaching 4 $6(1,15)$ ED 424 Methods and Materials in
Teaching Major	Secondary School Instruction 3 (3.0)
_	ED 498 Teaching Secondary
15	School Reading
	15
	131 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209.
² Biol 103, 104, 105, 106 and a two-semester sequence in astronomy, chemistry, geology, physical science, or physics.
³ Economics, philosophy, political science, psychology, religion, sociology.
⁴ This semester is a block schedule and must be taken as listed.
Note: The teaching major requires twenty-four hours of junior and senior history courses, with the following number of courses from Groups A, B, C, and D.
Group A (2 courses): Hist 300, 301, 302, 303, 304, 305, 306, 307, 308.
Group B (1 course): Hist 361, 363, 370, 372, 373, 374, 375, 376, 377, 385, 386.
Group D (2 courses): Hist 400, 440, 450, 460, 470, 471, 492, 493, 494, 495, 496, 499.

TEACHING AREA: MATHEMATICAL SCIENCES

FRESHMAN YEAR

First Semester

ED 100 Orientation 1	
ENGL 101 English Composition 3	(3,0)
MATH 106 Cal. of One Var. I . 4	(4,0)
Foreign Language 4	(3,1)
Science 2	
Elective 1	

16 - 17

SOPHOMORE YEAR

20 - 19

15 - 16

Second Semester

IUNIOR YEAR

MATH 301 Statistical Theory E and Methods I 3 (3,0) M MATH 308 College Geometry 3 (3,0) M	AAH 303 Evol. of Visual Arts I. 3 (3,0) ED 302 Educational Psychology. 3 (3,0) MATH 408 Topics in Geometry. 3 (3,0) MATH 411 Linear Algebra 3 (3,0) Elective
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SENIOR YEAR

(Block Schedule-Either Semester)

ED 458 Health Education 3 (3,0)	ED 335 Adol. Growth and Dev 3 (3,0)
MATH 412 Intro. to Modern	ED 412 Directed Teaching $4 \dots 6(1,15)$
Algebra	ED 424 Methods and Materials in
MUS 210 Music Appreciation 3 (3,0)	Secondary School Instruction 3 (3,0)
Mathematics Elective	ED 498 Teaching Secondary
	School Reading
15	
	15
	129 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209, ² Biol 103, 104, 105, 106 and a two-semester sequence in astronomy, chemistry, geology, physical science, or physics. ³ Economics, philosophy, political science, psychology, religion, sociology. ⁴ This semester is a block schedule and must be taken as listed. *Note:* Suggested mathematics electives: Comp Sc 205, 210, Math 405, 409, 452, 453,

454.

TEACHING AREA: MODERN LANGUAGES

(French, German and Spanish)

FRESHMAN YEAR

First Semester

Second Semester

ED 100 Orientation ENGL 101 English Composition MATH 101 Finite Probability Foreign Language Science 2 Elective	3(3,0) 3(3,0) 4(3,1) 4	ENGL 102 English Composition HIST 172 Western Civilization MATH 102 Intro. to Math. Anal. Foreign Language Science 2 Elective	3 3 4 4	(3,0) (3,0)
-			~0	

SOPHOMORE YEAR

HIST 173 Western Civilization 3 (3,0) Foreign Language 3 (3,0) Literature Requirement 1 3 (3,0) Science 2 4 Social Science Elective 3 3	Foreign Language 3 (3,0) Literature Requirement 1 3 (3,0) Science 2 4 4 Social Science Elective 3 3 3
Elective 1	
_	17
17	

JUNIOR YEAR

ED 301 Principles of American Ed. 3 (3,0) Teaching Major	ED 302 Educational Psychology. 3 (3,0) Teaching Major
	—
15	15

SENIOR YEAR

(Block Schedule-Fither Semester)

(Dioch Schedule	Little Demester)
AAH 303 Evol. of Visual Arts I 3 (3,0) ED 458 Health Education 3 (3,0) MUS 210 Music Appreciation 3 (3,0)	ED 335 Adol. Growth and Dev. 3 (3,0) ED 412 Directed Teaching 4 $6(1,15)$ ED 424 Methods and Materials in
Teaching Major 6	Secondary School Instruction 3 (3,0)
	ED 498 Teaching Secondary
15	School Reading 3 (1,4)

128 Total Semester Hours

15

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. 2 Biol 103, 104, 105, 106 and a two-semester sequence in astronomy, chemistry, geology, physical science, or physics.

physical science, or physics.
3 Economics, philosophy, political science, psychology, religion, sociology.
4 This semester is a block schedule and must be taken as listed.
Note: The teaching major requires 24 semester hours in either French, German, or Spanish as listed.

Spanish as listed.
French major. Must include Fr 205 and 21 hours arranged as follows: Group I. Fifteen semester credits from Fr 301, 302, 305, 309, 409.
Group II. Six semester credits from Fr 403, 404, 405, 406, 407, 408, 498.
German major. Must include Ger 205 and 21 semester hours arranged as follows: Group I. Fifteen semester hours from Ger 301, 302, 305, 307, 308.
Group II. Six semester hours from Ger 407, 408, 409, 410, 498.
Spanish major. Must include Span 205 and 21 hours arranged as follows: Group I. Six semester credits from Span 303, 304, 310, 311 (preferably in sequence). Group II. Twelve semester credits from Span 305, 307, 308, 409.
Group III. Three semester credits from Span 401, 402, 405, 406, 421, 422, 498.

TEACHING AREA: NATURAL SCIENCES

FRESHMAN YEAR

First Semester

Second Semester

ED 100 Orientation 1 (1,0) ENGL 101 English Composition 3 (3,0) MATH 101 Finite Probability 3 (3,0)	CH 102 General Chemistry 4 (3,3) ENGL 102 English Composition 3 (3,0) HIST 172 Western Civilization 3 (3,0) MATH 102 Intro. to Math. Anal. 3 (3,0) Foreign Language 4 (3,1) Elective 1 18
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SOPHOMORE YEAR

BIOL 103 General Biology I 3 (3,0) BIOL 105 General Biology Lab. I 1 (0,3) HIST 173 Western Civilization 3 (3,0) MATH 203 Elem. Stat. Inference 3 (3,0) Foreign Language 3 (3,0) Literature Requirement 1 3 (3,0) Elective 1 17 1	BIOL 104 General Biology II 3 (3,0) BIOL 106 General Biology Lab. II 1 (0,3) Foreign Language 3 (3,0) Literature Requirement 1 3 (3,0) Social Science Elective 3 6 Elective 1 17
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JUNIOR YEAR

ED 301 Principles of American Ed. 3 (3,0) GEOL 101 Physical Geology 4 (3,2) PHYS 207 General Physics I 4 (3,2) Science Elective 2	$\begin{array}{c} \text{ED 302 Educational Psychology 3} & (3,0)\\ \text{GEOL 102 Historical Geology 4} & (3,3)\\ \text{PHYS 208 General Physics II 4} & (3,2)\\ \text{Science Elective 2} & & & & \\ \text{Elective} & & & & & \\ \end{array}$
17	17

SENIOR YEAR

(Block Schedule-Either Semester)

(Dicon Schoulde	
AAH 303 Evol. of Visual Arts I 3 (3,0) ASTR 102 Stellar Astronomy 3 (3,0)	ED 335 Adol. Growth and Dev 3 (3,0) ED 412 Directed Teaching 4 6(1,15)
ED 458 Health Education \dots 3 (3,0)	ED 424 Methods and Materials in
MUS 210 Music Appreciation 3 (3,0)	Secondary School Instruction 3 (3,0)
Science Elective 2 3	ED 498 Teaching Secondary
	School Reading
15	
	15
	132 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Science electives to be taken in biological sciences, chemistry, physics, geology. ³ Economics, philosophy, political science, psychology, religion, sociology. ⁴ The last semester of the senior year is a block schedule and must be taken as listed.

TEACHING AREA: POLITICAL SCIENCE

FRESHMAN YEAR

First Semester

ED 100 Orientation	1	(1,0)
ENGL 101 English Composition.	3	(3,0)
HIST 172 Western Civilization	3	(3,0)
MATH 101 Finite Probability	3	(3,0)
Foreign Language	4	(3,1)
Science 2	-4	
Elective	1	

18 - 19

ENGL 102 English Composition.	3	(3,0)
HIST 173 Western Civilization		
MATH 102 Intro. to Math. Anal.	3	(3,0)
Foreign Language	4	(3,1)
Science 2		
Elective	1	
	_	

Second Semester

17-18

SOPHOMORE YEAR

HIST 101 History of the U.S. 3 (3,0) POL SC 101 Amer. Nat. Govt. 3 (3,0) Foreign Language 3 (3,0) Literature Requirement 1 3 (3,0) Science 2 4-3 Elective 1	HIST 102 History of the U.S. 3 (3,0) POL SC 201 Intro. to Pol. Sci. 3 (3,0) Foreign Language 3 (3,0) Literature Requirement 1 3 (3,0) Science 2 4-3 Elective 1
17–16	17-16

JUNIOR YEAR

ED 301 Principles of American Ed. 3 (3,0)	ED 302 Educational Psychology 3 (3,0)
Teaching Major	Teaching Major
15	15

SENIOR YEAR

(Block Schedule-Either Semester)

AAH 303 Evol. of Visual Arts I 3 (3,0) ED 458 Health Education 3 (3,0)	ED 335 Adol. Growth and Dev. 3 (3,0) ED 412 Directed Teaching 3 6(1,15)
MUS 210 Music Appreciation 3 (3,0)	ED 424 Methods and Materials in
Teaching Major	Secondary School Instruction 3 (3,0) ED 498 Teaching Secondary
15	School Reading 3 (1,4)
	15
	129 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209.
² Biol 103, 104, 105, 106 and a two-semester sequence in astronomy, chemistry, geology, physical science, or physics.
³ This is a block schedule and must be taken as listed.
Note: The teaching major requires twenty-four semester hours of junior- and senior-level political science courses. The hours are to be drawn from four of the following fields: American Government—Pol Sc 302 (required), 403, 405, 409
Comparative Government—Pol Sc 371, 372, 474, 475, 476
International Relations—Pol Sc 361, 462, 463, 464, 465
Political Echavior—Pol Sc 351, 352, 453, 482
Public Administration—Pol Sc 321, 422, 423, 424, 425, 426, 427, 428, 429
Public Law—Pol Sc 432, 433, 434, 435

TEACHING AREA: PSYCHOLOGY

FRESHMAN YEAR

First Semester

Second Semester

ENGL 101 English Composition 3 (3,0) H HIST 172 Western Civilization 3 (3,0) M MATH 101 Finite Probability 3 (3,0) F Foreign Language	ENGL 102 English Composition 3 (3,0) HIST 173 Western Civilization 3 (3,0) MATH 102 Intro. to Math. Anal. 3 (3,0) Foreign Language
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SOPHOMORE YEAR

MATH 203 Elem. Stat. Inference 3 (3,0) PSYCH 201 General Psychology 3 (3,0) Foreign Language Literature Requirement 1 Science 2 Lective 1 17-16	PSYCH 263 Intro. Exp. Psych 3 (3,0) Foreign Language
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JUNIOR YEAR

ED 301 Principles of American Ed. 3 (3,0) Teaching Major	ED 302 Educational Psychology. 3 (3,0) Teaching Major
15	18

SENIOR YEAR

(Block Schedule-Either Semester)

AAH 303 Evol. of Visual Arts I 3 (3,0) ED 458 Health Education 3 (3,0)	ED 335 Adol. Growth and Dev. 3 (3,0) ED 412 Directed Teaching 4 $6(1,15)$
MUS 210 Music Appreciation 3 (3,0) Teaching Major 6	ED 424 Methods and Materials in Secondary School Instruction 3 (3.0)
	ED 498 Teaching Secondary
15	School Reading $\ldots 3$ (1,4)
	15

132 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209.
² Biol 103, 104, 105, 106 and a two-semester sequence in astronomy, chemistry, geology, physical science, or physics.
³ Economics, philosophy, political science, psychology, religion, sociology.
⁴ This is a block schedule and must be taken as listed.
Note: The teaching major requires 24 semester hours of junior and senior psychology

courses.

TEACHING AREA: SOCIOLOGY

FRESHMAN YEAR

First Semester

Second Semester

ENGL 101 English Composition 3 (3,0) HIS HIST 172 Western Civilization 3 (3,0) MAJ MATH 101 Finite Probability 3 (3,0) Fore Foreign Language	GL 102 English Composition 3 (3,0) ST 173 Western Civilization 3 (3,0) IT1 102 Intro. to Math. Anal. 3 (3,0) reign Language
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SOPHOMORE YEAR

MATH 203 Elem. Stat. Inference 3 (3,0) SOC 201 Sociological Perspective . 3 (3,0) Foreign Language	SOC 202 Social Problems 3 (3.0) Foreign Language 3 (3.0) Literature Requirement 1 3 (3.0) Science 2 4-3 Elective 4 17-16 17-16
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IUNIOR YEAR

3
15

SENIOR YEAR

(Block Schedule-	-Either Semester)
AAH 303 Evol. of Visual Arts I 3 (3,0) ED 458 Health Education 3 (3,0) MUS 210 Music Appreciation 3 (3,0) Teaching Major 6 Elective 3 2	ED 335 Adol. Growth and Dev. 3 (3,0) ED 412 Directed Teaching 4 6(1,15) ED 424 Methods and Materials in Secondary School Instruction 3 (3,0) ED 498 Teaching Secondary School Reading
17	15
	134 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209.
² Biol 103, 104, 105, 106 and a two-semester sequence in astronomy, chemistry, geology, physical science, or physics.
³ Electives must include Econ 201, 202, Pol Sc 101.
⁴ This semester is a block schedule and must be taken as listed. *Note:* The teaching major consists of Soc 206, 309, 311, 321, 322, 324, 331, 341, 351, 361, 381, 391, 393, 421, 431, 443, 451, 481, 499.

BACHELOR OF SCIENCE CURRICULA

AGRICULTURAL EDUCATION

The Agricultural Education curriculum is designed for students who wish to prepare for positions in vocational agriculture, agricultural occupations, and other teaching positions in the secondary schools; engage in other forms of educational work such as agricultural missionary, public relations and agricultural extension; farming, soil conservation and other governmental work: business and industry.

The curriculum provides for a broad education in general and professional education including student teaching. In addition to required courses giving a thorough background in the agricultural and biological sciences, a student may minor in Business, International Agriculture, or a Second Department. Students in other departments in the College of Agricultural Sciences may minor in Agricultural Education and be certified to teach if they meet all requirements.

FRESHMAN YEAR

First Semester

Second Semester

16

AGRIC 104 Intro. to Plant Sci 3 (2,3)	AG ED 100 Orient. and Field Exp. 1 (0,2)
BIOL 103 General Biology I 3 (3,0)	AGRIC 103 Intro. to Ani. Ind 3 (2,3)
BIOL 105 General Biology Lab. I 1 (0,3)	BIOL 104 General Biology II 3 (3,0)
CH 101 General Chemistry 4 (3,3)	BIOL 106 General Biology Lab. II 1 (0,3)
ENGL 101 English Composition . 3 (3,0)	CH 102 or 112 General Chemistry 4 (3,3)
MATH 102 Intro. to Math. Anal.2 3 (3,0)	ENGL 102 English Composition . 3 (3,0)
17	Elective

SOPHOMORE YEAR

AG EC 202 Agric. Economics 3 (3,0) AG ED 201 Intro. to Agric. Ed. 3 (2,3) AGM 205 Principles of Farm Shop 3 (2,3) PHYS 207 General Physics I 4 (3,2) Literature Requirement 1 4 (3,0) Elective 1 17	AGRON 202 Soils
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IUNIOR YEAR

AGM 301 Soil and Water Conserva. 3 (2,3) ENT 301 General Entomology . 3 (2,3) Approved Agric. Econ. Elective 3 Approved Agriculture Elective 3 Minor 4	AG EC 302 Management of Agricultural Enterprises
	Minor 4

SENIOR YEAR

HORT 407 Landscape Design 3 (2,3)	AG ED 401 Methods in
PL PA 401 Plant Pathology 3 (2,3)	Agricultural Education
Minor 4	AG ED 406 Directed Teaching. 6(0,18)
Elective	AG ED 423 Curriculum 2 (2,0)
	AG ED 425 Teach. Agric. Mech., 2 (1,3)
16	ED 302 Educational Psychology. 3 (3,0)
	16
	124 Total Somester Hours

134 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Students who make a satisfactory score on the Mathematics Test, Level II (Standard) may schedule other mathematics courses or electives in lieu of Math 102. Students in-eligible for Math 102 will take Math 105. ³ To be selected from the following: Hist 101, 102, 173, 173, Phil 201, 325, Pol Sc 101, Psych 201, RS 301, 401, Soc 201. ⁴ See adviser for available minors and course requirements.

INDUSTRIAL EDUCATION

The curriculum in Industrial Education is designed to prepare students for careers in the teaching of industrial subjects and in training programs in industry. To accomplish these purposes the curriculum is divided into three areas of specialization leading to the degree of Bachelor of Science in Industrial Education. At the end of his freshman year, each student will select one of three options: Education for Industry, Industrial Arts Education, or Vocational-Technical Education. Each option requires 135 semester hours of coursework.

EDUCATION FOR INDUSTRY OPTION

The Education for Industry option is designed to prepare students to enter industry as training specialists. Due to the expansion of technology and industrial development, there is a need for training specialists and training directors in industry.

FRESHMAN YEAR

First Semester

EG 109 Engr. Graphical Com ENGL 101 English Composition IN ED 101 Intro. to Ind. Ed IN ED 102 Woodworking I	3 2 2	(3,0) (1,2) (1,3)
Mathematics Requirement Science Elective 2 Elective	4	

Second Semester

SOPHOMORE YEAR

IN ED 203 Basic Metal Processes 3 (1,6) SOC 201 Sociological Perspective . 3 (3,0) Literature Requirement 1 3 (3,0) Science Elective 2 4 (3,3) Social Science Elective 3 3	ECON 201 Principles of Economics 3 (3,0)IN ED 204 Graphic ArtsIN ED 208 ElectricityStyle 201 General Psychology3 (3,0)ElectiveLective4
Elective 1	
<u> </u>	16
17	

JUNIOR YEAR

ECON 301 Economics of Labor 3 (3,0)	ENGL 301 Public Speaking 3 (3,0)
ED 302 Educational Psychology. 3 (3,0)	IE 303 Job Evaluation and
IM 307 Personnel Management 3 (3,0)	Wage Incentives
IN ED 302 Dwelling Materials	IM 415 Business Policy 3 (3,0)
and Construction Methods 2 (1,2)	PSYCH 301 Industrial Psychology 3 (3,0)
IN ED 325 Ind. Org. and People 3 (3,0)	Approved Elective 4 6
Elective	
_	18
17	

SENIOR YEAR

IM 408 Work Simp. and Stand 3 (3,0) IN ED 405 Course Org. and Eval. 3 (3,0) IN ED 422 History and Philosophy of Industrial and Voc. Ed 3 (3,0) TEXT 460 Textile Processes 3 (3,0) Elective	IN ED 408 Training Prog. in Ind. 3 (3,0) IN ED 496 Public Relations 3 (3,0) SOC 351 Industrial Sociology 3 (3,0) Approved Elective 4
18	135 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Select from the following: astronomy, biology, botany, chemistry, geology, physical science, physics, zoology, At least two fields must be represented. ³ Select from the following: economics, history, philosophy, political science, psychology,

4 See adviser for list of electives.
 Note: One summer (400 clock hours) of field experience is required of each student following the completion of his sophomore year.

INDUSTRIAL ARTS EDUCATION OPTION

The Industrial Arts Education option is for those students who desire to teach industrial arts in the secondary schools. Industrial arts is the subject area in the public school system which attempts to provide youth with an interpretation of American industry. It is a general education subject designed to give students exploratory experience in the classroom and laboratory. Majors in this option are qualified for full certification as secondary school teachers of industrial arts and prevocational education.

FRESHMAN YEAR

First Semester

Second Semester

EG 109 Engr. Graphical Com 2 (0,6) ENGL 101 English Composition 3 (3,0) IN ED 101 Intro. to Ind. Ed 2 (1,2) IN ED 102 Woodworking I 2 (1,3) Mathematics Requirement 2 (2,0) Science Elective 2	EG 110 Engineering Graphics 2 (0,6) ENGL 102 English Composition. 3 (3,0) IN ED 103 Woodworking II 2 (1,3) IN ED 105 Machining Practices. 3 (1,6) Mathematics Requirement 2 (2,0) Social Science Elective 3 3 Elective 1
$\overline{16}$	$\overline{16}$

SOPHOMORE YEAR

IN ED 203 Basic Metal Processes 3 (1,6)IN ED 205 Power Technology 3 (2,2)Literature Requirement 1 3 (3,0)Science Elective 2	IN ED 204 Graphic Arts 3 (1,6) IN ED 208 Electricity 3 (2,3) IN ED 313 Arts and Crafts 3 (1,6) Science Elective 2 4 (3,3) Approved Elective 4 3 Elective 1
1.77	17
17	17

IUNIOR YEAR

ED 302 Educational Psychology. 3 (3,0) IN ED 302 Dwelling Materials	ED 458 Health Education 3 (3,0) ENGL 301 Public Speaking 3 (3,0)
and Construction Methods 2 (1,2) IN ED 414 Electronics for Teach. 3 (1,6) TEXT 460 Textile Processes 3 (3,0) Social Science Elective 3 3	IN ED 416 Management and Operation of Ind. Ed. Labs 3 (2,2) Social Science Elective 3
Approved Elective 4 5	
—	18
19	

SENIOR YEAR

AAH 303 Evol. of Visual Arts I 3 (3,0) IN ED 422 History and Philosophy of Industrial and Voc. Ed 3 (3,0) IN ED 441 Comp. Lab. Field Exper 2 (1,3) MUS 210 Music Appreciation 3 (3,0)	ED 335 Adol. Growth and Dev 3 (3,0) IN ED 402 Directed Teaching 6(0,18) IN ED 405 Course Organization and Evaluation
Approved Elective 4 6	15
17	135 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Science electives to be selected from astronomy, biology, botany, chemistry, geology, physical science, physics, or zoology. At least two fields must be represented, one of which must be in the biological sciences. ³ Social Science electives to be selected from economics, history, philosophy, political science, psychology, religion, sociology. At least two fields must be represented with six, but not more than six hours in one field. ⁴ See class adviser for list of approved electives.

VOCATIONAL-TECHNICAL EDUCATION OPTION

The Vocational-Technical Education option is designed to prepare teachers of vocational and technical subjects in the senior high schools, area vocational centers, and technical education centers. All elective courses in this option will be in an area of specialization or related fields. Teachers graduating from this option will possess the skills and knowledge required to teach the occupation or family of occupations in their area of specialization.

FRESHMAN YEAR

First Semester

Second Semester

A hot beinester	Second Semester
EG 109 Engr. Graphical Com 2 (0,6) ENGL 101 English Composition 3 (3,0) IN ED 101 Intro. to Ind. Ed 2 (1,2) IN ED 102 Woodworking I 2 (1,3) Mathematics Requirement 2 (2,0) Science Elective 2	EG 110 Engineering Graphics 2 (0,6) ENGL 102 English Composition. 3 (3,0) IN ED 105 Machining Practices. 3 (1,6) Mathematics Requirement 2 (2,0) Social Science Elective 3 3 Elective 3 16

SOPHOMORE YEAR

IN ED 203 Basic Metal Processes 3 (1,6) IN ED 205 Power Technology 3 (2,2) Literature Requirement 1 3 (3,0) Science Elective 2	ENGL 301 Public Speaking
Elective 1	
_	14
17	

SUMMER

IN ED 350 Industrial Cooperative Experience..... 6 (0,6)

JUNIOR YEAR

ED 302 Educational Psychology. 3 (3,0) IN ED 302 Dwelling Materials and Construction Methods 2 (1,2) Social Science Elective 3 3 Elective (Area of Spec.) 3 (3,0) Elective	ED 458 Health Education 3 (3,0) IN ED 416 Management and Operation of Ind. Ed. Labs 3 (2,2) Social Science Elective 3
15	15

SUMMER

IN ED 450 Industrial Cooperative Experience 6

SENIOR YEAR

AAH 303 Evol. of Visual Arts I. 3 (3,0)	ED 335 Adol. Growth and Dev 3 (3,0)
IN ED 422 History and Philosophy	IN ED 402 Directed Teaching 6(0,18)
of Industrial and Voc. Ed 3 (3,0)	IN ED 405 Course Organization
IN ED 441 Comp. Lab.	and Evaluation $\ldots 3$ (3,0)
Field Exper	IN ED 425 Teaching Ind. Subj 3 (3,0)
MUS 210 Music Appreciation 3 (3,0)	
Elective (Area of Spec.) 4	15
15	

135 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Science electives to be selected from astronomy, biology, botany, chemistry, geology, physical science, physics, or zoology. At least two fields must be represented, one of which must be in the biological sciences. ³ Social Science electives to be selected from economics, history, philosophy, political science, psychology, religion, sociology. At least two fields must be represented with six, but not more than six hours in one field. ⁴ See adviser for list of approved electives.

SCIENCE TEACHING

The program leading to a Bachelor of Science degree in Science Teaching is designed for students planning to teach biological sciences, chemistry, earth science, mathematical sciences, or physical sciences on the secondary school level. The required science electives are included to give some degree of competency in a field other than the major area.

A student must have a minimum of 130 semester hours of credit for graduation.

TEACHING AREA: BIOLOGICAL SCIENCES

FRESHMAN YEAR

First Semester

MATH Elective

Second Semester

16

18

SOPHOMORE YEAR

HIST 172 Western Civilization 3 (3,0) PHYS 207 General Physics 1 4 (3,2) Literature Requirement 1 3 (3,0) Chemistry Elective	HIST 173 Western Civilization 3 (3,0) PHYS 208 General Physics II 4 (3,2) Literature Requirement 1 3 (3,0) Chemistry Elective 4 Social Science Elective 3 3 Elective 1
17	
	18

JUNIOR YEAR

BOT 202 Survey of Plant Kingdom 4 (3,3)ED 302 Educational Psychology. 3 (5)ED 301 Principles of American Ed. 3 (3,0)GEN 302 Genetics	3,3) 3,3)
17	

SENIOR YEAR

(Block	Schedi	ele—Either Semester)
AAH 303 Evol. of Visual Arts I. BOT 421 Plant Physiology or ZOOL 459 Syst. Physiology ED 458 Health Education Major Elective 2	4 (3,3 4 (3,3 3 (3,6	 ED 412 Directed Teaching 4 6(1,15) ED 424 Methods and Materials in Secondary School Instruction 3 (3,0) ED 498 Teaching Secondary School Reading 3 (1,4)
		133 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209.

² Botany, genetics, microbiology, zology.
3 Economics, philosophy, political science, psychology, religion, sociology.
4 Block schedule must be taken as shown.

TEACHING AREA: CHEMISTRY

FRESHMAN YEAR

First Semester

Second Semester

Second Semester

BIOL 103 General Biology I 3 (3,0) BIOL 104 General Biology II 3 (3,0) BIOL 105 General Biology Lab. I 1 (0,3) BIOL 106 General Biology Lab. II 1 (0,3) BIOL 106 General Biology Lab. II 1 (0,3) CH 101 General Chemistry

SOPHOMORE YEAR

CH 223 Organic Chemistry3 (3,0)CH 227 Organic Chemistry Lab.1 (0,3)HIST 172 Western Civilization3 (3,0)MATH 206 Calculus of Sev. Var.4 (4,0)Literature Requirement 13 (3,0)Elective	CH 224 Organic Chemistry 3 (3,0) HIST 173 Western Civilization 3 (3,0) Literature Requirement 1 3 (3,0) Social Science Elective 2 4 Elective
15	16

JUNIOR YEAR

CH 313 Quantitative Analysis3 (3,0)ED 301 Principles of American Ed. 3 (3,0)PHYS 207 General Physics 14 (3,2)Social Science Elective 23Elective5	CH 331 Physical Chemistry 3 (3,0) CH 339 Physical Chem. Lab. 1 (0,3) ED 302 Educational Psychology 3 (3,0) PHYS 208 General Physics II 4 (3,2) Elective 6
18	17

SENIOR YEAR

(Block Schedule-Either Semester)

AAH 303 Evol. of Visual Arts I. 3 (3,0) CH 332 Physical Chemistry 3 (3,0) CH 340 Physical Chem. Lab 1 (0,3) CH 402 Inorganic Chemistry 3 (3,0) ED 458 Health Education 3 (3,0)	ED 335 Adol. Growth and Dev. 3 (3,0) ED 412 Directed Teaching 3 6(1,15) ED 424 Methods and Materials in Secondary School Instruction 3 (3,0) ED 498 Teaching Secondary
MUS 210 Music Appreciation 3 (3,0)	School Reading
16	15
	130 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209.
² Economics, philosophy, political science, psychology, religion, sociology.
³ Block schedule must be taken as shown.

TEACHING AREA: EARTH SCIENCE

FRESHMAN YEAR

First Semester

BIOL 105 General Biology Lab. I 1 (0,3)BIOICH 101 General Chemistry	L 104 General Biology II 3 (3,0) L 106 General Biology Lab. II 1 (0,3) 102 General Chemistry 4 (3,3) GL 102 English Composition 3 (3,0) TH 102 Intro. to Math. Anal. 3 (3,0) tive
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SOPHOMORE YEAR

GEOL 101 Physical Geology 4 (3, HIST 172 Western Civilization 3 (3, PHYS 207 General Physics 1 4 (3, Literature Requirement 1 3 (3, Social Science Elective 3 3	(0) HIST 173 Western Civilization 3 (3,0) (2) PHYS 208 General Physics II 4 (3,2) (0) Literature Requirement 1 3 (3,0)
Elective 1	
	18
10	

JUNIOR YEAR

ASTR 101 Solar Sys. Astr 3 (3, or ASTR 102 Stellar Astr 3 (3, ED 301 Principles of American Ed. 3 (3, GEOL 306 Mineralogy 3 (2, MATH 203 Elem. Stat. Inference 3 (3, Elective	D) GEOL 405 Geomorphology 4 (3,3) D) PHYS 240 Physics of the Weather 3 (3,0) 3) Science Elective 3) Science X 3 3
16	

SENIOR YEAR

(Block Schedule—Either Semester)

AAH 303 Evol. of Visual Arts I 3 (3,0) ED 458 Health Education 3 (3,0) MUS 210 Music Appreciation 3 (3,0) Science Elective	ED 335 Adol. Growth and Dev. 3 (3,0) ED 412 Directed Teaching 4 6(1,15) ED 424 Methods and Materials in Secondary School Instruction 3 (3,0)
Elective	ED 498 Teaching Secondary
—	School Reading $\ldots 3$ (1,4)
15	
	15
	130 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Prerequisite: Satisfactory score on the Mathematics Test, Level II or permission of instructor.

3 Economics, philosophy, political science, psychology, religion, sociology. 4 Block schedule must be taken as shown.

TEACHING AREA: MATHEMATICAL SCIENCES

FRESHMAN YEAR

First Semester

BIOL 103 General Biology I BIOL 105 General Biology La CH 101 General Chemistry . ED 100 Orientation ENGL 101 English Compositi MATH 106 Cal. of One Var. Elective

Second Semester

3	(3,0)	BIOL 104 General Biology II 3 (3,0)
ab. I 1	(0,3)	BIOL 106 General Biology Lab. II 1 (0,3)
4	(3,3)	CH 102 or 112 General Chemistry 4 (3,3)
1		ENGL 102 English Composition 3 (3,0)
ion 3		MATH 108 Cal. of One Var. II . 4 (4,0)
I 4		Elective 1
1		_
		16

17

SOPHOMORE YEAR

HIST 172 Western Civilization3 $(3,0)$ MATH 206 Calculus of Sev. Var. 4 $(4,0)$ PHYS 207 General Physics I4 $(3,2)$ Literature Requirement 13 $(3,0)$ Elective2	$\begin{array}{c} \text{COMP SC 205 Elem. Comp. Prog. 3} (3,0) \\ \text{HIST 173 Western Civilization 3} (3,0) \\ \text{PHYS 208 General Physics II 4} (3,2) \\ \text{Literature Requirement 1} \ldots 3 (3,0) \\ \text{Elective } \ldots 4 \end{array}$
16	17

JUNIOR YEAR

ED 301 Principles of American Ed. 3 (3,0) MATH 301 Statistical Theory and Methods I	ED 302 Educational Psychology 3 (3,0) MATH 408 Topics in Geometry 3 (3,0) MATH 411 Linear Algebra 3 (3,0) Science Elective
	-
15	17

SENIOR YEAR

(Black Schedula_Fither Semaster)

(Diock Deneutite-	- Anther Semester/
AAH 303 Evol. of Visual Arts I. 3 (3,0) ED 458 Health Education 3 (3,0)	ED 335 Adol. Growth and Dev 3 (3.0) ED 412 Directed Teaching 4 6(1,15)
MATH 412 Intro. to Modern	ED 424 Methods and Materials in
Algebra 3 (3,0)	Secondary School Instruction 3 (3,0)
MUS 210 Music Appreciation 3 (3,0)	ED 498 Teaching Secondary
Mathematics Elective 2 6	School Reading 3 (1,4)
_	
18	15
	131 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209.
² Suggested electives: Comp Sc 205, 210, Math 405, 409, 452, 453, 454.
³ Economics, philosophy, political science, psychology, religion, sociology.
⁴ Block schedule must be taken as shown.

TEACHING AREA: PHYSICAL SCIENCES

FRESHMAN YEAR

First Semester

Second Semester

BIOL 103 General Biology I 3 (3,0) BIOL 105 General Biology Lab. I 1 (0,3) CH 101 General Chemistry 4 (3,3) ED 100 Orientation 1 (1,0) ENGL 101 English Composition 3 (3,0) MATH 105 Algebra and Trig 5 (5,0)	BIOL 104 General Biology II 3 (3,0) BIOL 106 General Biology Lab. II 1 (0,3) CH 102 or 112 General Chemistry 4 (3,3) ENGL 102 English Composition. 3 (3,0) MATH 106 Cal. of One Var. I 4 (4,0) Elective
Elective 1	
	16
18	

SOPHOMORE YEAR

HIST 172 Western Civilization 3 (3,0) PHYS 207 General Physics I 4 (3,2) Literature Requirement 1 3 (3,0) Science Elective	CH 201 General Chemistry 4 (3,3) HIST 173 Western Civilization 3 (3,0) PHYS 208 General Physics II 4 (3,2) Literature Requirement 1 3 (3,0) Elective
17	17

JUNIOR YEAR

ASTR 101 Solar System Astronomy 3 (3,0) ED 301 Principles of American Ed. 3 (3,0) GEOL 101 Physical Geology 4 (3,2) Social Science Elective 2 3 Elective	ASTR 102 Stellar Astronomy 3 (3,0) ED 302 Educational Psychology 3 (3,0) GEOL 102 Historical Geology 4 (3,3) PHYS 460 Contemporary Physics for High School Teachers 3 (3,0) Social Science Elective 2 3
16	
	16

SENIOR YEAR

(Block Schedule-Either Semester)

AAH 303 Evol. of Visual Arts I ED 458 Health Education		ED 335 Adol. Growth and Dev ED 412 Directed Teaching 3	
MUS 210 Music Appreciation	3 (3.0)	ED 424 Methods and Materials in	
Science Elective	6	Secondary School Instruction	
-		ED 498 Teaching Secondary	
1	15	School Beading	3 (14)

School Reading (1,4)

15

130 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209.
² Economics, philosophy, political science, psychology, religion, sociology.
³ Block schedule must be taken as shown in either semester of the senior year.

COLLEGE OF ENGINEERING

The College of Engineering offers professional curricular programs and programs in both Engineering Analysis and Engineering Technology. Each of the programs offered leads to a wide range of career opportunities and serves as preparation for further study at the graduate level.

Professional Curricula. Six, four-year professional-oriented curricula are offered by the College of Engineering; namely, Agricultural Engineering, Ceramic Engineering, Chemical Engineering, Civil Engineering, Electrical Engineering, and Mechanical Engineering. Each of these professional curricula is accredited by the Engineers' Council for Professional Development, the recognized national accrediting agency for professional curricula in engineering. The curriculum in Agricultural Engineering is jointly administered by the College of Agricultural Sciences and the College of Engineering.

Although the College of Engineering does not offer specific options or majors in each of these professional curricula, the instruction includes many phases of each respective field. Thus, a civil engineering student is graduated in civil engineering rather than structural engineering, highway engineering, sanitary engineering, or other such options. However, a student who wishes to study within the areas encompassed by these options will find adequate courses within the Civil Engineering curriculum to prepare himself for work in any of these areas. In the same way the other engineering curricula include thorough education in various phases of the field of specialization without overemphasizing one phase to the neglect of others. The professional curricula lead to a Bachelor of Science degree in the specific professional area.

The courses required in all professional curricula and the Engineering Analysis curriculum for the freshman year are as follows:

FRESHMAN YEAR

First Semester

CH 101 General Chemistry	4	(3,
ENGL 101 English Composition	3	(3,
ENGR 180 Engineering Concepts.	3	(2,
or Humanistic-Social Elective .		
MATH 106 Cal. of One Var. I	4	(4,
Elective	2	

Second Semester

4 (3,3)	Basic Science 1
tion. $3(3,0)$	ENGL 102 English Composition 3 (3,0)
cepts. $3(2,2)$	Humanistic-Social Elective 3
tive . 3	or ENGR 180 Engr. Concepts. 3 (2,2)
I 4 (4,0)	MATH 108 Cal. of One Var. II . 4 (4,0)
	PHYS 122 Phys. with Cal. I 3 (2,2)
	Elective 1
16	
	17-18

¹ Agricultural Engineering students should consult adviser. Ceramic Engineering students may take either Ch 102 or 112. Chemical Engineering students are required to take Ch 112. Mechanical Engineering students are required to take Ch 102.

Engineering Analysis Curriculum:¹ This curriculum is a four-year engineering science-oriented course of study. Its objectives are twofold. These are (1) to prepare a student for employment in areas of engineering activity requiring a high level of analytical competency, and (2) to provide a flexible undergraduate preparation for the study of engineering at the graduate level.

The curriculum leads to the Bachelor of Science degree in Engineering Analysis. Requirements for this degree are stated in terms of subject matter area rather than in terms of specific courses. Degree requirements are as follows:

Hour	s Credit
Area of Concentration	
Basic Science (including 8 hours of physics)	16
Engineering Science (distributed in at least	
six engineering science areas)	
Humanistic-Social Studies	
Mathematics (including 12 hours of post-calculus mathematics)	24
Electives	22
	138

The educational objectives of the program will be met by the selection of an area of concentration which will be chosen from several specialty areas offered within the professional engineering curricula. The selection of specific courses, particularly in the junior and senior years, will then depend primarily on the choice of the area of concentration. By judicious selection of courses within this flexible structure, a student may prepare himself for entry into the professional schools of law and medicine.

Maximum flexibility within this program is achieved by permitting a student to defer his choice of specialization until the junior year or later. Such deferral will then allow students from junior and senior colleges not offering engineering to transfer into the program with little or no loss in academic credit.

Engineering Technology Curriculum:¹ This curriculum is a fouryear, applications-and-job oriented plan of study which leads to a Bachelor of Science degree in Engineering Technology. It provides a broad base of fundamentals and their application in the areas of civil, electrical, mechanical, and industrial engineering technology. In addition, electives amounting to approximately two semesters of work permit developing a program to match the student's aptitudes and interests as related to industrial and other employment opportunities. These opportunities are found in such areas as plant engineering, electrical and mechanical equipment development, production supervision, industrial planning, produc-

¹ Additional information on both the Engineering Analysis and the Engineering Technology programs is available from the Office of the Dean of Engineering.

tion methods, technical purchasing and sales, building construction, quality control, technical personnel management, specification, operation and supervision of plant environmental and energy systems, equipment maintenance, and technical writing and drawing.

The engineering technologist is typically a practical person interested in applying engineering principles and in organizing people for industrial production, construction or operation; or in the improvement of devices, processes, methods or procedures, as contrasted to the engineer whose more indepth, theoretical training qualifies him more for doing original system design.

Requirements for the Bachelor of Science degree in Engineering Technology are as follows:

	Hour	s Credit
Basic Science and Mathematics (including statistics, compute		
programming, and an elective)		25
Technical Core		35
Technical Specialty		25
Communications, Humanities, and Social Sciences (including		
electives)		24
Approved Electives		11
Electives		10
	-	
]	.30

The Engineering Technology program is designed to educate both regular four-year students and transfer students from community colleges and technical education colleges.

AGRICULTURAL ENGINEERING

The graduate in Agricultural Engineering with broad training in mathematics, physics, chemistry, and the biological sciences as well as comprehensive coverage of the engineering sciences is well equipped to apply engineering to many functions affecting the wellbeing of mankind. The agricultural engineer is sought by industry and public service organizations primarily for his ability to apply engineering know-how to agricultural production and processing and to the management of land and water resources. Specific areas of interest include power and machinery, soil and water resources engineering, electric power and processing, structures and environment, and food engineering.

The curriculum includes such engineering sciences as mechanics, fluids, thermodynamics, electrical theory, computing devices, and systems analyses. The basic agricultural sciences of soil, plants, and animals are included to provide a foundation for agricultural engineering analysis and design. Also included are the important facets of energy conversion, engineering properties of biological materials, research methods, and use of economy and integrity in design.

Graduate programs lead to the Master of Science, Master of Engineering, and the Doctor of Philosophy degrees.

Opportunities for employment of agricultural engineering graduates include design engineers, research engineers, production engineers, or as sales engineers with industry; as teachers, research, extension, or field engineers with state and federal agencies: engineers in the private sectors; and others.

See page 100 for Freshman Year.

SOPHOMORE YEAR

First Semester

Second Semester

AGE 221 Soil and Water Resources Engineering I 3 (2,3) EG 109 Engr. Graphical Com. 2 (0,6) EM 201 Engr. Mech. (Statics) 3 (3,0) MATH 206 Calculus of Sev. Var. 4 (4,0) PHYS 221 Phys. with Cal. II 3 (2,2) Literature Requirement 1 3 (3,0) Elective 1	AGE 212 Fund. of Mechanization 3 (2,3) EM 202 Engr. Mech. (Dynamics) 3 (3,0) MATH 208 Engineering Math. I. 4 (4,0) Humanistic-Social Elective 2 3 Plant Science Elective 2 3 Elective
Elective 1	17

10

IUNIOR YEAR

AGE 353 Computational Systems. 2 (1,3) AGE 355 Engr. Anal. and Creat. 2 (1,3) E&CE 307 Basic Elec. Engr 3 (2,2) EM 304 Mechanics of Materials 3 (3,0) or EM 320 Fluid Mechanics 3 (3,0) Animal Science Elective 2 3 Engineering Science Elective 2 3 16	AGE 362 Energy Conv. in Ag. Sys. 3 (2,3) AGE 364 Agric, Waste-Management Systems		
	18		
CENIOD VEAD			

SENIOR YEAR

AGE 431 Agric. Structures Design 3 (2,3) AGE 471 Undergraduate Research 1 (0,3)	AGE 416 Agric. Machinery Design 3 (2,3) AGE 422 Soil and Water
ECON 201 Prin. of Economics 3 (3,0)	Resources Engineering II 3 (2,3)
or ECON 200 Econ. Concepts. 3 (3,0)	AGE 442 Agric. Process Engr 3 (2,3)
Humanistic-Social Elective 2 3	Engineering Science Elective 2 6
Mathematics Elective 2 3 (3,0)	Elective
Elective	—
—	18
16	138 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209, 2 Electives to be selected in consultation with adviser. Note: Agricultural Engineering curriculum is jointly administered by the College of Engineering and the College of Agricultural Sciences.

CERAMIC ENGINEERING

Window glass, implantable teeth, brick, ceramic bones, nuclear fuel, radomes, solid-state electronic devices, and bathroom fixtures are illustrations of the variety of products of the multibillion-dollar ceramic industry. Ceramic engineers are engineers to this industry, providing professional service in research, design, technical sale, production, and management.

The curriculum is an engineering curriculum with 75 percent of the course time devoted to coursework common to all engineers and 25 percent to specialization in the field of ceramics. The core courses are in mathematics, basic science, engineering science, humanities, and social sciences. The specialized courses are in nonmetallic minerals, high-temperature chemistry, thermal processing, and material characterization.

The curriculum leads to the degree of Bachelor of Science in Ceramic Engineering. Graduate courses are offered leading to advanced degrees.

See page 100 for Freshman Year.

SOPHOMORE YEAR

First Semester

Second Semester

CRE 201 Intro. to Ceramic Engr. 2 (2,0) CRE 204 Laboratory Procedures. 1 (0,3) MATH 206 Calculus of Sev. Var. 4 (4,0) PHYS 221 Phys. with Cal. II 3 (2,2) Literature Requirement 1 3 (3,0) Planned Elective	CRE 202 Ceramic Materials 3 (3,0) MATH 208 Engineering Math. I. 4 (4,0) PHYS 222 Phys. with Cal. III 3 (2,2) Literature Requirement 1 3 (3,0) Planned Elective 4 Elective 1 18
17	

IUNIOR YEAR

CH 331 Physical Chemistry 3 (3,0) CRE 304 Experiment Design 2 (1,3) CRE 307 Thermal Process. of Cer. 3 (3,0) E&CE 307 Basic Elec. Engr 3 (2,2) EM 201 Engr. Mech. (Statics) 3 (3,0) Planned Elective	CRE 302 Thermo-Chemical Cer. 3 (3,0) CRE 309 Research Methods 2 (0,6) E&CE 308 Electronics and Electromechanics 3 (2,2) Planned Elective 6 Elective 3
17	17
SENIOR	YEAR
CRE 402 Solid State Ceramics 3 (3,0)	CRE 403 Glasses

CRE 402 Solid State Ceramics 3 (3,0) EM 304 Mechanics of Materials 3 (3,0) Planned Elective	CRE 403 Glasses 3 (3,0) ME 304 Heat Transfer 3 (3,0) Planned Elective
Elective	
	18
17	
11	138 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. *Note:* Nine credits of planned electives must be taken in humanistic—social science courses. Nineteen credits of planned electives should be technical courses selected with the help of class adviser.

CHEMICAL ENGINEERING

The Chemical Engineering curriculum is unique in that it is based on the three sciences of chemistry, physics, and mathematics. As a result, the traditional chemical-process industries which produce the industrial chemicals upon which our modern society is based require large numbers of chemical engineers. In addition, graduates are avidly sought by industries in many areas of specialized technology such as nuclear power, fibers and textiles, pharmaceuticals, pulp and paper, computers, foods, metals, ceramics, instrumentation and automatic control, and petroleum. The chemical engineer is in the forefront of the fight against environmental pollution and is leading the way in applying engineering technology to the solution of medical and health-related problems.

The chemical engineering graduate, because of his broad background in three sciences is uniquely prepared for a wide variety of careers in which he can apply his abilities and education. By the judicious use of electives and course selection, and with the advice and consent of his adviser, a chemical engineering student may enhance his basic education by the selection of an option designed to further a specific career objective. Such options might be used to prepare him to enter other professional schools, such as medicine, dentistry, or law.

See page 100 for Freshman Year.

SOPHOMORE YEAR

First Semester

CH 223 Organic Chemistry	3	(3,0)
CHE 201 Intro. to Chem. Engr	3	(2,3)
EM 201 Engr. Mech. (Statics)	3	(3,0)
MATH 206 Calculus of Sev. Var.	4	(4,0)
PHYS 221 Phys. with Cal. II	3	(2,2)
Literature Requirement 1	3	(3,0)
Elective	1	

CH 331 Physical Chemistry CH 339 Physical Chemistry Lab.. CHE 301 Unit Op. Theory I E&CE 307 Basic Elec. Engr. PHYS 222 Phys. with Cal. III

Humanistic-Social Elective

Elective

20

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2

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IUNI

 $\begin{array}{c} 3 & (3,0) \\ 1 & (0,3) \\ 3 & (3,0) \\ 3 & (2,2) \\ 3 & (2,2) \end{array}$

Second Semester CH 224 Organic Chemistry 3 (3,0) CH 229 Organic Chemistry Lab. 1 (0,3)

)))))	CHE 229 Organic Chemistry Lab., 1 (0,3) CHE 202 Stagewise Separation Op. 4 (3,3) COMP SC 210 Digital Computation and Num. Meth. for Engr.2 3 (3,0) MATH 208 Engineering Math. I. 4 (4,0) Literature Requirement 1 3 (3,0) Elective
OR	YEAR
)))	CH 332 Physical Chemistry 3 (3,0) CH 340 Physical Chemistry Lab 1 (0,3) CHE 302 Unit Op. Theory II 3 (3,0) CHE 306 Unit Op. Lab. I 1 (0,3) CHE 331 Chem. Engr. Thermo. I 3 (3,0)

CHE	: 331	Chem.	Engr.	Thermo.	13	(3,0)
CHE	E 352	Chem.	Engr.	Sys. Anal	. 4	(3,3)
EM	304	Mechani	cs of	Materials.	. 3	(3,0)

18

SENIOR YEAR

CHE 401 Transport Phenomena 3 (3,0) CHE 407 Unit Op. Lab. II	CHE 422 Process Dev., Design and Optimiza. of Chem. Engr. Sys. II 3 (0,9) CHE 453 Process Dynamics 3 (3,0) CRE 419 Sci. of Engr. Materials . 3 (3,0) Humanistic-Social Elective 6 Elective
	144 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Or ChE 210 if offered.

Elective Policy: All electives must be chosen from a departmental elective list. A copy of this list may be obtained from the departmental secretary.

CIVIL ENGINEERING

Civil engineering involves the planning, design, construction, maintenance, and use of facilities and systems to control and improve the environment for modern civilization. Civil engineering is the broadest of the engineering professions, being the stem from which most other branches of engineering have developed.

The program in Civil Engineering leads to the Bachelor of Science degree and is designed to equip the graduate with a knowledge of basic science, engineering science, and engineering design. The civil engineering graduate is prepared to work immediately upon graduation in practically any of the areas of the profession. These include traffic and transportation engineering, structural engineering, construction, soils and foundation engineering, ocean and coastal engineering, airphoto interpretation, hydrology, public works engineering, and others. The engineering student is also educated in the humanities, social sciences, and in economic issues. A concerned society demands economy as well as realistic consideration of the resulting human benefits of the engineer's endeavors.

Graduates are encouraged to become registered engineers and to continue their education throughout their professional careers. Many students find that programs in Civil Engineering provide excellent preparation for careers in technical sales and management.

See page 100 for Freshman Year.

SOPHOMORE YEAR

First Semester

Second Semester

CE 206 Elementary Surveying 2 (1,3 EM 201 Engr. Mech. (Statics) 3 (3,0 MATH 206 Calculus of Sev. Var. 4 (4,0 PHYS 221 Phys. with Cal. II 3 (2,2 Literature Requirement 1 3 (3,0 Elective	 or EG 109 Engr. Graph. Com. 2 (0,6) EM 304 Mechanics of Materials . 3 (3,0) EM 305 Mech. of Materials Lab. 1 (0,3)
JUNI	OR YEAR
CE 301 Structural Analysis I 3 (2.2) CE 302 Structural Steel Design 3 (2.2)

CRE 310 Intro. to Material Sci 3 (3,0) E	CE 310 Transportation Engr 4 (3,2)
EM 202 Engr. Mech. (Dynamics) 3 (3,0) E	ECON 201 Principles of Economics 3 (3,0)
ESE 401 Environmental Engr 3 (3,0) H	E&CE Elective
17	18

SENIOR YEAR

CE 330 Soil Mechanics 3 (2,2) CE 424 Construction Methods 2 (2,0) EM 320 Fluid Mechanics 3 (3,0) EM 322 Fluid Mechanics Lab 1 (0,3) Earth or Life Science Elective 2 3 Humanistic—Social Elective 2 3 Technical Elective 2 3 19–18	CE 402 Reinforced Concrete Design
	138 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Each class adviser has a list of approved electives from which students may make selections. Any exceptions to this list must have the approval of the department head.

ELECTRICAL AND COMPUTER ENGINEERING

Responsibilities of the electrical and engineering profession range from highly analytical problem solving to detailed design. The department's name—Electrical and Computer Engineering—is intended to emphasize both the close relationship of computers to all phases of the profession and the major role that computers play in the curriculum at Clemson.

Systems, electronic networks, and electromagnetic fields provide the core curriculum areas. These fundamental studies in analysis and experimentation receive further development in elective courses. Humanistic-social electives provide the graduate with the ability to address himself to the "why" of engineering as well as the "how."

Students who are interested in communications study information theory, electromagnetic theory, switching circuits, and electronics.

Technological innovations in electronics have resulted in increasingly complex solid-state components—the transistor, integrated circuit, and LSI component. The electronics emphasis includes solid-state devices and circuits and integrated circuit technology.

The department offers courses in real-time computing, computer language structures, theory and design of digital computers, computation and simulation of physical systems, and information processing and data handling.

Energy systems analysis and energy conversion is appropriate for students who plan to work for electric utilities, electrical equipment manufactures, or companies which are large users of electrical energy. See page 100 for Freshman Year.

SOPHOMORE YEAR

First Semester

E&CE 201 Logic and Comp. 3 (3,0) Devices 3 (4,0) MATH 206 Calculus of Sev. Var. 4 (4,0) 9HYS 221 Phys. with Cal. II PHYS 221 Phys. with Cal. II 3 (2,2) Literature Requirement 1 3 (3,0) Elective 4	E&CE 202 Electrical Circuits I . 3 (2,2) E&CE 250 Principles of Digital Computer Systems
17	Literature Requirement 1 \dots 3 (3,0) $\overline{17}$

IUNIOR YEAR

E&CE 301 Electric Circuits II 3 (2,2) E&CE 320 Electronics I	E&CE 302 Linear Control Sys 3 (3,0) E&CE 317 Electrical Sys. Analysis 3 (3,0) E&CE 321 Electronics II 3 (2,2) E&CE 341 Electric and Magnetic Fields II 2 (2,0) E&CE 420 Power Sys. Analysis I 3 (3,0) Humanistic—Social Elective 2 3 17
SENIOR	YEAR
E&CE 411 Electrical Systems 2 (0,4) E&CE 422 Electronics III 3 (2,2) Humanistic—Social Elective 2 3 Technical Elective 3 10	E&CE 410 Discrete Sys. Design 3 (3,0) E&CE 451 System Design Project 2 (0,4) Technical Elective 3 10 10 10 10 Elective

138 Total Semester Hours

18

Second Semester

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209, 2 These courses must be selected from the departmental list of approved humanistic-social electives. The courses must be selected so as to satisfy the college sequence requirements. ³ A minimum of six credits of technical electives must be selected from design courses in the Electrical and Computer Engineering Department. Six credits must be selected from the engineering sciences.

18

MECHANICAL ENGINEERING

Mechanical engineers are involved in the solution to mankind's basic problems: the maintenance and development of food, shelter, clothing, health, transportation, and communications. These problems require that the mechanical engineer be prepared to work in a wide variety of areas including bioengineering, energy systems, environmental and life support systems, propulsion and transportation systems, food technology, materials processing and manufacturing, construction techniques, and maintenance. Their functions may range from technical management to basic research and development, but they all involve innovative problem-solving skills.

In preparing an individual for a 40-45 year professional career, it is essential to develop the entire person. This involves a balanced program encompassing the humanities, social sciences, communicative skills, basic sciences, engineering sciences, and laboratory and design experience. The student begins with the basic sciences and communicative skills, progresses through the engineering sci-

Engineering 109

ences, and finally applies these principles in such areas as energy conversion and transfer, mechanical design and system analysis. It is in this final stage that the student experiences the relevant problem-solving aspects of engineering.

Most mechanical engineering graduates take positions in industry, government, or business, but many others continue their formal education in a graduate program. The Department of Mechanical Engineering offers study leading to the Master of Engineering, Master of Science, and Doctor of Philosophy degrees.

See page 100 for Freshman Year.

SOPHOMORE YEAR

First Semester

CRE 310 Intro. to Material Sci 3 (3,0) EM 201 Engr. Mech. (Statics) 3 (3,0) MATH 206 Calculus of Sev. Var. 4 (4,0) ME 201 Innovative Design I 2 (1,3) PHYS 221 Phys. with Cal. II 3 (2,2) Literature Requirement 1 3 (3,0)	EM 202 Engr. Mech. (Dynamics) 3 (3,0) MATH 208 Engineering Math. I 4 (4,0) ME 202 Innovative Design II 3 (2,3) PHYS 222 Phys. with Cal. III 3 (2,2) Literature Requirement 1
18	17

JUNIOR YEAR

E&CE 307 Basic Elec. Engr 3 (2,2) EM 304 Mechanics of Materials . 3 (3,0) EM 320 Fluid Mechanics	E&CE 308 Electronics and Electromechanics 3 (2,2) ME 302 Automatic Controls 3 (3,0) ME 304 Heat Transfer 3 (3,0) ME 312 Engineering Thermo. II 3 (3,0) ME 313 Instru. and Meas. 3 (2,3) Elective 3
19	18

SENIOR YEAR

ME 401 Design of Mechanical		
System Components		(3,0)
ME 405 Kinematics and Dynamics		
of Machinery	3	(3,0)
ME 412 Design of Thermal Sys.		
Components	3	(3,0)
ME 413 Thermal Systems Lab.		
or ME 414 Mech. Sys. Lab	1	(0,3)
Technical Elective	3	
Humanistic-Social Elective	3	
	16	

	ME 402 Innovative Design III	3	(2,3)
	ME 414 Mech. Sys. Lab.	1	(0,3)
	or ME 413 Thermal Sys. Lab		(0,3)
)	Humanistic-Social Elective		
	Technical Elective		
	Elective	3	
	-		
]	16	

Second Semester

138 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. *Note:* All electives must be approved in advance by departmental advisers.

COLLEGE OF FOREST AND RECREATION RESOURCES

The College of Forest and Recreation Resources is concerned with the management, use, and stewardship of all of our forest resources and with individual and societal well-being through wise use of leisure. These two general areas of study offer broad opportunities in the management of our forest resources and our recreation resources for their maximum service to present and future generations.

The College of Forest and Recreation Resources offers curricula designed to prepare students for professional careers in the following areas:

- 1. The Forest Management curriculum prepares graduates for employment as managers and administrators of forest lands for production of timber, water, wildlife, esthetic values, and recreational use.
- 2. The Wood Utilization curriculum prepares graduates for careers in the forest products and allied industries in the areas of production, utilization, and marketing of wood and allied products.
- 3. The Recreation and Park Administration curriculum prepares recreation directors for counties, towns and cities, institutions, industries, and youth-serving agencies, as well as managers for park systems at the municipal, county, state, or federal levels.

FOREST MANAGEMENT

The Forest Management curriculum combines a broad education in liberal arts and the physical, mathematical, and biological sciences with the applied forestry sciences needed in the management of the forest and forest environment for their products and services. Foresters of professional standing are employed in various capacities by private concerns and by federal, state, and other public agencies.

Because of the nature of their education, foresters are qualified for a broad spectrum of employment possibilities. They may be engaged as managers, administrators, or owners of forest lands or forest-based businesses; as technical specialists in the production of timber, useable water, wildlife, and esthetic values, and in the recreational use of the forest; or as professionals in other areas where the conservation of our natural resources is a matter of concern. Foresters earning advanced degrees find employment in academic work and in research conducted both by public and private agencies.

The undergraduate curriculum provides a strong program in the basic knowledge and skills required of a professional forester. The

Second Semester

curriculum is also designed to provide the necessary prerequisites for those students that desire to continue in graduate study. The Department of Forestry offers graduate programs that lead to a Master of Science in Forestry or a Master of Forestry degree.

The Forest Management curriculum is accredited by the Society of American Foresters.

FRESHMAN YEAR

First Semester

i not bennester	becond bemester
BIOL 103 General Biology I \dots 3 (3,0) BIOL 105 General Biology Lab 1 (0,3) CH 101 General Chemistry \dots 4 (3,3) ENGL 101 English Composition 3 (3,0) FOR 101 Introduction to Forestry 1 (1,0) MATH 106 Cal. of One Var. I \dots 4 (4,0) Elective \dots 1	BIOL 104 General Biology II 3 (3,0) CH 102 General Chemistry 4 (3,3) EG 105 Engineering Graphics 2 (0,6) ENGL 102 English Composition 3 (3,0) FOR 102 Introduction to Forestry 1 (1,0) MATH 108 Cal. of One Var, II 4 (4,0) Elective 1
· -	
17	18

SOPHOMORE YEAR

AGRON 202 Soils. 3 (2,2) ECON 201 Principles of Economics 3 (3,0) FOR 205 Dendrology 4 (3,3) PHYS 207 General Physics I 4 (3,2) Literature Requirement 1 3 (3,0) Elective 1	CE 201 Surveying 3 (2,3) COMP SC 205 Elem. Comp. Prog. 3 (3,0) ENGL 301 Public Speaking 3 (3,0) FOR 206 Silvics 4 (3,3) GEOL 219 Geology for Foresters. 3 (3,0) Elective 1
	17
18	17

FORESTRY SUMMER CAMP

FOR 252 Fores FOR 253 Fores	t Plants
	9

JUNIOR YEAR

ENT 307 Forest Entomology 3 EX ST 301 Introductory Statistics 3 FOR 308 Aerial Photos in For 3 WB 412 Wildlife Management 3 Social Science Elective	 (2,2) FOR 302 Forest Mensuration 3 (2,3) FOR 304 Forest Economics 3 (2,3) FOR 306 Wood and Wood Fiber 	$\begin{array}{c} 3 & (2,3) \\ 3 & (3,0) \\ 2 & (1,3) \end{array}$
		-

SENIOR YEAR

FOR 417 Forest Mgt. and Reg 4 (3,3)	FOR 401 Logging and Milling 3 (2,3)
FOR 420 Forest Products 2 (2,0)	FOR 412 Forest Protection 2 (2,0)
PL PA 405 Forest Pathology 3 (2,3)	FOR 414 Management Plans 1 (0,3)
POL SC 101 Amer. Natl. Govt 3 (3,0)	FOR 416 Forest Policy and Admin. 2 (2,0)
Emphasis Area 6	FOR 418 Forest Valuation 3 (3,0)
—	Elective
18	
	17

148 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. Note: The emphasis areas are Forest Management, Forest Economics and Marketing, Forest Biology, Forest Wildlife Management, Forest Recreation, Forest Harvesting, Forest Influences, Forest Protection, Forest Biometrics, Forest Soils, Humanities, and Wood Utilization. The student selects one of these and in consultation with his/her adviser schedules approved courses for that particular emphasis area.

112 Degrees and Curricula

WOOD UTILIZATION

The Wood Utilization curriculum combines a broad education in the sciences and humanities. Emphasis in the professional courses is placed on the role of wood as a basic forest resource. Graduates are employed by wood-using industries and their suppliers, research laboratories, trade associations, and state and federal organizations.

The core curriculum allows for emphasis in two areas of specialization: Wood Science and Wood Industries Management. Wood Science deals with the properties and processing of wood, wood fiber, and products derived from wood. Wood Industries Management prepares students for the managerial aspects of forest products industries, including marketing and technical services. Twelve credit hours, listed as emphasis areas in the core curriculum qualify a student as a participant in one of the two areas. The area of interest could be explored in more depth through use of the remaining elective credits.

Successful completion of the curriculum leads to a Bachelor of Science degree in Wood Utilization. Graduate programs leading to the Master of Science and Master of Forestry degrees with a specialization in Wood Utilization are also offered.

FRESHMAN YEAR

First Semester

BIOL 103 General Biology I 3	
BIOL 105 General Biology Lab. 1	(0,3)
CH 101 General Chemistry 4	
ENGL 101 English Composition . 3	(3,0)
FOR 101 Introducton to Forestry 1	(1,0)
MATH 106 Cal. of One Var. I . 4	(4,0)
Elective I	

Second Semester

CH 102 General Chemistry EG 105 Engineering Graphics ENGL 102 English Composition FOR 102 Introduction to Forestry MATH 108 Cal. of One Var. II 4 POL SC 101 Amer. Natl. Govt Elective	$\begin{array}{c} 2 & (0,6) \\ 3 & (3,0) \\ 1 & (1,0) \\ 4 & (4,0) \\ 3 & (3,0) \end{array}$
11	3

SOPHOMORE YEAR

FOR 205 Dendrology 4 (3,3) FOR 421 Wood Properties I 3 (2,3) PHYS 207 General Physics I 4 (3,2) Literature Requirement I 3 (3,0) Approved Elective 3 Plostine 1	CH 201 General Chemistry 4 (3,3) ECON 201 Principles of Economics 3 (3,0) FOR 422 Wood Properties II 3 (2,3) PHYS 208 General Physics II 4 (3,2) Literature Requirement 1 3 (3,0) Elective 1
Elective 1	Elective I
18	18

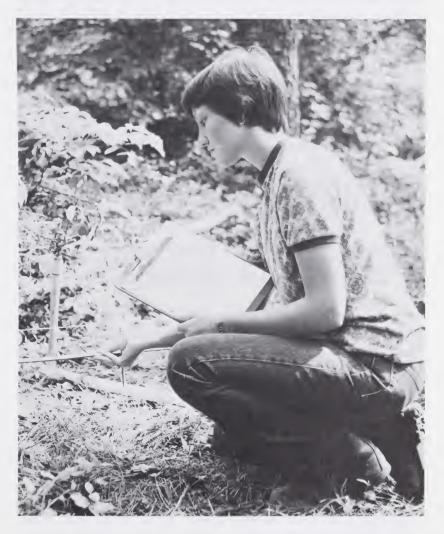
JUNIOR YEAR

COMP SC 205 Elem. Comp. Prog. 3 (3,0)EX ST 301 Introductory Statistics 3 (2,2)FOR 305 Elements of Forestry 2 (2,0)FOR 307 Elements of Forestry Lab 1 (0,3)FOR 427 Wood Processing I 3 (2,3)Elective	FOR 302 Forest Mensuration 3 (2,3) FOR 304 Forest Economics 3 (3,0) FOR 306 Wood and Wood Fiber 1 Identification 2 (1,3) FOR 428 Wood Processing II 2 (2,3) Emphasis Area 6
18	17

17

FOR 419 Senior Problems 3(1-3,0) FOR 420 Forest Products 2 (2,0) FOR 425 Wood Chemistry 3 (2,3) FOR 429 Wood Design 3 (2,3) Emphasis Area 6,3)	ENGL 301 Public Speaking 3 (3,0) FOR 401 Logging and Milling 3 (2,3) FOR 411 Har. Forestry Prod 3 (2,3) IM 304 Stat. Quality Control 3 (3,0) Approved Elective
17	17
	140 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. *Note:* The emphasis areas are Wood Industries Management, Wood Science, and Forest Management. The student selects one of these and in consultation with his/her adviser schedules approved courses for that particular emphasis area.



SENIOR YEAR

BECREATION AND PARK ADMINISTRATION

The curriculum in Recreation and Park Administration prepares students for a variety of careers in leisure-service agencies. The undergraduate curriculum is designed to provide a broad exposure to courses in the social, physical and biological sciences as well as develop the basic knowledge and skills required to manage and administer leisure-service resources.

Flexibility within the curriculum is achieved by permitting the student the opportunity to select coursework from among several emphasis areas that include Community Leisure Services, Recreation Resource Management, and Therapeutic Recreation. The latitude in area and course selection permits maximum accommodation of the individual student's interests and professional career obiectives.

Graduate study leading to a Master of Recreation and Park Administration degree is also offered by the Department.

FRESHMAN YEAR

17	URALITAT A		
First Semester		Second Semester	
BIOL 103 General Biology I 3 (ENGL 101 English Composition 3 (HIST 102 History of the U.S 3 (POL SC 101 Amer. Natl. Govt 3 (RPA 101 Intro. to Leisure Ser 3 (Elective	3,0) 3,0) 3,0) 3,0)	BIOL 104 General Biology II 3 ENGL 102 English Composition. 3 MATH 101 Finite Probability 3 RPA 102 Issues in Leisure Ser 3 RPA 205 Leisure Programs I 3 Elective 1	(3,0)
16		16	
SOPH	IOMOI	RE YEAR	
RPA 203 Personal and Com. Health 3 (RPA 206 Leisure Programs II 1 (3,0)	ECON 200 Economic Concepts 3 HUM 201 or 202 Intro. to Hum. 3 RPA 207 Leisure Programs III . 1 SOC 201 Sociological Perspective. 3 Science Requirement 2	(3,0) (0,3)
17		16	
	NIOP	YEAR	
ENGL 301 Public Speaking 3 (3		RPA 321 Recreation Admin 3 RPA 330 Intro. to Environmental	(3,0)
RPA 308 Leadership and Group Processes in Recreation 3 (3 RPA 311 Therapeutic Recreation 3 (3 Emphasis Area 3	3,0) 3,0)		(3,0)
15		16	
	SUMM	IER	
RPA 405 Field Training in Recreation 8 (0,24)			
SENIOR YEAR			
RPA 403 Elements of Recreation and Park Planning 3 (1) RPA 409 Meth. of Rec. Research I 3 (1) 5 Emphasis Area 3 8 Elective 2	2,3)	RPA 410 Meth. of Rec. Research II 3 Emphasis Area 3 Elective 2 15	(3,0)
16		135 Total Semester Hours	

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Two-semester sequences in astronomy, chemistry, geology, physical science, physics,

or Zool 220, 221. 3 The emphasis areas in the Department of Recreation and Park Administration include Community Leisure Services, Recreation Resource Management, and Therapeutic Recreation. The student selects one of these areas and in consultation with his/her adviser schedules the required and approved courses for that particular emphasis area.

COLLEGE OF INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE

The programs of the College of Industrial Management and Textile Science embrace three major areas: teaching, research, and public service. The College is responsible for seven graduate programs (two in cooperation with other administrative units). nine undergraduate programs, and a series of professional development courses for business and industry. The undergraduate curricula are in the areas of Accounting, Administrative Management, Economics, Financial Management, Industrial Management, Textile Chemistry, Textile Science, and Textile Technology. These curricula are designed to prepare the students for a variety of careers. as well as to furnish an education on which to build for a lifetime. The curricula recognize the need for an understanding of the basic principles of science and appreciation for the nature of human beings, and the comprehension of the economic, political, and social environment. Flexibility in course selection and choice of areas for emphasis is made possible by secondary concentrations and minors as indicated

ACCOUNTING

This curriculum leads to the Bachelor of Science degree in Accounting. The degree program is accredited by the American Assembly of Collegiate Schools of Business and is designed to prepare students for professional careers in accounting and management. The major study of accounting is well supported by sequential courses in English, mathematics, management, economics, and sociology.

The graduate in Accounting is well prepared for entrance in law school, graduate school, or the practice of accountancy, either public, private, or governmental. The study of accounting in preparation for a career in other areas of management will provide mastery over an essential tool which reinforces experience and judgment in the decision-making process.

FRESHMAN YEAR

First Semester

Second Semester

ECON 201 Principles of Economics 3 (3,0) ENGL 101 English Composition 3 (3,0) MATH 106 Cal. of One Var. I 4 (4,0) SOC 201 Sociological Perspective 3 (3,0) Science Elective 2	ECON 202 Principles of Economics 3 (3,0)ENGL 102 English Composition 3 (3,0)MATH 108 Cal. of One Var, II . 4 (4,0)Science Elective 2
17	17

SOPHOMORE YEAR

ACCT 201 Principles of Accounting 3 (3,0) MATH 231 Math. of Life Ins 3 (3,0) SOC 351 Industrial Sociology 3 (3,0) History Elective	ACCT 202 Principles of Accounting 3 (3,0) COMP SC 205 Elem. Comp. Prog. 3 (3,0) IM 201 Intro. to Ind. Mgt 3 (3,0) MATH 301 Stat. Theory and Meth.I 3 (3,0) Literature Requirement 1 3 (3,0) Elective
	16

JUNIOR YEAR

ECON 314 Inter. Econ. Theory 3 (3,0) ENGL 301 Public Speaking 3 (3,0) FIN 306 Corporation Finance 3 (3,0)	ACCT 302 Intermed. Accounting. 3 (3,0) ACCT 303 Cost Accounting 3 (3,0) ENGL 304 Advanced Composition 3 (3,0) LAW 313 Commercial Law 3 (3,0) IM 308 Principles of Marketing 3 (3,0) 15

SENIOR YEAR

ACCT 305 Income Taxation ACCT 410 Budgeting and Executive Control ACCT 411 Advanced Accounting ACCT 415 Auditing MGT SC 414 Statistical Analysis Approved Elective	3(3,0) 3(3,0) 3(3,0)	ACCT 405 Adv. Federal Taxes . 3 (3,0 ACCT 407 Accounting Research . 1 (1,0 1M 402 Operations Planning and Control 3 (3,0 IM 415 Business Policy 3 (3,0 Approved Elective))
		—	
	18	16 132 Total Semester Hours	

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Science elective includes any natural or physical science.

2 Science elective includes any natural or physical science. Note: Students who enter the degree program in Accounting after the 1975-76 academic year are required to earn a grade of C or higher in all prerequisite accounting courses in order to be eligible for enrollment in the next higher-level accounting course. Math 100 and 105 (Math 105 was formerly Math 103 and 104) credits may not be counted in computing the minimum number of credit hours required for graduation with $P \in \frac{1}{2}$

a B.S. in Accounting degree.

ADMINISTRATIVE MANAGEMENT

The Bachelor of Science degree in Administrative Management is designed for those students interested in careers as professional managers in the less technical areas of management. The program is accredited by the American Assembly of Collegiate Schools of Business. Such areas include marketing, personnel administration, purchasing, and public administration at the local, state and national levels. In addition, the qualified graduate of this curriculum will have a background suitable for pursuing graduate study in such areas as marketing, transportation, finance, and economics, as well as the behavioral sciences.

The program of study included in the Administrative Management curriculum is designed to provide the student with (1) an appreciation of the social, political, and economic environments in which business firms must operate; (2) knowledge of the functional areas of business, their interrelationship and use of analytical methods in solving problems; and (3) a facility in the use of mathematics, statistics, and the behavioral sciences in performing managerial functions.

FRESHMAN YEAR

First Semester

Second Semester

ENGL 101 English Composition 3 (3,0)HIST 173 Western Civilization 3 (3,0)MATH 102 Intro. to Math. Anal.2 3 (3,0)POL SC 101 Amer. Natl. Govt 3 (3,0)Science Elective 3	ECON 201 Principles of Economics 3 (3,0) ENGL 102 English Composition 3 (3,0) IM 201 Intro. to Ind. Mgt 3 (3,0) MATH 101 Finite Probability 2 3 (3,0) Science Elective 3
17	17

SOPHOMORE YEAR

ECON 202 Principles of Economics 3 (3,0) COMP SC MATH 203 Elem. Stat. Inference 2 3 (3,0) IM 304 St PSYCH 201 General Psychology. 3 (3,0) SOC 201 5	Principles of Accounting 3 (3,0) 205 Elem. Comp. Prog. 3 (3,0) at. Quality Control 3 (3,0) Sociological Perspective . 3 (3,0)
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IUNIOR YEAR

ACCT 303 Cost Accounting 3 (3,0) ECON 301 Economics of Labor. 3 (3,0) IM 308 Principles of Marketing. 3 (3,0) LAW 322 Legal Environ. of Bus. 3 (3,0) MGT SC 310 Intro. to Mgt. Sci 3 (3,0) Elective	ACCT 410 Budgeting and Executive Control
	10
18	16

SENIOR YEAR

ENGL 301 Public Speaking	3	(3,0)
IM 402 Operations Planning and Control		
IM 418 Management Inform. Sys.	3	(3,0)
Management Option 4	6	
-		
1	15	

IM 407 Directed Research		
or IM 410 Dir. Res. in Marketing		
IM 412 Marketing Management.		
IM 415 Business Policy		
IM 499 Computer Utilization II		(1,0)
Approved Elective 5	9	
	17	

132 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209-² Credits earned in Math 106, 108, 301 may be substituted for Math 101, 102, 203 and elective credits.

3 Any natural or physical science course.

³ Any natural or physical science course. ⁴ Management Options. In the senior year a student must complete one of two manage-ment options. To receive credit, at least two courses in the option must be completed. Regional Analysis: IM 404 and 405 or 406. Logistics: IM 417 and Econ 419 or IM 420. ⁵ Approved Elective. One course from each of the three areas listed is required for the nine hours of approved electives.

Economics: Econ 302, 308, 309, 407, 419, 424. Marketing: IM 401, 413, 419, 421. Management: Any senior-level course in the Department of Industrial Management. *Note:* Six hours of free electives must be in nonbusiness areas.

ADMINISTRATIVE MANAGEMENT—OCCUPATIONAL SAFETY AND HEALTH MAJOR

The Bachelor of Science degree in Administrative Management with Occupational Safety and Health major is designed for those students interested in careers as professional managers. This concentration provides the student with an indepth knowledge of the field of occupational safety and health. It prepares the student to fulfill industry's increasing need for managers and coordinators of safety programs. While concentrated, the course of study is designed to prepare students for careers in the less technical areas

of management in the following areas: personnel management, marketing, purchasing, and public administration at the local, state. and federal levels. In addition, the qualified graduate of this curriculum will have a background suitable for pursuing graduate study in such areas as marketing, transportation, finance, business administration, the behavioral sciences, and economics.

FRESHMAN YEAR

Second Semester

17

First Somester

or PHY SC 101 Physical Sci. I 4 (3,2) ENGL 101 English Composition 3 (3,0) MATH 102 Intro. to Math. Anal.2 3 (3,0) POL SC 101 Amer. Natl. Govt. 3 (3,0) History Elective 3	A HSt Demester	becond bemester
	ENGL 101 English Composition . 3 (3,0) MATH 102 Intro. to Math. Anal.2 3 (3,0)	or PHY SC 102 Physical Sci. II 4 (3,2) ECON 201 Principles of Economics 3 (3,0) ENGL 102 English Composition. 3 (3,0) MATH 101 Finite Probability 2 . 3 (3,0) Elective

SOPHOMORE YEAR

ACCT 201 Principles of Accounting 3 (3,0)ECON 202 Principles of Economics 3 (3,0)MATH 203 Elem. Stat. Inference 2 3 (3,0)SOC 201 Sociological Perspective . 3 (3,0)Literature Requirement 1 3 (3,0)Elective	ACCT 202 Principles of Accounting 3 (3,0) COMP SC 205 Elem. Comp. Prog. 3 (3,0) IM 201 Intro. to Ind. Mgt 3 (3,0) PSYCH 201 General Psychology 3 (3,0) SH 201 Scope of Occupational Safety and Health 3 (3,0)	
16	15	
JUNIOR YEAR		
FIN 306 Corporation Finance 3 (3,0) IM 307 Personnel Management 3 (3,0)	ECON 301 Economics of Labor 3 (3,0) ECON 306 Risk and Insurance 3 (3,0)	

 FIN 306 Corporation Finance 3 (3,0) IM 307 Personnel Management 3 (3,0) MGT SC 310 Intro. to Mgt. Sci 3 (3,0) PSYCH 301 Industrial Psychology. 3 (3,0) or SOC 351 Industrial Soc 3 (3,0) SH 301 Industrial Accident Prevention and Loss Control I 3 (3,0) 	ECON 301 Economics of Labor 3 (3,0) ECON 306 Risk and Insurance 3 (3,0) IM 304 Stat. Quality Control 3 (3,0) LAW 322 Legal Environ. of Bus. 3 (3,0) SH 302 Industrial Accident Pre- vention and Loss Control II 3 (3,0) SH 303 Industrial Health Mgt 3 (3,0)
15	18
SENIOR	YEAR
ENGL 301 Public Speaking 3 (3,0)	IM 403 Special Problems 1 $(1,0)$
or ENGL 304 Adv. Composition 3 (3,0)	or IM 407 Directed Research 1 $(1,0)$
IM 308 Principles of Marketing 3 (3,0)	or IM 410 Dir. Res. in Marketing 1 $(1,0)$
IM 402 Op. Plan. and Control 3 (3,0)	IM 415 Business Policy 3 $(3,0)$
IM 418 Management Inform. Sys. 3 (3,0)	IM 499 Computer Utilization II 1 $(1,0)$
SH 401 Fire Protection and Prev. 3 (3,0)	SH 404 Industrial Safety Mgt 3 $(3,0)$
Elective	Elective

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Credits earned in Math 106, 108, 301 may be substituted for Math 101, 102, 203 and elective credits. ³ History elective to be selected from Hist 101, 102, 172, 173.

132 Total Semester Hours

18

ECONOMICS

A bachelor's degree in Economics provides a thorough understanding of the economic system and prepares the student for a broad choice of career opportunities. By combining general education courses, a minor or option, and a strong major in economics, students can prepare themselves for specialized graduate studies and careers in business and government.

The Department of Economics offers two degree paths for the undergraduate. The Bachelor of Arts degree is distinguished by its emphasis on the language skills and the humanities. A broad choice of minors is available for this program. The Bachelor of Science program emphasizes quantitative skills and particular preparation for careers in business and offers a structured selection of options.

BACHELOB OF ARTS IN ECONOMICS

FRESHMAN YEAR

First Semester

Second Semester

ENGL 101 English Composition3 (3,0) HIST 172 Western Civilization3 (3,0) MATH 102 Intro. to Math. Anal.2 3 (3,0) Modern Language	ENGL 102 English Composition 3 (3,0) HIST 173 Western Civilization 3 (3,0) MATH 101 Finite Probability 2 3 (3,0) Modern Language
17–18	17–18

SOPHOMORE YEAR

ECON 201 Principles of Economics 3 (3,0) HIST 101 History of the U.S.4 . 3 (3,0) MATH 203 Elem. Stat. Inference 2 3 (3,0) Literature Requirement 1 3 (3,0) Modern Language 3 (3,0) Elective	ECON 202 Principles of Economics 3 (3,0) HIST 102 History of the U.S.4 3 (3,0) MATH 106 Cal. of One Var. I 2 4 (4,0) Literature Requirement 1
16	17

JUNIOR YEAR

ACCT 200 Basic Accounting or ACCT 201 Prin. of Acct ECON 314 Inter, Econ. Theory Humanities 5 Major 6 Minor 6	3 (3,0) 3 (3,0) 3 3	ECON 407 National Income and Employment Analysis 3 (3,0) Humanities 5
	15	15

SENIOR YEAR

Major 6 Minor 6 Approved Elective 6 4-3	Major
16-15	17–16

130 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209, ² The sequence Math 101, 102, 203, 106, may be replaced by Math 106, 108, 301. ³ Two courses from the same science area, excluding physical science, are required. ⁴ Students minoring in political science, psychology, or sociology may substitute Pol Sc 101 or 201; Psych 201, 263; or Soc 201, 202 for Hist 101, 102. ⁵ To be selected from English, humanities, modern language, music, philosophy, religion,

visual studies.

See department requirements. Note: Those seeking teacher certification will be required to complete more than 130 semester hours.

Twenty-four semester hours above the sophomore level are required, including Econ 314 and 407. (Econ 314 should be scheduled to follow immediately after Econ 202.) Courses also must include 9 semester hours to be selected from Econ 302, 399, 403, 404, 410, 412, 420, and 424. The remaining hours may be selected from Ag Ec 456, Econ 301, 302, 305, 306, 308, 309, 309, 403, 404, 408, 410, 412, 419, 420, 421, 422, 424, Ex St 462, Hist 306, IM 404, 405, 406, Mgt Sc 311, SE 484.

MINOR CONCENTRATIONS

A student pursuing a Bachelor of Arts degree in Economics must select a minor concentration under one of the options as follows:

1. Secondary or minor concentrations. Accounting (to include Acct 202, 301, 302, 303, 410), Biological Science, Chemistry, City and Regional Planning, English, Fine Arts, Geology, History, Mathematical Sciences, Modern Languages, Music, Philosophy, Physics, Political Science, Psychology, Sociology, Speech and Drama, and Textiles

Students who consider the Bachelor of Arts curriculum in Economics and desire to go into secondary school teaching should elect to take the degree in Education with a teaching area in Economics. The courses will be those required for teaching certificates as specified by the South Carolina Department of Education as well as those economics courses required for an Economics major.

Specific requirements for most minors may be found under the section on the College of Liberal Arts and the College of Sciences, Bachelor of Arts curriculum. Requirements for a major in Education with a teaching area in Economics are shown under the College of Education.

A minor in Economics is provided for other degree programs consisting of 15 hours above the sophomore level which must include Econ 314 and 407.

2. "Cluster Minor." This minor concentration is designed to allow students a somewhat wider choice of course materials than is possible with the conventional subject-matter minor. The general requirement for the "Cluster Minor" is 15 semester credits in courses numbered higher than 300 (except where noted differently), chosen according to one of the plans as follows:

Group I	Social Sciences ¹ History, Political Science, Psychology, Sociology
Group II	Philosophy and Religion
Group III	Administration ¹ Accounting, Finance, Industrial Management, Law
Group IV	Life Sciences ² Biochemistry, Botany, Genetics, Microbiology, Zoology
Group V	Physical Sciences ²

Chemistry, Geology, Physics

¹ At least two courses must be taken in each subject chosen. ² No course in the 100 series is acceptable toward the "cluster minor" and not more than two courses in the 200 series. At least two courses must be taken in each subject chosen.

Second Semester

APPROVED ELECTIVES

A list of approved electives for both degree and quality requirements may be obtained from the departmental secretary or from an adviser.

BACHELOR OF SCIENCE IN ECONOMICS

FRESHMAN YEAR

First Semester

CCT 201 Principles of Accounting 3 (3,0)NGL 101 English Composition 3 (3,0)HST 172 Western Civilization 3 (3,0)AATH 102 Intro. to Math. Anal.3 3 (3,0)Vatural Science 2	ACCT 202 Principles of Accounting 3 (3,0) ENGL 102 English Composition 3 (3,0) HIST 173 Western Civilization 3 (3,0) MATH 101 Finite Probability 3 3 (3,0) Natural Science 2
17-16	17-16

SOPHOMORE YEAR

ECON 201 Principles of Economics 3 (3,0) MATH 106 Cal. of One Var. I 3 . 4 (4,0) Literature Requirement 1 3 (3,0) Social Science Elective 3 Elective 4	ECON 202 Principles of Economics 3 (3,0) FIN 306 Corporation Finance 3 (3,0) Literature Requirement 1 3 (3,0) Social Science Elective 3 Elective 4
17	16

JUNIOR YEAR

COMP SC 205 Elem. Comp. Prog. 3 (3,0) ECON 302 Money and Banking 3 (3,0) ECON 314 Inter. Econ. Theory 3 (3,0) LAW 322 Legal Environ. of Bus. 3 (3,0) Option 15	ECON 407 National Income and Employment Analysis 3 (3,0) MATH 203 Elem. Stat. Inference 3 (3,0) or MATH 301 Stat. Theory and Meth. I 3 (3,0) Major 3 3 Option 3 3 Elective 3 15
SENIOR	YEAR
Major 6 Option 6 Approved Elective 6	Major 6 Option 5-3 Approved Elective 6-10
18	132 Total Semester Hours

OPTIONS

A(El H M El

Rather than having a minor or secondary concentration as in the Bachelor of Arts program in Economics, a student in the Bachelor of Science program selects one of several options. These options generally consist of 15 hours of a certain core of study. It is felt that these options might be particularly appealing to certain students with definite vocational interests. Also, an appropriately chosen option would greatly facilitate moving into a Master of Business Administration program in graduate school or law school.

Students enrolling in the Bachelor of Science program in Economics will be given the precise courses required in each of the following options.

Accounting ACCT 301 Inter. Accounting 3 (3,0) ACCT 302 Inter. Accounting 3 (3,0) ACCT 303 Cost Accounting 3 (3,0) and ACCT 305 Income Tax 3 (3,0) or ACCT 411 Advanced Acct 3 (3,0) and ACCT 415 Auditing 3 (3,0) LAW 312 Commercial Law 3 (3,0)	Management Science ACCT 303 Cost Accounting 3 (3,0) or ACCT 305 Income Taxation 3 (3,0) or LAW 312 Commercial Law 3 (3,0) IM 404 Managerial Economics 3 (3,0) MGT SC 311 Intro. to Econometrics 3 (3,0) MGT SC 413 Management Sci. I 3 (3,0) MGT SC 414 Statistical Analysis 3 (3,0)
15	15
Computer Science	Mathematical Sciences—Statistics
COMP SC 308 Data Processing for Business Applications 3 (3,0) COMP SC 409 Introduction to Numerical Analysis 1 3 (3,0) COMP SC 410 Introduction to Numerical Analysis 11 3 (3,0) MATH 208 Engineering Math. I 4 (4,0)	MATH 108 Cal. of One Var. II . 4 (4,0) MATH 206 Calculus of Sev. Var. 4 (4,0) MATH 405 Stat. Theory and Meth. II 3 (3,0) MATH 411 Linear Algebra 3 (3,0) MATH 452 Linear Programming 3 (3,0)
MGT SC 311 Intro. to Econometrics 3 (3,0)	17
$\overline{16}$	
Environmental Studies	Public Administration 5
AG EC 403 Land Economics 3 (3,0) BOT 145 Environmental Dynamics 2 (2,0) CRD 357 Nat. Res. Economics 3 (3,0) EN SC 471 Man and His Envir 2 (2,0) ESE 401 Environmental Engr 3 (3,0) WRE 450 Water Resources Engr. 3 (3,0)	POL SC 302 State and Local Govt. 3 (3,0) POL SC 321 Gen. Public Admin. 3 (3,0) POL SC 341 Pol. Sci. Meth 3 (2,1) POL SC 422 Prob. of Pub. Admin. 3 (3,0) POL SC 423 Municipal Admin 3 (3,0)
$\overline{16}$	15
Social Science	Textile Science
HIST 306 Amer. Econ. Develop 3 (3,0) POL SC 321 Gen. Public Admin. 3 (3,0) or POL SC 361 Inter. Politics 3 (3,0) SOC 351 Industrial Sociology 3 (3,0) Elective 4	TEXT 122 Intro. to Textiles 2 (1,3) TEXT 305 Basic Fibers 3 (3,0) TEXT 306 Yam Formation 3 (3,0) TEXT 313 Fabric Formation 3 (3,0) TEXT 314 Dyeing and Finishing 3 (3,0) TEXT 475 Textile Marketing 3 (3,0)
Urban Studies	17
CRP 411 Intro. to City and R CRP 412 City and Regional Pl CRP 421 Urban Social Structu SOC 206 Intro. to Methods of	anning Theory 3 (3,0) are

15

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Excluding Phy Sc 101, 102. ³ The sequence of Math 101, 102, 106 may be replaced by Math 106, 108, 206. ⁴ Electives to be selected from 300- and 400-level courses in history, political science,

⁴ Electives to be selected from 300- and 400-level courses in history, political science, psychology, and sociology. ⁵ Pol Sc 101, 201 are required as electives; Econ 420, 421 are to be included in major. *Note:* Twenty-four semester hours above the sophomore level are required, including Econ 314 and 407. (Econ 314 should be scheduled to follow immediately after Econ 202.) Courses also must include 9 semester hours to be selected from Econ 302, 403, 404, 410, 412, and 420. The remaining hours may be selected from Ag Ec 456, Econ 301, 302, 305, 306, 309, 403, 404, 410, 412, 419, 420, 421, 422, 424, Ex St 462, Hist 306, IM 404, 405, 406, Mgt Sc 311, SE 484.

FINANCIAL MANAGEMENT

The degree program for the Bachelor of Science in Financial Management is accredited by the American Assembly of Collegiate Schools of Business. The curriculum provides the student with a course of study in preparation for a career in such areas as banking, insurance, brokerage and related activities. The student should be well prepared to serve on the financial staff of practically any business firm for the purpose of planning, providing, and controlling the capital of the firm. This curriculum should also

Second Semester

prepare the student for service in government and agencies and programs of government. The graduate with this degree should be adequately prepared for entrance in law or graduate school.

The coursework consists largely of courses in English, mathematics, accounting, economics, management, and the social sciences. The special interests of the individual student may be pursued through elective credit.

FRESHMAN YEAR

First Semester

I hot bennester	becond bonnester
ECON 201 Principles of Economics 3 (3,0) ENGL 101 English Composition 3 (3,0) IM 201 Intro. to Ind. Mgt 3 (3,0) MATH 101 Finite Probability 2 3 (3,0) POL SC 101 Amer. Natl. Govt 3 (3,0) Elective 4	ECON 202 Principles of Economics 3 (3,0) ENGL 102 English Composition 3 (3,0) MATH 102 Intro. to Math. Anal.2 3 (3,0) History Elective

SOPHOMORE YEAR

ACCT 201 Principles of Accounting 3 (3,0) MATH 203 Elem. Stat. Inference 2 3 (3,0) SOC 201 Sociological Perspective . 3 (3,0) Literature Requirement 1 3 (3,0) Elective 4	ACCT 202 Principles of Accounting 3 (3,0) COMP SC 205 Elem. Comp. Prog. 3 (3,0) PSYCH 201 General Psychology 3 (3,0) SOC 351 Industrial Sociology 3 (3,0) Literature Requirement 1 3 (3,0) Elective 4
16	
	18
JUNIOR	YEAR
ACCT 301 Intermed. Accounting. 3 (3,0)	ACCT 302 Intermed. Accounting 3 (3,0)

ACCT 301 Intermed. Accounting. 3 (3,0)	ACCT 302 Intermed. Accounting 3 (3,0)
ECON 302 Money and Banking 3 (3,0)	ACCT 303 Cost Accounting \ldots 3 (3,0)
ECON 314 Inter, Econ. Theory 3 (3,0)	FIN 308 Fin. Inst. and Markets 3 (3,0)
ENGL 304 Advanced Composition 3 (3,0)	IM 308 Principles of Marketing 3 (3.0)
FIN 306 Corporation Finance 3 (3,0)	LAW 313 Commercial Law 3 (3,0)
LAW 312 Commercial Law 3 (3,0)	
	15
18	

SENIOR YEAR

ACCT 305 Income Taxation3 (3,0)ACCT 410 Budgeting and3 (3,0)Executive Control3 (3,0)FIN 310 Prob. in Fin. Mgt.3 (3,0)IM 402 Oper. Plan. and Control3 (3,0)Required Elective 36	ENGL 301 Public Speaking 3 (3,0) FIN 404 Seminar in Finance 3 (3,0) IM 415 Business Policy 3 (3,0) Required Elective 3 6 15 15
18	

132 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Credits earned in Math 106, 108, 301 may be substituted for Math 101, 102, 203, and elective credits. (See adviser.) ³ Twelve credits must be completed from the following courses: Acct 415, Ag Ec 352, Econ 305, 306, 412, 422, Fin 402, Math 231, Mgt Sc 310. ⁴ Six elective credits must be in nonbusiness areas. *Notes:*

 Students who enter the degree program in Financial Management after the 1975-76 academic year are required to earn a grade of C or higher in all prerequisite accounting courses in order to be eligible for enrollment in the next higher-level accounting course.
 Math 100 credits may not be counted in computing the minimum number of credit hours required for graduation with a B.S. in Financial Management degree.

INDUSTRIAL MANAGEMENT

This curriculum is designed to adequately prepare students for positions of major management responsibility in the technologically oriented industries. The program is accredited by the American Collegiate Schools of Business. Graduates are sought for positions

as projects directors by various government agencies and have successfully filled a wide variety of positions in industry and government research centers. Banks and financial institutions also utilize the Industrial Management graduate in a liaison role as between them and their technologically oriented business customers. The degree offers an unexcelled background for those interested in careers as technical sales representatives.

During the first year, education in the mathematical and physical sciences is emphasized. In the second, third, and senior years, the student's work expands into the areas of industrial engineering, financial management, and the social sciences.

FRESHMAN YEAR

First Semester

Second Semester

CH 101 General Chemistry 4 (3,3) EG 109 Engr. Graphical Com 2 (0,6) ENGL 101 English Composition 3 (3,0) HIST 173 Western Civilization 3 (3,0) MATH 106 Cal. of One Var. I . 4 (4,0)	CH 102 General Chemistry 4 (3,3) ENGL 102 English Composition 3 (3,0) IM 201 Intro. to Ind. Mgt 3 (3,0) MATH 108 Cal. of One Var. II 4 (4,0) PHYS 122 Phys. with Cal. I 3 (2,2)
16	17

SOPHOMORE YEAR

ACCT 201 Principles of Accounting 3 (3,0)	ACCT 202 Principles of Accounting 3 (3,0)
ECON 201 Principles of Economics 3 (3,0)	COMP SC 205 Elem. Comp. Prog. 3 (3,0)
ENGR 220 Tech. in Mod. World. 3 (3,0)	ECON 202 Principles of Economics 3 (3,0)
MATH 301 Stat. Theory and Meth. I 3 (3,0)	IM 304 Stat. Quality Control 3 (3,0)
PSYCH 201 General Psychology . 3 (3,0)	Literature Requirement 1 3 (3,0)
15 (3,0)	15

JUNIOR YEAR

SENIOR YEAR

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² The student is encouraged to select an area concentration. He may, with the approval of his adviser, select instead nine credits from an approved technical elective list.

AREA CONCENTRATIONS

During the junior and senior years students are encouraged to select from one of the following areas for the purpose of emphasizing a particular phase of the curriculum. Computer programming and application are stressed in all upper division courses: Biological Sciences, Ceramics, Defense Studies, Economics, Environmental Science, Health and Hospital Administration, Human Resources, Industrial Engineering, Industrial Statistics, Management Science, Marketing Analysis, Regional Science, and Textiles.

TEXTILE CHEMISTRY, TEXTILE SCIENCE, AND TEXTILE TECHNOLOGY PROGRAMS

The textile student studies the polymer synthesis of fibers by man or nature, the processes for converting these fibers into a textile structure, the science of the addition of coloring agents and finishes to improve the desirability, and the test methods for evaluating the performance of textile products.

Graduates of the Textile Department hold jobs with responsibilities in corporate management, sales, manufacturing management, design, research, development, technical service, quality control, and personnel management. They create new products and processes and solve problems. They create styles, patterns, textures, and colors for apparel, home, and industrial use as well as special application. They deal with computers, automation, product quality, plant performance, environmental control, and consumer safety.

The textile industry has a continuing need for technically trained men and women to help it meet sociologically desirable standards such as those required by the Occupational Safety and Health Act, the Consumer Product Safety Agency, and the Environmental Protection Agency. In addition, there is a need to reduce costs and increase exports, and to develop new fibers and fabrics to satisfy the whims of fashion.

In the textile curricula a broad background is stressed, with as much as two-thirds of the courses coming from the large resources of the University outside the department. In addition, the 34 hours of electives permit the student to gain expertise in related fields.

The Textile Department offers three undergraduate degrees which differ in the content of science and business courses. The B.S. in Textile Chemistry and the B.S. in Textile Science are both based on the three sciences: chemistry, physics, and mathematics. With this firm base, the graduate is able to apply scientific knowledge to the solution of problems involving both chemical and physical principles. The graduates will be concerned with the conception, design, construction, and management of complete systems of labor, machinery and processes for the most efficient production of textiles or related chemicals. These two courses differ in that Textile Chemistry has a greater emphasis on chemistry, and Textile Science has a greater emphasis on yarn and fabric formation. Both curricula prepare one for graduate study in textiles.

The Bachelor of Textile Technology program has as its core the desirable business and humanistic courses in economics, management, sociology, and psychology that prepare the graduate to begin a management career as a production manager in a textile mill. It is less well adapted to train a man for graduate work, but with proper choice of electives a student could prepare himself for graduate school in certain areas.

The Textile Department also offers advanced degrees as follows: Master of Science in Textile Chemistry, Master of Science in Textile Science, Doctor of Philosophy in Textile and Polymer Science, and in cooperation with the Chemistry Department, the Doctor of Philosophy in Chemistry with a major in Textile Chemistry.

Textile courses also may be taken as a minor area or as free electives. Recommended groups of courses may consist of 3, 6, 12, or 20 credits.

BASIC FRESHMAN YEAR FOR TEXTILE CHEMISTRY AND TEXTILE SCIENCE PROGRAMS

17

First Semester

CH 101 General Chemistry 4 (3,3) ENGL 101 English Composition 3 (3,0) HIST 173 Western Civilization 3 (3,0) MATH 106 Cal. of One Var. I 4 (4,0) TEXT 122 Introduction to Textiles 2 (1,3) Elective

1 Textile Science majors substitute Ch 102.

TEXTILE CHEMISTRY

SOPHOMORE YEAR

First Semester

Second Semester

Second Semester

CH 112 General Chemistry $1 \dots 4$ (3,3) ENGL 102 English Composition 3 (3,0) MATH 108 Cal. of One Var. II 4 (4,0) PHYS 122 Phys. with Cal. I $\dots 3$ (2,2) Elective $\dots 2$

16

CH 223 Organic Chemistry 3 (3,0) CH 225 Organic Chemistry Lab. 2 (0,6) MATH 206 Calculus of Sev. Var. 4 (4,0) PHYS 221 Phys. with Cal. II 3 (2,2) PHYS 223 Physics Lab. I 1 (0,3) Literature Requirement 1 3 (3,0) Elective	CH 224 Organic Chemistry 3 (3,0) CH 226 Organic Chemistry Lab 2 (0,6) MATH 208 Engineering Math. I 4 (4,0) PHYS 222 Phys. with Cal. III 3 (2,2) PHYS 224 Physics Lab. II 1 (0,3) Elective

JUNIOR YEAR

CH 331 Physical Chemistry 3 (3,0) ECON 200 Economic Concepts 3 (3,0) TC 315 Introduction to Polymer Science and Engineering 3 (3,0) TC 317 Polymer and Fiber Lab 1 (0,3) Elective	CH 332 Physical Chemistry 3 (3,0) ENGL 304 Advanced Composition 3 (3,0) TC 316 Chemical Preparation of Textiles
16	18

SENIOR YEAR

TC 457 Dyeing and Finishing I 3 (3,0) TC 459 Dyeing and Fin. Lab. I. 1 (0,3) TEXT 313 Fabric Formation 3 (3,0) TEXT 321 Fiber Science 3 (2,2) Elective 2	TC 458 Dyeing and Finishing II. 3 (3,0) TC 460 Dyeing and Fin. Lab. II 1 (0,3) TEXT 322 Properties of Textile Structures
16	132 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Class advisers have lists of approved electives and will suggest sequences of courses.

TEXTILE SCIENCE

See page 126 for Freshman Year.

SOPHOMORE YEAR

First Semester

Second Semester

18

MATH 206 Calculus of Sev. Var. 4 (4,0) PHYS 221 Phys. with Cal. II 3 (2,2) PHYS 221 Physics Lab. 1 (0,3) TC 303 Textile Chemistry 3 (3,0) TC 305 Textile Chemistry Lab. 1 (0,3) Literature Requirement 1 3 (3,0) Elective 1 1	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
$\overline{16}$	16

JUNIOR YEAR

-	
TEXT 301 Fiber Processing I 3 ((2,2) ENGL 304 Advanced Composition 3 (3,0)
TEXT 311 Fabric Development I 3 ((2,2) TEXT 302 Fiber Processing II 3 (2,2)
TEXT 321 Fiber Science 3 (2,2) TEXT 312 Fabric Development II 3 (2,2)
Elective 2 8	TEXT 322 Properties of Textile
	Structures
17	Elective

SENIOR YEAR

TC 315 Introduction to Polymer	TC 457 Dyeing and Finishing I. 3 (3,0)
Science and Engineering 3 (3,0)	TC 459 Dyeing and Fin. Lab. I . 1 (0,3)
TC 317 Polymer and Fiber Lab. 1 (0,3)	TEXT 414 Nonwoven and
TEXT 403 Fiber Processing III 3 (2,2)	Knitted Structures
TEXT 411 Fabric Development III 3 (2,2)	Elective 2
Elective 2 6	
	16
16	
	132 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Advisers have lists of approved electives and will suggest sequences of courses.

TEXTILE TECHNOLOGY

E H M T B E

FRESHMAN YEAR

First Semester

Second Semester

CNGL 101 English Composition IIST 173 Western Civilization IIST 102 Intro. to Math. Anal. EXT 122 Introduction to Textiles Vasic Science Clective	3 3 2 4	(3,0) (3,0) (1,3) (3,3)	ENGL 102 English Composition. 3 MATH 101 Finite Probability . 3 TEXT 305 Basic Fibers	(3, 3 (3) 4 (3)	0)

SOPHOMORE YEAR

ACCT 200 Basic Accounting 3 (3, MATH 203 Elem. Stat. Inference. 3 (3, SOC 201 Sociological Perspective . 3 (3, TEXT 301 Fiber Processing I 3 (2, Literature Requirement 1 3 (3, Elective	(0) PSYCH 201 General Psychology 3 (3,0) 5,0) TEXT 302 Fiber Processing II 3 (2,2) 7,2) TEXT 324 Textile Statistics 3 (3,0)
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JUNIOR YEAR

ECON 301 Economics of Labor3 (3,0)TEXT 311 Fabric Development I 3 (2,2)TEXT 403 Fiber Processing III3 (2,2)Elective 2Elective 2	IM 307 Personnel Management 3 (3,0) TEXT 312 Fabric Development II 3 (2,2) TEXT 475 Textile Marketing 3 (3,0) Elective 2
15	15

SENIOR YEAR

IM 402 Operations Planning	LAW 312 Commercial Law 3 (3,0)
and Control	TEXT 322 Prop. of Text. Struc 3 (2,2)
TEXT 314 Dyeing and Finishing, 3 (3,0)	TEXT 414 Nonwoven and
TEXT 321 Fiber Science 3 (2,2)	Knitted Structures 3 (3,0)
TEXT 411 Fabric Development III 3 (2,2)	TEXT 428 Textile Research 3
Elective 2 5	Elective 2
17	16
	128 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Advisers have lists of approved electives and will suggest sequences of courses.



COLLEGE OF LIBERAL ARTS

The College of Liberal Arts, in addition to its six major curricula leading to the degree of Bachelor of Arts, makes indispensable contributions to the programs of all other divisions of the University, including nearly all the instruction in the humanities and the social sciences.

Single or double major ¹ concentrations may be elected in English, History, Modern Languages, Political Science, Psychology, and Sociology; minor concentrations are offered in these disciplines, in Communications, Music, Philosophy, Speech and Drama, and Spanish-American Area Studies. In cooperation with other colleges of the University minor concentrations are also available in Accounting, Biology, Chemistry, Economics, Fine Arts, Geology, Mathematical Sciences, and Physics. Supporting work is offered in interdisciplinary humanistic studies. A student who elects a double major ¹ concentration will not be required to complete a minor concentration.

The College of Liberal Arts offers programs leading to graduate degrees in English and History.

BACHELOR OF ARTS CURRICULUM

The curriculum leading to the degree of Bachelor of Arts is designed to meet the needs of students who desire a broad general education, with emphasis upon the humanities and the social sciences, as a preparation for intelligent citizenship, for general commercial and industrial life, for government service, and for teaching. This curriculum also provides excellent background for the study of law, journalism, or medicine.

As soon as feasible in his college career, and not later than the end of the sophomore year, the student seeking the Bachelor of Arts degree will select a major and a minor field of concentration from the following areas (or a double major¹ from the list of possible majors):

Majors	Minors	
English	Accounting	Modern Languages
History	Biological Science	Music
Modern Languages	Chemistry	Philosophy
Political Science	"Cluster Minor"	Physics
Psychology	Communications	Political Science
Sociology	Economics	Psychology

1 The first degrees with the double major are to be awarded no earlier than May 1979.

130 Degrees and Curricula

Minors		
English	History	Sociology
Fine Arts	Mathematical	Spanish-American Area
Geology	Sciences	Studies
		Speech and Drama

To fulfill requirements for a major concentration, a student takes 24 semester hours credit from courses above the sophomore level. including or in addition to certain courses specified by the major department; except as specified below, the minor concentration requires 15 credits from courses above the sophomore level, including certain specified courses. For a double major ³ concentration, a student must fulfill all requirements for each major.

The total number of semester credits required for the degree is 130: of these, at least 12 should be earned in humanities courses numbered 300 or higher and at least 12 in social science courses numbered 300 or higher. The humanities are for this purpose considered to include art, English, languages, music, philosophy, and religion as well as courses entitled humanities: the social sciences are here considered to include economics, geography, history, political science, psychology, and sociology.

Students in the Bachelor of Arts program who expect to teach in the public schools may elect education courses required for teaching certificates by the South Carolina State Department of Education such courses to be approved by their own departmental advisers.

BASIC CURRICULUM

FRESHMAN YEAR

First Semester	Second Semester		
ENGL 101 English Composition 3 (3,0) HIST 172 Western Civilization 3 (3,0) MATH 101 Finite Probability 3 (3,0) Foreign Language	ENGL 102 English Composition 3 (3,0) HIST 173 Western Civilization 3 (3,0) MATH 102 Intro. to Math. Anal. 3 (3,0) Foreign Language		
16-17	16-17		
SOPHOMORE YEAR			
Foreign Language 3 (3,0) Literature Requirement 1 3 (3,0) Approved Elective 12	Foreign Language3 (3,0)Literature Requirement 13 (3,0)Approved Elective10		
18	16		
JUNIOR	YEAR		
Major and Minor Areas	Major and Minor Areas		
16-15	15		

SENIOR YEAR

Major and										
Approved I	Elective	• • •	• •	•	•	•	•	•	. 9	

18 - 17

Major and Minor Areas Approved Elective 0 ĕ 15 130 Total Semester Hours

^I To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² A two-semester sequence of the same science (astronomy, biology, chemistry, geology, physical science, or physics).

The first degrees with the double major are to be awarded no earlier than May 1979.

MAJOB CURBICULA IN THE COLLEGE OF LIBERAL ARTS

ENGLISH

The program of study for a major concentration in English consists of courses stipulated in the basic curriculum¹ for the Bachelor of Arts and 24 semester credits of English, arranged as follows:

- Group I Engl 405.
- Group II Three credits from Engl 406, 409, 410, 436, 443, 445, 446. 461.
- Group III Three credits from Engl 425, 427, 431, 437, 462.
- Group IV Three credits from Engl 422, 423, 424, 447.
- Group V Twelve additional credits above the sophomore level, including at least six credits from the 400 level.²

Rising junior students with grade-point ratios of 3.3 or higher may, with the advice and consent of departmental advisers and the English Major Committee, propose different arrangements of the 24 upper-level English credits required. Candidates are expected to demonstrate the logic and thematic unity of their proposals. Continued approval will require that an overall grade-point ratio of 3.3 be maintained.

The Department requires certification of proficiency in composition for all its majors. Proficiency may be demonstrated in any of the following ways:

1. By passing Engl 101-102 with no grade lower than B; OR, if placement credit is awarded for 101 and/or 102, by passing the required sophomore literature courses with no grade lower than B.

2. By passing Engl 304. (If taken to satisfy the proficiency requirement, however, Engl 304 may not be included in Group V above.)

3. In unusual circumstances, by special examination.

English majors must complete Hist 361, 363, and the third year of a foreign language or the second year of two foreign languages.

¹ The Department recommends but does not insist that English majors take Engl 203 and 204 to satisfy the sophomore literature requirement. ² In no case may courses numbered lower than 300 be included in Group V; nor may any course be used toward satisfaction of both major and minor requirements.

132 Degrees and Curricula

Additional approved electives are added as necessary to meet the minimum number of 130 credits for graduation.

HISTORY

The recommended program of study consists of the required courses in the Bachelor of Arts curriculum; completion of the third year of a foreign language; 30 additional credits in history, including at least two courses at the 400 level, selected with the advice and consent of a departmental adviser and arranged to suit the academic interests of the student. Additional approved electives are added as needed to meet the minimum of 130 semester credits required for graduation.

MODERN LANGUAGES

A student may elect a major concentration in a single language or a concentration split between two languages; however, the department recommends a minor concentration outside the Department of Languages.

1. The recommended program of study for a major in Modern Languages consists of the courses stipulated in the basic Bachelor of Arts curriculum, plus the following courses:

French: Group I Group II	Fr 205 and 24 semester credits arranged as follows: Twelve credits from Fr 301, 302, 303, 305, 309, 409. Twelve credits from Fr 403, 404, 405, 406, 407, 408, 498.
German:	Twenty-four semester credits arranged as follows:
Group I	Twelve credits from Ger 301, 302, 305 and either 307, 308 or 405.
Group II	Twelve credits from Ger 407, 408, 409, 410, 498.
Spanish: Group I Group II Group III	 Span 205 and 24 semester credits arranged as follows: Six credits from Span 303, 304, 310, 311. Six credits from Span 305, 307, 308, 409. Twelve credits from Span 401, 402, 405, 406, 407, 421, 422, 498.

2. The recommended program for a split major in Modern Languages consists of the courses stipulated in the basic Bachelor of Arts curriculum, Fr 205 or Ger 205 or Span 205, plus eighteen credits in the primary language and twelve credits in the secondary language, arranged as follows: Primary Language

- French: Fr 301, 302, 305 and either 303, 306, 308 or 309 plus six 400-level credits.
- German: Ger 301, 302, 305 and either 307, 308 or 405 plus six 400-level credits.
- Spanish: Span 303, 304 or 310, 311, 305 and either 306, 307 or 308 plus six 400-level credits.

Secondary Language

Twelve semester credits from 300- and 400-level courses in language.

3. Additional approved electives are added as needed to meet the minimum of 130 credits required for graduation.

POLITICAL SCIENCE

For a major concentration in Political Science, the recommended program of study consists of the required courses in the Bachelor of Arts curriculum; Pol Sc 101, 201, 341 and 21 semester hours of political science drawn from at least four of these fields:

- 1. American Government-Pol Sc 302, 403, 405, 409
- 2. Comparative Governments-Pol Sc 371, 372, 474, 475, 476
- 3. International Relations-Pol Sc 361, 462, 463, 464, 465
- 4. Political Behavior-Pol Sc 341, 442, 443, 454
- 5. Political Thought-Pol Sc 351, 352, 453
- Public Administration—Pol Sc 321, 422, 423, 424, 425, 426, 427, 428, 429
- 7. Public Law-Pol Sc 432, 433, 434, 435, 439

With the department head's approval, Pol Sc 300 and 482 may be appropriately applied to one of the seven areas. Additional approved electives are added as needed to meet the minimum of 130 semester hours required for graduation.

PSYCHOLOGY

The recommended program of study for a major concentration in Psychology consists of the required courses in the Bachelor of Arts curriculum, Psych 201, 263, 363, and 20 additional credits drawn from 300- and 400-level psychology courses. One of these courses must be included: Psych 332, 341 and 344, 451. Zool 470 may be included. Additional approved electives are added as needed to meet the minimum of 130 semester hours required for graduation.

SOCIOLOGY

The recommended program of study for a major concentration in Sociology consists of the required courses in the Bachelor of Arts curriculum, Soc 204, 206, 208, and 24 credits from one of these areas:

1. General Sociology. Soc 311 or 443, 324 or 341, 361 or 381, 391 or 393, 431 or 441, plus 9 credits selected from sociology and rural sociology courses numbered 300 or higher.

2. Social Services Sociology. Soc 302, 304, 495; 9 credits from Soc 309, 343, 393, 405, 431, 433, 451, 481, 490, 492; plus 6 credits from sociology and rural sociology courses numbered 300 or higher.

3. Criminal Justice Sociology. Soc 393, 495; 6 credits from Pol Sc 435, Soc 305, 490; 6 credits from Soc 361, 391, 481, 492, 494; 6 credits from other sociology and rural sociology courses numbered 300 or higher.

MINOR CONCENTRATIONS

Students seeking the Bachelor of Arts degree may choose one of several minor concentrations available. The requirements for each area are detailed below.

Accounting. A minor concentration in Accounting requires Acct 201, 202, 301, 302, and six additional credits in accounting courses numbered higher than 201.

Biological Science. A minor concentration in Biological Science requires 15 semester credits in the biological sciences numbered higher than 200.

Chemistry. A minor concentration in Chemistry requires Ch 101, 102, and 15 additional credits in chemistry, the courses to be selected in consultation with the Department of Chemistry.

"Cluster Minor." This minor concentration is designed to allow students a somewhat wider choice of course materials than is possible with the conventional subject-matter minor. The general requirement for the "Cluster Minor" is 15 semester credits in courses numbered higher than 300 (except where noted differently), chosen according to one of the plans listed below. Courses within the student's major area may not be included in the "Cluster Minor."

- Group I Social Sciences Economics, Geography, History, Political Science, Psychology, Sociology
- Group II Philosophy and Religion

- Group III Administration Accounting, Economics, Finance, Industrial Management, Law
- Group IV Life Sciences¹ Biochemistry, Botany, Genetics, Microbiology, Zoology
- Group V Physical Sciences ¹ Chemistry, Geology, Physics

Communications. A minor concentration in communications requires 18 credits distributed as follows:

General Communications Option: Engl 231, 304 and either 302 or 307; Phil 202; six approved elective credits.

Advertising Option: Ag Ec 351; Engl 231 or 304; In Ed 204; Psych 361; six approved elective credits.

Commerce Option: Ag Ec 351 or In Ed 496; Engl 231 or 304, 302 or 307; IM 308; six approved elective credits.

Politics Option: Engl 304 and either 302 or 307; Pol Sc 341, 443; six approved elective credits.

Elective credits are approved by the Head of the Department of English or his representative.

Economics. A minor concentration in Economics requires Econ 201, 202, 314, 407, and 9 credits from these courses: Ag Ec 456, Econ 301, 302, 305, 306, 308, 309, 314, 399, 403, 404, 407, 408, 410, 412, 419, 420, 421, 422, 424, Ex St 462, IM 404, 405, 406, Mgt Sc 311.

English. A minor concentration in English requires 15 semester credits in English above the sophomore level, arranged as follows:

Group I Engl 405.

Group II Three credits from Engl 406, 409, 410, 425, 427, 431, 436, 437, 443, 445, 446, 461, 462.

Group III Three credits from Engl 422, 423, 424, 447.

Group IV Six additional credits above the sophomore level, including at least three credits from the 400 level.

Department certification of proficiency in composition is required. (See discussion under major concentration in English.)

Fine Arts. The minor concentration in Fine Arts requires Hum 201, 202 (or Arch 101, 102) and 15 semester credits from the following courses, of which at least 9 must be earned in courses num-

 $^{^1}$ No course in the 100 series is acceptable toward the "Cluster Minor" and not more than two courses in the 200 series.

bered 300 or higher, and no more than 9 in any discipline selected: Art and Architectural History (all courses); Engl 305, 308, 309, 310, 311, 333, 334, 450, 451; Hum 301, 303, 305; LS 190; Mus 151, 152, 205, 206, 210, 251, 252, 305, 306, 311, 315, 316, 362, 365, 421, 422; Visual Studies (all courses).

Geology. A minor concentration in Geology requires 15 semester credits from the following courses: Geol 101, 102, 306, 309, 402, 403, 404, 411, 412.

History. A minor concentration in History requires Hist 101, 102, and 15 additional credits drawn from 300- and 400-level history courses.

Mathematical Sciences. A minor concentration in Mathematical Sciences requires Math 106, 108, 206, and 9 additional credits in mathematics, including at least two of these courses: Comp Sc 205, Math 208, 301; and one 400-level course in mathematics or computer science.

Modern Languages. A minor concentration in Modern Languages requires Fr 205 or Ger 205 or Span 205 plus 15 semester credits in one modern language from courses on the 300- and 400-levels, including at least one course on the 400 level.

Music. A minor concentration in Music requires Mus 151, 152, 205, 206, two credits in ensemble (Mus 361, 362, or 365), and 11 additional credits from these courses: Mus 210, 251, 252, 305, 306, 311, 315, 316, 421, 422. Two additional ensemble credits may be included.

Philosophy. A minor concentration in Philosophy requires six credits from Phil 201, 202, 203, and 15 semester credits from the following courses: Phil 303, 304, 312, 318, 322, 325, 344.

Physics. A minor concentration in Physics requires Phys 122 and 15 additional semester credits in physics, including Phys 221, 222.

Political Science. A minor concentration in Political Science requires Pol Sc 101, 201, and 15 additional semester credits selected from at least three of the fields of political science listed above under the major curriculum for Political Science.

Psychology. A minor concentration in Psychology requires Psych 201, 263 (except for Sociology majors), and 15 semester credits from 300-400 level psychology courses.

Sociology. A minor concentration in Sociology requires Soc 201 or 204 and 15 credits from sociology and rural sociology courses numbered 300 or higher.

Spanish-American Area Studies. A minor concentration in Spanish-American Area Studies requires the equivalent of Span 202, plus 15 semester credits distributed as follows: 6 credits from Hist 340, 341, 342, 440; 6 credits from Span 305, 306, 308, 310, 311; three credits from Agric 301, 401, Econ 410, Pol Sc 475.

Speech and Drama. A minor concentration in Speech and Drama requires Engl 303 and 12 additional credits in speech and drama, including at least one course from each of these groups:

Group I Engl 105, 232, 301, 302, 306, 307, 362, 363.

Group II Engl 305, 308, 309, 310, 311.

APPROVED ELECTIVES FOR STUDENTS IN THE COLLEGE OF LIBERAL ARTS

Class advisers in the College of Liberal Arts will normally approve the following courses as electives, but the Dean of the College of Liberal Arts retains the prerogative of limiting the total number of credits that may be approved in a discipline or area. Accounting (all courses); Aerospace Studies and Military Science (combined maximum of 10 credits); Agricultural Economics 352; Architecture 253; Art and Architectural History (limit of 12 credits); Ceramic Arts 101, 102; Computer Science 205, 321; Economics (all courses); Education (courses required for certification in South Carolina; other courses by special arrangement); Engineering 220; Experimental Statistics 301, 462; Industrial Education 204, 440; Industrial Management 201, 299, 307, 405; Law 312, 313, 322; Management Science 311, 413, 414; Rural Sociology 301; Textile Science 333; and Visual Studies (limit of 9 credits).

All courses offered in the College of Liberal Arts and the College of Sciences may be taken as electives except: Engl 100, 111, Math 100, 115, 116, 215, 216, Phys 460.



COLLEGE OF NURSING

The College of Nursing offers a Baccalaureate and an Associate degree program in nursing. These programs are accredited by the State Board of Nursing of South Carolina and the National League for Nursing. A graduate program leading to the Master of Science in Nursing degree was established in 1974. Application for national accreditation for this program will be made as soon as appropriate. Men and women are admitted to all programs.

The program leading to the Bachelor of Science in Nursing degree is designed to prepare students for the practice of professional nursing in a variety of settings-hospitals, industry, clinics, and public health agencies. The program offers the foundation for graduate study in nursing and an unlimited opportunity for men and women for sound career development in professional nursing. The baccalaureate program is four academic years in length. The student is enrolled in liberal arts and basic science courses during the first two years. These courses are arranged sequentially in order to provide the foundation for professional courses which are planned for the junior and senior years. In addition, advanced liberal arts courses are taken during the junior and senior years. Clinical nursing experiences under the guidance of the College of Nursing faculty will take place with patients in the Greenville Hospital System, Easley Baptist Hospital, Oakmont Nursing Center, Lila Dovle Annex - Oconee Memorial Hospital, Anderson County Head-Start Center, Clemson Day Care Center, Appalachian Health Department, Districts I and II, and with local public health agencies.

The program leading to the Associate in Arts in Nursing degree is designed to prepare the student at the technical level of nursing for direct patient-centered nursing under supervision in hospitals and other institutional health centers. The associate degree program may be completed in two academic years. This technical background is balanced by courses in the biological and social sciences and the humanities. Clinical learning experiences planned as an integral part of the program, under the guidance of the College of Nursing faculty, take place with patients in the Anderson Memorial Hospital. In addition, learning experiences are planned at the Anderson County Public Health District, Anderson-Oconee-Pickens Mental Health Center, Self Memorial Hospital, Beckman Mental Health Center in Greenwood, and physicians' offices.

Students enrolled in the College of Nursing must meet the course requirements in the sequence as described for each program in order to qualify for the degree and for licensure to practice nursing. All students enrolled in the College of Nursing are required to

achieve a grade of C in each nursing course attempted and demonstrate satisfactory performance in the clinical laboratory to be eligible for the succeeding nursing courses.

BACHELOR OF SCIENCE IN NUBSING

FRESHMAN YEAR

First Semester

BIOL 103 General Biology I 2 3 (3,0) BIOL 105 General Biology Lab. I2 1 (0,3) CH 101 General Chemistry 4 (3,3) ENGL 101 English Composition 3 (3,0) MATH 101 Finite Probability 3 (3,0) NURS 100 Orientation 1 (1,0)	BIOL 104 General Biology II 2 . 3 $(3,0)$ BIOL 106 Gen. Biology Lab. II 2 1 $(0,3)$ CH 102 General Chemistry 4 $(3,3)$ ENGL 102 English Composition 3 $(3,0)$ MATH 102 Intro. to Math. Anal. 3 $(3,0)$ History Elective
15	17

SOPHOMORE YEAR

BIOCH 210 Elem. Biochemistry. 4 (3, MICRO 305 General Microbiology 4 (3,	
PSYCH 201 General Psychology 3 (3, ZOOL 220 Human Anatomy and	0) Relations
Physiology I	(3) PSYCH 321 Develop. Psychology . 3 (3,0)
18	ZOOL 221 Human Anatomy and Physiology II
10	17

IUNIOR YEAR

NURS 309 Human Values in Nurs. 3 (3,0) NURS 310 Perspectives in
NURS 311 Nursing During Altera-	
tions in Life Patterns 5 (2,9) NURS 312 Nursing of Acute
NURS 313 Promotion of Health. 3 (2,3)	
NUTR 451 Human Nutrition 3 (3,0	
SOC 202 Social Problems 3 (3.0	
500 202 Social Hobienis 5 (5,0	Elective
17	Elective
14	17

SENIOR YEAR

NURS 413 Complex Nursing Intervention I4 (1,9)NURS 419 Multiproblem Family . 3 (2,3) NURS 421 Hist. and Phil. of Nurs. 3 (3,0) Elective 43Elective 53	NURS 414 Complex Nursing Intervention II4 (2,6)NURS 422 Cur, Research in Nurs. 3 (3,0)PSYCH 302 Social Psychology 3 (3,0)Nursing Elective 64 (2,6)Elective 53
16	17

134 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Biol 110 and 111 may be taken in lieu of Biol 103, 104, 105, 106. (See Course Description section.)

Description section.) ³ Soc 309 may be taken in lieu of Soc 311. ⁴ Electives to be selected from the following: Humanities, literature, music, philosophy, religion; courses must be numbered 201 and above. ⁵ Select free electives from courses numbered 201 and above. ⁶ Select from the following: Nurs 426, 431, 432, 434, 435, 436, 437, 438, 439.

Notes:

1. Nurs 207 and 209 are open to students enrolled in the Baccalaureate program only. These courses are offered first summer session for incoming special students with permis-

These courses are offered first summer session for incoming special students with permission of the Dean of the College of Nursing.
2. A grade of C is required in all nursing courses.
3. The physical, biological, and social sciences and mathematics courses scheduled for the freshman and sophomore years are prerequisite to nursing courses numbered 300 and above. A grade of C or above is required in each biological science course (Bioch 210, Micro 305, Zool 220, 221) scheduled for the sophomore year as described in the curriculum plan of the Baccalaureate degree program.
4. A minimum grade-point ratio of 2.0 is required for registration in nursing courses numbered 300 and above.

Second Semester

ASSOCIATE IN ARTS IN NURSING

First Semester

FIRST YEAR

Second Semester

ENGL 101 English Composition 3 (3,0) NURS 103 Nursing I 6 (3,9) PSYCH 201 Gen. Psychology 3 (3,0) ZOOL 110 Integrated Science I 4 (3,3)	ENGL 102 English Composition. 3 (3,0) NURS 104 Nursing II
16	16

SECOND YEAR

NURS 205 Nursing III7(3,12)SOC 201 Sociological Perspective.3 (3,0)Elective 16	NURS 204 Trends in Nursing 3 (3,0) NURS 206 Nursing IV 11(6,15) SOC 433 Sociology of Aging 3 (3,0)
16	17
	65 Total Semester Hours

1 Consult catalog or adviser for electives. Note: A minimum grade of C is required for Nurs 103-204 for continuance in the Associate in Arts program.



COLLEGE OF SCIENCES

The College of Sciences, attuned to the times and its needs, offers nine major curricula leading to the degree of Bachelor of Science. These are Biochemistry, Botany, Chemistry, Geology, Mathematical Sciences, Medical Technology, Microbiology, Physics, and Zoology,

In addition, the Bachelor of Arts degree is offered with a major emphasis in either Chemistry, Geology, Mathematical Sciences, or Physics.

Not only are the departments in the College of Sciences concerned with their own programs, but they work closely with the other academic departments in the University. This interweaving of the physical, mathematical and biological sciences with other disciplines, such as economics, engineering, management and others allows a student great flexibility and responsibility in designing his own program.

BACHELOR OF ARTS CURRICULA

The curricula leading to the Bachelor of Arts degree are designed to meet the needs of those students who desire a broad general education. The first two years are spent in introductory work in various areas in order to give the student breadth of view. This type of background enables the student to take a more intelligent part in the selection of his major and minor fields of concentration. The major areas in the College of Sciences are Chemistry, Geology, Mathematical Sciences, and Physics.

There are a great number of choices in the minor area from the different academic departments in the University. Thus, a student has a larger degree of flexibility and responsibility in designing his curriculum in the Bachelor of Arts program. The minor fields are as follows:

Accounting	Mathematical Sciences
Biochemistry	Microbiology
Botany	Modern Languages
Chemistry	Philosophy
"Cluster Minor"	Physics
Economics	Political Science
English	Psychology
Fine Arts	Sociology
Geology	Zoology
History	0.

Note: No curriculum in the College of Sciences leading to the Bachelor of Arts degree will allow credit for either Engl 100 or Math 100 to be used to satisfy requirements for graduation.

142 Degrees and Curricula

The major concentration requires 24 semester hours, and the minor 15 semester hours above the sophomore level unless otherwise indicated. These fit into the basic curriculum for the three upper-class years with minor variations depending on the specific major or minor selected. Consequently, a student not positive of his major or minor field has the advantage of making his decision while in the curriculum with a minimum loss of credit.

MAJOR FIELDS OF CONCENTRATION

BASIC FRESHMAN YEAR FOR CHEMISTRY AND GEOLOGY PROGRAMS

For the Bachelor of Arts degree, Chemistry requires 130 semester hours, and Geology requires 128 semester hours.

First Semester

Second Semester

CH 101 General Chemistry 4 (3,3) ENGL 101 English Composition 3 (3,0) MATH 106 Cal. of One Var. I 4 (4,0) Modern Language	CH 112 General Chemistry 1 4 (3,3) ENGL 102 English Composition . 3 (3,0) MATH 108 Cal. of One Var. II 4 (4,0) Modern Language 4 (3,1)
	—
15	15

1 Geology majors may substitute Ch 102.

CHEMISTRY

SOPHOMORE YEAR

First Semester

Second Semester

CH 223 Organic Chemistry 2 3 (3,0) CH 227 Organic Chemistry Lab. 1 (0,3) MATH 206 Calculus of Sev. Var. 4 (4,0) PHYS 122 Phys. with Cal. 1 3 (2,2) Literature Requirement 1 3 (3,0) Modern Language	CH 224 Organic Chemistry 2 3 (3,0) CH 228 Organic Chemistry Lab. 1 (0,3) HIST 172 Western Civilization 3 (3,0) PHYS 221 Phys. with Cal. II 3 (2,2) Literature Requirement 1 3 (3,0) Modern Language

JUNIOR YEAR

Chemistry Elective 4	Chemistry Elective 4 Minor 6 Elective 6 16
----------------------	--

SENIOR YEAR

Chemistry Elective	3	Chemistry Elective	3
Ī	7	130 Total Semester Hours	:

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Ch 223, 224 will count toward the 24 hours of the Chemistry major.

GEOLOGY

See page 142 for Freshman Year.

SOPHOMORE YEAR

First Semester	Second Semester
GEOL 101 Physical Geology 4 (3,2) MATH 206 Calculus of Sev. Var. 4 (4,0) Modern Language 3 (3,0) Literature Requirement 1 3 (3,0) Elective 3	GEOL 102 Historical Geology
17	17
JUNIOI	YEAR
GEOL 306 Mineralogy 3 (2,3) HIST 173 Western Civilization 3 (3,0) Geology Elective 3 Humanities Elective 3 Minor 3 Elective 3 18 18	GEOL 309 Petrology 3 (2,3) Geology Elective 3 Humanities Elective 3 Minor 3 Elective 4 16
SENIO	YEAR

GEOL 402 Structural Geology ... 3 (2,2) GEOL 404 Economic Geology ... 3 (3,0) Geology Elective 3 Geology Elective 3 Minor 3 Social Science Elective 3 Elective 3 6 15 15 128 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209,

MATHEMATICAL SCIENCES

Minor Natural Science

Social Science I Elective

For a major concentration a recommended program of study is shown below, with 130 semester hours required for graduation.

FRESHMAN YEAR

Second Semester **First Semester** 17 17

SOPHOMORE YEAR

MATH 206 Calculus of Sev. Var. 4 (4,0)MATH 301 Stat. Theory and Meth. I 3 (3,0)Literature Requirement 1 3 (3,0)Modern Language 3 (3,0)Elective 2 3	ECON 200 Economic Concepts3 (3,0)MATH 208 Engineering Math. I.4 (4,0)MATH 411 Linear Algebra3 (3,0)Literature Requirement 13 (3,0)Elective 23			
10	10			
16	16			
JUNIOR YEAR				
MATH 350 Intro. to Math. Models 3 (3,0) Minor	MUS 210 Music Appreciation 3 (3,0) or AAH 303 Evol. of Vis. Arts I 3 (3,0)			

o. to Math. Models 3 (3,0)	MUS 210 Music Appreciation
	or AAH 303 Evol. of Vis. Arts I
Elective 2 4	Mathematics Elective 2
Elective 2 3	Minor
	Natural Science Elective 2
	Social Science Elective 2
16	

16

3343

	SERIOR	LAN		
MATH 412 Intro. to Mod. Algebra or MATH 419 Discrete Math. Structures I MATH 453 Adv. Calculus I or MATH 463 Math. Analysis I Minor Elective	3 (3,0) 3 (3,0) 3 (3,0) 6	MATH 454 Adv. Calculus II or MATH 464 Math. Analysis I Humanities 2 Mathematics Elective 2 Minor Elective 2 130 Total Semester Hours	[3] 3 3 3	

SENIOR VEAR

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Electives must be approved by adviser.

PHYSICS

For a major concentration a recommended program of study is shown below, with 128 semester hours required for graduation.

The B.A. in Physics program is ideal for students interested in acquiring a broad-based liberal education that includes a strong and solid understanding of science.

FRESHMAN YEAR

First Semester

Second Semester H 112 General Chemistry 4

CH 101 General Chemistry 4 (3,	3) CH 112 General Chemistry 4 (3,3)
ENGL 101 English Composition. 3 (3,6	D) ENGL 102 English Composition. 3 (3,0)
HIST 172 Western Civilization 3 (3,0)) HIST 173 Western Civilization 3 (3,0)
MATH 106 Cal. of One Var. I . 4 (4,0)) MATH 108 Cal. of One Var. II . 4 (4,0)
PHYS 101 Current Topics in	PHYS 122 Phys. with Cal. I 3 (2,2)
Modern Physics 1 (0,5	2) —
	17
15	

SOPHOMORE YEAR

DOLLOUINO	
MATH 206 Calculus of Sev. Var. 4 (4,0) PHYS 221 Phys. with Cal. II 3 (2,2) PHYS 223 Physics Lab. I 1 (0,3) Literature Requirement 1 3 (3,0) Modern Language 4 (3,1) Elective 1 16 16	MATH 208 Engineering Math. I. 4 (4,0) PHYS 222 Phys. with Cal. III 3 (2,2) PHYS 224 Physics Lab. II 1 (0,3) Literature Requirement 1 3 (3,0) Modern Language 4 (3,1) Elective

JUNIOR YEAR

PHYS 321 Mechanics I 3 (3,0) Humanities 3 3 3 Minor 3 3 3 Modern Language 3 (3,0) 3 Elective 3 3 3	PHYS 322 Mechanics II 3 (3,0) PHYS 340 Elec. and Magnetism I 3 (3,0) Humanities Minor 3 Modern Language 3 (3,0)
15	15

SENIOR YEAR

PHYS 455 Quantum Physics I 3 (3,0) Minor 6 Physics Elective 4 Social Science Elective 3	Minor 3 Physics Elective 4 Social Science Elective 3 Elective 6
16	128 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. Note: For a major or minor concentration in Physics, Phys 221 and 222 will count.

MINOR CONCENTRATIONS

Accounting, A minor concentration in Accounting requires Acct 201, 202, 301, 302, and six additional credits in accounting courses numbered higher than 201.

Chemistry. A minor concentration in Chemistry requires Ch 101. 112, and 15 additional credits in chemistry, the courses to be selected in consultation with the Department of Chemistry.

"Cluster Minor." This minor concentration should consist of 15 semester credits in courses numbered higher than 300 (with some exceptions). The subject area of the major should be excluded from the grouping in the minor. The groups available in the "Cluster Minor" are as follows:

Group I Social Sciences¹ Economics, History, Political Science, Psychology, Sociology

Philosophy and Religion Group II

Group III Fine Arts²

AAH 315, 316; Engl 305, 308, 310, 311, 333; Mus 151, 152, 205, 206, 210, 251, 252, 305, 306, 311, 315, 316, 362, 365, 421, 422; Vis 203, 205, 207, 209, 211, 213, 215, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416

Group IV Administration ¹ Accounting, Finance, Economics, Industrial Management. Law

Group VI Physical Sciences⁴ Astronomy, Chemistry, Geology, Mathematical Sciences, Physics

Economics. The recommended program of study consists of Econ 201, 202, and 15 semester hours selected from the following (including 314 and 407): Econ 301, 302, 305, 306, 308, 309, 314, 403, 404, 407, 410, 412, 420, 421, 422, 424; Ag Ec 456; Ex St 462; IM 404, 405, 406; Mgt Sc 311.

English. The recommended program of study includes the required courses for the Bachelor of Arts curriculum and 15 semester hours of English, arranged as follows:

Group V Life Sciences³ Biochemistry, Botany, Genetics, Microbiology, Zoology

¹ At least two courses must be taken in each subject chosen. ² Of the courses chosen, nine credits must be taken in courses numbered 300 or higher. ³ No course in the 100 series is applicable and not more than two courses in the 200 series.

⁴ No course in the 100 series is applicable, and not more than two courses may be taken in each subject chosen.

- Group I Engl 405 and either 422, 423, or 424.
- Group II One of these courses: Engl 402, 404, 409, 410, 413, 416, 424, 425, 427, 431, 437, 438, 439, 443, 445, 446, 461, 462.
- Group III Six additional semester credits from English courses numbered higher than 400.

Engl 304, Advanced Composition, or departmental certification of proficiency in composition is required.

Fine Arts. The minor concentration in Fine Arts consists of Hum 201, 202 or Arch 101, 102, and 15 semester credits from the following courses, of which at least 9 must be earned in courses numbered 300 or higher, and no more than 9 in any discipline selected: AAH 315, 316; Engl 305, 308, 310, 311, 333; Mus 151, 152, 205, 206, 210, 251, 252, 305, 306, 311, 315, 316, 362, 365, 421, 422; Visual Studies (all courses).

Geology. A minor concentration requires 15 semester hours from the following courses: Geol 306, 309, 310, 313, 402, 403, 404, 405, 407, 408, 411.

History. The recommended program of study consists of 15 semester hours drawn from 300- and 400-level history courses.

Mathematical Sciences. A minor concentration in Mathematical Sciences requires Math 106, 108, 206, and 9 additional credits in mathematics. These additional credits should include at least two of the following courses: Comp Sc 205, Math 208, 301; and one 400-level course in mathematics or computer science.

Modern Languages. A minor concentration in Modern Languages requires 15 semester credits in one modern language from courses numbered higher than 300, including at least one course on the 400 level.

Philosophy. The recommended program of study consists of 15 semester hours of coursework beyond Phil 201, 202—drawn from Phil 203, 303, 304, 312, 318, 322, 344.

Physics. A minor concentration in Physics requires Phys 122 and 15 additional semester credits in physics, including Phys 221, 222.

Political Science. The recommended program of study consists of 15 semester hours beyond Pol Sc 101 and 201 in courses drawn from at least three of the following fields:

- 1. American Government-Pol Sc 302, 403, 409
- 2. Comparative Governments—Pol Sc 371, 372
- 3. International Relations—Pol Sc 361, 462, 463, 464
- 4. Political Behavior-Pol Sc 341, 433, 442

- 5. Political Thought-Pol Sc 351, 352
- 6. Public Administration—Pol Sc 321
- 7. Public Law-Pol Sc 432, 433

Psychology. A minor concentration in Psychology requires Psych 201, 263, and 15 semester credits from the following courses: Comp Sc 205, Psych 301, 302, 303, 305, 321, 323, 341, 361, 363, 402, 411, 425, 442, 471, 475, 482, 490, 493, 494, 497, 499.

Sociology. A minor concentration in Sociology requires 15 semester hours beyond Soc 201, 202 to be selected from the following courses: RS 359, 401, Soc 309, 311, 321, 322, 324, 331, 341, 343, 351, 361, 381, 391, 393, 421, 431, 433, 441, 451, 481, 490, 499.

BACHELOR OF SCIENCE CURRICULA

BIOCHEMISTRY

Biochemistry is the study of the molecular basis of life. In order to comprehend the current biochemical information and to make future contributions to our molecular understanding of life processes, the student must obtain a broad background in biology and a firm foundation in chemistry, mathematics, and physics; the biochemistry curriculum is built upon this concept.

The program provides an excellent educational background for professional school (e.g., medicine, dentistry, or veterinary medicine) and graduate school in biochemistry or another biological science discipline.

The graduate will find employment opportunities in the research and service programs of universities, medical schools, hospitals, research institutes, and industrial and government laboratories.

FRESHMAN YEAR

First Semester

Second Semester

BIOL 110 Prin. of Biology I 5 $(4,3)$ CH 101 General Chemistry 4 $(3,3)$ ENGL 101 English Composition. 3 $(3,0)$ MATH 106 Cal. of One Var. I . 4 $(4,0)$	BIOL 111 Prin. of Biology II \ldots 5 (4,3) CH 112 General Chemistry \ldots 4 (3,3) ENGL 102 English Composition. 3 (3,0) MATH 108 Cal. of One Var. II . 4 (4,0)
_	
16	16

SOPHOMORE YEAR

177	CH 223 Organic Chemistry	BIOCH 301 Molecular Biology 3 (3,0) CH 224 Organic Chemistry 3 (3,0) CH 228 Organic Chemistry Lab. 1 (0,3) PHYS 221 Phys. with Cal. II 3 (2,2) PHYS 223 Physics Lab. I 1 (0,3) Literature Requirement 1 3 (3,0) Approved Elective 2 3
17	17	17

Note: No curriculum in the College of Sciences leading to the Bachelor of Science degree will allow credit for either Engl 100 or Math 100 to be used to satisfy the requirements for graduation.

CH 313 Quantitative Analysis ... 3 CH 317 Quantitative Anal. Lab... 1 CH 331 Physical Chemistry3 CH 339 Physical Chemistry Lab... 1 PHYS 222 Phys. with Cal. III ... 3 (3,0)(0,3)(3,0)(0,3)CH 332 Physical Chemistry 3 (3,0) CH 340 Physical Chemistry Lab. . 1 (0,3) MICRO 305 General Microbiology 4 (3,3) Approved Elective 2 Science Elective 3 6 (2.2)š š š 17 17 SENIOR YEAR BIOCH 422 Phys. Approach to 3 (3,0) 1 (0,3) 3 (0,9) Bioch. BIOCH 425 Gen. Biochemistry Lab. 1 BIOCH 491 Spec. Prob. in Bioch.. 3 or BIOCH 491 Spec. Prob. in or Science Elective 3 ENGL 301 Public Speaking 3 Δ Bioch. 3 Approved Elective 210 (0,9)3 (3.0)Approved Elective 2 6 18 - 1716 - 17

134 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² At least 18 hours must be elected from the humanities and/or social sciences. A oneyear sequence from the following is strongly recommended: Ger 101, 102; Fr 101, 102; Russ 101, 102.

³ An approved elective to be selected from botany, chemistry, computer science, genetics, mathematics, microbiology, physics, plant pathology, or zoology. At least one semester of Bioch 491 is required.

BOTANY

Botany is a diversified subject area that seeks to explain the many aspects of plant life—as it is today, as it was yesterday, and as it will be tomorrow. Areas explored by botanists range from highly theoretical experimentation to direct utilization of knowledge in order to solve problems such as the enhancement of food supplies, maintenance and improvement of human health, and conservation of nature's beauty. Studies in botany extend from consideration of minute molecular and subcellular activities to descriptions of structure, function, and action of whole plants and to evaluations of how plants are associated with the operation of the entire planet.

Because of the breadth of the subject, a variety of different job expectations and interests may be found among students majoring in Botany. For this reason, the Botany curriculum consists of three options which provide appropriate avenues for students seeking different types of careers in plant biology. Options fall into two programs: (1) Pregraduate School program which meets the needs of students wishing to pursue advanced degrees and (2) Prevocational program for students planning to begin career vocations immediately upon completion of the bachelor's degree.

JUNIOR YEAR

BOTANY — PREGRADUATE SCHOOL MOLECULAR AND ORGANISMAL OPTIONS

The Pregraduate School program provides two options: (1) Organismal option which emphasizes the biology of plants and prepares students for graduate study in the descriptive or empirical aspects of botany; and (2) Molecular option which stresses experiences in physical and mathematical sciences, in addition to a core of botanical courses, and prepares students to undertake graduate study in molecular and physiological botany.

FRESHMAN YEAR

First Semester

Second Semester

BIOL 110 Prin. of Biology I 5 (4,3) CH 101 General Chemistry 4 (3,3) ENGL 101 English Composition. 3 (3,0) MATH 106 Cal. of One Var. I 4 (4,0) Elective 1	BIOL 111 Prin. of Biology II 5 (4,3) CH 112 General Chemistry 4 (3,3) ENGL 102 English Composition 3 (3,0) Mathematics Requirement 23-4 Elective 1
17	16-17

SOPHOMORE YEAR

BOT 201 Field Botany	BOT 202 Survey of Plant Kingdom 4 (3,3) CH 224 Organic Chemistry
17-18	

1 See Molecular or Organismal Option.

² Mathematics Requirement. For Molecular Option Math 108 and one of the following: Comp Sc 205, 210, Math 206, 301; for Organismal Option two of the following: Comp Sc 205, Math 108, 301, 405.

BOTANY — PREGRADUATE SCHOOL MOLECULAR OPTION

JUNIOR YEAR

First Semester

BOT 331 Intro. Plant Taxonomy . 3 (2,3) BOT 451 Plant Anatomy 4 (3,3) PHYS 122 Phys. with Cal. 1 3 (2,2) Elective 1	BOT 42 MICRO PHYS 2 PHYS 2 Flective
17	Elective

Second Semester

BOT 421 Plant Physiology MICRO 305 General Microbiology PHYS 221 Phys. with Cal. II PHYS 223 Physics Lab. I Elective	$\frac{4}{3}$	(3,3) (2,2)
	17	

SENIOR YEAR

BIOCH 423 Prin. of Biochemistry . BIOCH 425 Gen. Biochemistry Lab. BOT 441 Plant Ecology GEN 302 Genetics PHYS 222 Phys. with Cal. III PHYS 224 Physics Lab. II	$ \begin{array}{c} 1 & (0,3) \\ 3 & (2,3) \\ 4 & (3,3) \\ 3 & (2,2) \end{array} $	BIOCH 424 Prin. of Biochemistry 3 (3,0) BIOCH 426 Gen. Biochemistry Lab. 1 (0,3) Botany Elective 6 Elective 1 7
	15	

132-134 Total Semester Hours

¹ Electives: A minimum of six hours from two subject areas of social sciences (economics, political science, psychology, sociology); a minimum of nine hours from at least two subject areas of the humanities (literature and English, modern languages, humanities, art, music, philosophy, religion); a minimum of eight hours from courses related to the option and approved by the student's adviser.

BOTANY --- PREGRADUATE SCHOOL ORGANISMAL OPTION

JUNIOR YEAR

First Semester	Second Semester
BOT 331 Intro. Plant Taxonomy . 3 (2,3) BOT 451 Plant Anatomy 4 (3,3) PHYS 207 General Physics I 4 (3,2) Elective 1 6	BOT 421 Plant Physiology4 (3,3)MICRO 305 General Microbiology4 (3,3)PHYS 208 General Physics II4 (3,2)Elective4
17	16
SENIOR	YEAR
BOT 441 Plant Ecology 3 (2,3) GEN 302 Genetics 4 (3,3)	Botany Elective
Botany Elective 3 Elective 1 7	16
17	
	132-134 Total Semester Hours

1 Electives: A minimum of nine hours from at least two subject areas of the social sciences; a minimum of twelve hours from at least two subject areas of the humanities; a minimum of ten hours from courses related to the option and approved by the student's adviser

BOTANY-PREVOCATIONAL

The Prevocational program is structured to furnish some employment advantages upon graduation. The core of the program provides a foundation in botany, a solid introduction to other sciences and liberal arts; and just as important, it provides a flexibility through free electives that allows students to develop in peripheral areas of interest or areas necessited for specialized employment. Among the courses appropriate for electives are those from areas of applied plant sciences, business, recreation, forestry, environment, and those in education required for South Carolina certification in secondary education. Students completing the Prevocational program should find employment opportunities as teachers, in the many facets of research, production, and sales and services connected with agriculture and other plant-oriented industries. In addition, persons knowledgeable of plants and plant biology may find job opportunities with one of the many private or governmental agencies associated with environmental health, monitoring and control, land management and land-use planning, or in various aspects of conservation, beautification, and preservation of natural and modified landscapes, or in a variety of positions related to outdoor recreation.

FRESHMAN YEAR

First Semester

BIOL 110 Prin. of Biology I CH 101 General Chemistry ENCL 101 English Composition MATH 101 Finite Probability Elective	4 3 3	(3,3) (3,0)
-	-	

Second Semester

BIOL 111 Prin. of Biology II CH 102 General Chemistry ENGL 102 English Composition MATH 203 Elem. Stat. Inference Elective	4 3 3	(3,3) (3,0)
-	17	

SOPHOMORE YEAR

0011101110		
BIOCH 210 Elem. Biochemistry 4 (3,3) BOT 201 Field Botany	BOT 202 Survey of Plant Kingdom 4 (3,3) PHYS 208 General Physics II 4 (3,2) ZOOL 201 Invertebrate Zoology . 4 (3,3) or ZOOL 202 Vertebrate Zoology 4 (3,3) Elective 1	
JUNIOF	R YEAR	
BOT 331 Intro. Plant Taxonomy. 3 (2,3) BOT 451 Plant Anatomy 4 (3,3) Elective 1 9 16	BOT 421 Plant Physiology 4 (3,3) MICRO 305 General Microbiology 4 (3,3) Zoology Elective 3 Elective 1 6 17	
SENIOR YEAR		
BOT 441 Plant Ecology 3 (2,3) GEN 302 Genetics 4 (3,3) Elective 1 10 17 17	Botany Elective 6 Elective 1 10 16	
	132 Total Semester Hours	

1 Electives: A minimum of 12 hours from at least two subject areas of the social sciences; a minimum of 12 hours from at least two subject areas of the humanities; a minimum of 15 hours from courses related to anticipated vocation and subject to approval by the student's adviser.

CHEMISTRY

Chemistry, an experimental discipline based on observation guided by molecular theory, is of fundamental importance in much of modern science and technology. Its molecular concepts form the basis for ideas about complex material behavior. Due to the fundamental nature and extensive application of chemistry, an unusually large variety of challenging opportunities to contribute in the scienceoriented community are open to the student whose education is built around the principles of this discipline.

The curriculum, through the career requirement options and the large number of electives, provides each student an opportunity to select a coherent program of study beyond the basic courses suited to his or her needs. Career requirement options are provided for students anticipating graduate study in chemistry or related fields; employment following the B.S. degree in laboratory, production, technical sales or management positions; professional studies (e.g., medicine); chemical physics; geochemistry; and employment in fields requiring extensive preparation in courses other than sciences (e.g., patent law and technical writing). Significant features of the curriculum are the student's extensive participation in experimental work and the opportunity to take part in a research investigation during the junior and senior years.

FRESHMAN YEAR

First Semester

Second Semester

CH 101 General Chemistry 4 COMP SC 205 Elem. Comp. Prog. 3 ENGL 101 English Composition. 3 GER 101 Elementary German 2. 4 MATH 106 Cal. of One Var. I 4	(3,0) (3,0) (3,1)	CH 112 General Chemistry 4 $(3,3)$ ENGL 102 English Composition. 3 $(3,0)$ GER 102 Elementary German 2 . 4 $(3,1)$ MATH 108 Cal. of One Var. II . 4 $(4,0)$ PHYS 122 Phys. with Cal. I 3 $(2,2)$
_		
18		18

SOPHOMORE YEAR

0 OT A OT		
CH 223 Organic Chemistry 3 $(3,0)$ CH 225 Organic Chemistry Lab., 2 $(0,6)$ MATH 206 Calculus of Sev. Var. 4 $(4,0)$ PHYS 221 Phys. with Cal. II 3 $(2,2)$ PHYS 223 Physics Lab. I 1 $(0,3)$ Literature Requirement 1 3 $(3,0)$	CH 224 Organic Chemistry 3 (3,0) CH 226 Organic Chemistry Lab. 2 (0,6) MATH 208 Engineering Math. I. 4 (4,0) PHYS 222 Phys. with Cal. III 3 (2,2) PHYS 224 Physics Lab. II 1 (0,3) Literature Requirement 1 3 (3,0)	
10	10	
16	16	
JUNIOR YEAR		
CH 313 Quantitative Analysis 3 (3,0)	CH 332 Physical Chemistry 3 (3,0)	

CH 313 Quantitative Analysis 3 (3,0) CH 315 Quantitative Anal. Lab 2 (0,6) CH 331 Physical Chemistry 3 (3,0) CH 339 Physical Chemistry Lab. 1 (0,3)	CH 332 Physical Chemistry 3 (3,0) CH 340 Physical Chemistry Lab. 1 (0,3) CH 411 Instrumental Analysis 4 (2,6) Elective 3
Elective 3	
	10
	10
16	

SENIOR YEAR

CH 402 Inorganic Chemistry Career Requirements 4 Elective 3	6	Career Requirements 4 4 Elective 11 15
		130 Total Semester Hours

1 To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. 2 Students planning to take biology courses register for Biol 103, 104, 105, 106 in the freshman year and delay Ger 101, 102 until the junior year. 3 At least six hours must be in humanities and/or social sciences. 4 A minimum of ten hours to be selected from advanced science, engineering, and mathe-matics courses. (See adviser.)

GEOLOGY

Geology is a relatively young science. The word itself is only about 200 years old. It means the science of the earth. Such a science must be involved with the physics and chemistry of materials which comprise the earth, but equally important it must consider the development of life on earth. Fundamentally, the chemical, physical and biological responses to various environments on and in the earth must be thoroughly understood so that the historical development of the earth may be deduced, predictions of the future inferred, and natural resources intelligently developed.

Industry in our modern civilization is dependent on minerals and rocks. Metals have their origin in them as do our chief power sources, coal, petroleum, and radioactive minerals. The power and wealth of nations depend largely on their exploration, control and development of mineral wealth.

Second Semester

Geologists today are entering upon a new era. Widening horizons are indicated by employment not only in mineral-producing industries but by railroads, municipalities, engineering firms, and water authorities. For this reason, it is important that the geologist's education rest on a broad vet rigorous base.

This curriculum provides the student with the fundamentals in the geological sciences and excellent support in the other basic sciences. On successful completion of the Bachelor of Science program the student should be adequately prepared for employment or for graduate study in any field of geology.

FRESHMAN YEAR

First Semester

	o o o o o o o o o o o o o o o o o o o
CH 101 General Chemistry 4 (3,3) ENGL 101 English Composition 3 (3,0) MATH 106 Cal. of One Var, I 4 (4,0) Modern Language 2 4 (3,1)	CH 102 or 112 General Chemistry 4 (3,3) ENGL 102 English Composition . 3 (3,0) MATH 108 Cal. of One Var. II . 4 (4,0) Modem Language 2
15	15

SOPHOMORE YEAR

GEOL 101 Physical Geology 4 (3,2) HIST 172 Western Civilization 3 (3,0) MATH 206 Calculus of Sev. Var. 4 (4,0) Literature Requirement 1 3 (3,0) Modern Language 2 3 (3,0)	GEOL 102 Historical Geology 4 (3,3) HIST 173 Western Civilization 3 (3,0) PHYS 122 Phys. with Cal. I 3 (2,2) Literature Requirement 1 3 (3,0) Modern Language 2 3 (3,0)
17	16

JUNIOR YEAR

Summer Geology Course 4 6

SENIOR YEAR

GEOL 402 Structural Geology 3 (2,2) GEOL 403 Invert. Paleontology 3 (2,3) GEOL 411 Research Problems 1 (0,3)	GEOL 310 Optical Mineralogy 3 (1,4) GEOL 404 Economic Geology 3 (3,0) Elective10
Elective 3	10
17	10
	134 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² German or French is recommended. Two years in the same language are required. ³ At least 12 hours must be elected from the humanities and/or social sciences. ⁴ Clemson University does not conduct a field course in geology, but attendance at a course approved by the geology staff is required.

MATHEMATICAL SCIENCES

The Mathematical Sciences curriculum, carefully designed to possess a high degree of versatility, equips the student with the knowledge of mathematical concepts and methods that are applicable in the areas of physics, computer science, communication theory, data processing, statistics, operations research, economics, or any branch of the physical sciences in which a strong mathematical background is desired. In addition to containing the basic courses which provide the student with the mathematical skills necessary in the use of mathematics as it relates to other fields of knowledge, the curriculum allows the student in his junior year to select one of nine optional sets of courses, providing an introduction to an area where mathematics is applied. These options are Actuarial Science, Biology, Chemistry, Computer Science, Managerial Science, Operations Research, Physics, Psychology, and Statistics.

In addition to the overall goal of preparing the student to cope with the dynamics of any mathematical environment, the curriculum seeks to provide an adequate background for the student who plans to pursue graduate study in mathematics or to fill many interesting positions in space research, computer development, business, or government research. Those electing the Biology option will have the necessary preparation for entering medical school.

FRESHMAN YEAR

First Semester

Second Semester

CH 101 General Chemistry 4 (3,3)	CH 102 General Chemistry 4 (3,3)
COMP SC 205 Elem. Comp. Prog. 3 (3,0)	ECON 200 Economic Concepts 2 . 3 (3,0)
ENGL 101 English Composition 3 (3,0)	ENGL 102 English Composition . 3 (3,0)
HIST 172 or 173 West. Civ.2 3 (3,0)	MATH 108 Cal. of One Var. II . 4 (4,0)
MATH 106 Cal. of One Var. I 4 (4,0)	Elective 3
17	17

SOPHOMORE YEAR

MATH 206 Calculus of Sev. Var. 4 $(4,0)$ MATH 301 Stat. Theory and Meth. I 3 $(3,0)$ PHYS 122 Phys. with Cal. I 3 $(2,2)$ Literature Requirement 1 3 $(3,0)$	MATH 208 Engineering Math. I. 4 (4,0) MATH 411 Linear Algebra 3 (3,0) Literature Requirement 1 3 (3,0) Elective 3 6
Elective 3 3	
_	16
16	

JUNIOR YEAR

MATH 350 Intro. to Math. Models 3 (3,0) MATH 453 Advanced Calculus I. 3 (3,0) or MATH 463 Math. Analysis I 3 (3,0) Modern Language Modern Language 4 (3,1) Option 3 4 3	MATH 402 Theory of Probability 3 (3,0)MATH 454 Advanced Calculus II 3 (3,0)or MATH 464 Math. Analysis II 3 (3,0)Modern Language4 (3,1)Option3Elective3
16	16

SENIOR	TEAN
ENGL 301 Public Speaking3 (3,0)MATH 412 Intro. to Mod. Algebra 3 (3,0)or MATH 419 Discrete Math.Structures I3 (3,0)Mathematics Elective 43 (3,0)Option3Elective4	Mathematics Elective 3 3 Option 3 3 Elective 3 10 10 16 16 16
16	130 Total Semester Hours
OPTIONS	
Chemistry 3 (3,0) CH 331 Physical Chemistry 3 (3,0) CH 332 Physical Chemistry 3 (3,0) CH 339 Physical Chemistry Lab. 1 (0,3) 1 (0,3) CH 340 Physical Chemistry Lab. 1 (0,3) 1 (0,3) CH 402 Inorganic Chemistry 3 (3,0) 3 (3,0) CH 405 Spectroscopy and Mol. 3 (3,0) Struc. 3 (3,0)	Statistics MATH 404 Intro. to Stoch. Proc. 3 (3,0) MATH 405 Statistical Theory and Methods II 3 (3,0) MATH 409 Statistical Theory and Methods III 3 (3,0) MATH 471 Applied Statistical Decision Theory 3 (3,0)
14	12
Managerial Science 5 IM 402 Oper. Plan. and Control . 3 (3,0) IM 404 Managerial Economics 3 (3,0) or IM 418 Mgt. Inform. Sys 3 (3,0) MATH 404 Intro. to Stoch. Proc. 3 (3,0) MATH 452 Linear Programming . 3 (3,0) 12	Operations Research COMP SC 409 Introduction to Numerical Analysis I
Physics 6 PHYS 321 Mechanics I 3 (3,0) PHYS 322 Mechanics II 3 (3,0) or PHYS 441 Elec. and Mag. II 3 (3,0) PHYS 340 Elec. and Magnetism I 3 (3,0) 9	Psychology 7 PSYCH 201 General Psychology . 3 (3,0) PSYCH 263 Intro. Exper. Psych 3 (3,0) PSYCH 305 Applied Psychology . 3 (3,0) PSYCH 363 Adv. Exper. Psych 4 (3,3) PSYCH 471 Psych. Test Eval 3 (3,0) 16
	10

SENIOR YEAR

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Those qualifying for advanced placement in languages or wanting to take languages the freshman year may take them in place of these courses. ³ Electives approved by the adviser should include one of the following sequences: Biol 103, 104, 105, 106; Econ 314, Mgt Sc 311; Phys 221, 223, 222, 224. ⁴ To be selected from Math 403, 404, 405. ⁵ Select from the following sequence: Econ 314, Mgt Sc 311. ⁶ Select the following sequence: Phys 221, 222, 224. ⁷ Select the following sequence: Biol 103, 104, 105, 106.

MATHEMATICAL SCIENCES - ACTUARIAL SCIENCE OPTION

FRESHMAN YEAR

First Semester

Second Semester

CH 101 General Chemistry 4 (3,3) CH 102 General Chemistry 4 (3,3) COMP SC 205 Elem. Comp. Prog. 3 (3,0) ENGL 102 English Composition 3 (3,0) ENGL 101 English Composition 3 (3,0) MATH 108 Cal. of One Var. II. 4 (4,0) HIST 172 or 173 West. Civ.2 3 (3,0) MATH 231 Math. of Life Ins. 3 (3,0) MATH 106 Cal. of One Var. I 4 (4,0) Elective 2 3
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17

SOPHOMORE YEAR

ECON 200 Economic Concepts 3 (3,0) MATH 206 Calculus of Sev. Var. 4 (4,0) MATH 301 Stat. Theory and Meth. 1	ECON 306 Risk and Insurance 3 (3,0) ECON 314 Inter. Econ. Theory 3 (3,0) MATH 208 Engineering Math. 1 4 (4,0) MATH 212 Actuarial Sci. Sem. I 1 (1,0) MATH 411 Linear Algebra 3 (3,0) Literature Requirement 1 3 (3,0)
16	17

IUNIOR YEAR

ACCT 201 Principles of Accounting 3 (3,0 MATH 430 Actuarial Finite Diff, 3 (3,0 MATH 453 Advanced Calculus I. 3 (3,0 or MATH 463 Math. Anal. I 3 (3,0 Modern Language	 MATH 431 Theory of Interest 3 (3,0) MATH 454 Advanced Calculus II 3 (3,0) or MATH 464 Math. Anal. II 3 (3,0)
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SENIOR YEAR

ENGL 301 Public Speaking 3 (MATH 350 Intro. to Math. Models 3 (MATH 403 Statistical Inference 4 MATH 412 Intro. to Mod. Algebra		
MATH 402 Theory of Prob.4 3 (or MATH 419 Discrete Math.		(0,0)
MGT SC 311 Intro. to		Structures I	3	(3,0)
Econometrics 3 ((3,0)	MATH 432 Actuarial Science		
Elective 4		Sem. II 4	1	(1,0)
		Elective 3	8	
16		-		
			5	
		130 Total Semester Hours		

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Those qualifying for advanced placement in languages or wanting to take languages the freshman year may take them in place of these courses. ³ Electives must be approved by adviser. ⁴ Math 430 and 431 will be offered in 1978/79 and alternate years thereafter. There-fore, Math 402, 403, 432 should be scheduled by juniors or seniors during the off year.

MATHEMATICAL SCIENCES - BIOLOGY OPTION

FRESHMAN YEAR

First Semester

C N N

N E

BIOL 103 General Biology I ... 3 (3,0) BIOL 105 General Biology Lab. I 1 (0,3) COMP SC 205 Elem. Comp. Prog. 3 (3,0) ENGL 101 English Composition... 3 (3,0) MATH 106 Cal. of One Var. I. 4 (4,0) PHYS 207 General Physics 1 2 ... 4 (3,2) 18 17

SOPHOMORE YEAR

0011101110	
CH 101 General Chemistry 4 (3,3) MATH 206 Calculus of Sev. Var. 4 (4,0) MATH 301 Stat. Theory and Meth. I 3 (3,0) Literature Requirement 1 3 (3,0) Elective	CH 112 General Chemistry 4 $(3,3)$ MATH 208 Engineering Math. I 4 $(4,0)$ MATH 411 Linear Algebra 3 $(3,0)$ PHYS 208 General Physics II 4 $(3,2)$ Literature Requirement 1 3 $(3,0)$
17	18
JUNIOR	
CH 223 Organic Chemistry 3 (3,0) CH 227 Organic Chemistry Lab. 1 (0,3)	CH 224 Organic Chemistry 3 (3,0) CH 228 Organic Chemistry Lab. 1 (0,3)

CH 227 Organic Chemistry Lab. 1 (0,3)	CH 228 Organic Chemistry Lab. 1 (0,3)
MATH 350 Intro. to Math. Models 3 (3,0)	MATH 402 Theory of Probability 3 (3,0)
MATH 453 Advanced Calculus I. 3 (3,0)	MATH 454 Advanced Calculus II 3 (3,0)
or MATH 463 Math. Analysis I. 3 (3,0)	or MATH 464 Math. Analysis II 3 (3,0)
Modern Language 4 (3,1)	Modern Language 4 (3,1)
	Elective 1
15	15

Second Semester

(3,0) (4,0) (3,0)

(3,0)

Second Semester

SENIOR YEAR

BOT 202 Survey of Plant King. 4 (3,3) or ZOOL 301 Comp. Vert. Anat. 4 (3,3) MATH 412 Intro. to Mod. Algebra 3 (3,0) or MATH 419 Discrete Math. Structures I	BOT 441 Plant Ecology 3 (2,3) ENGL 301 Public Speaking 3 (3,0) HIST 172 or 173 West. Civilization 3 (3,0) Mathematics Elective 3 3 (3,0) Elective 3 15
15	130 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Those qualifying for advance placement in languages or wanting to take languages the freshman year may take them in place of these courses. ³ Electives must be approved by adviser. ⁴ To be selected from Math 403, 404, or 405.

MATHEMATICAL SCIENCES—COMPUTER SCIENCE OPTION

FRESHMAN YEAR

First Semester

CH 101 General Chemistry 4 (3,3)	CH 102 General Chemistry 4 (3,3)
COMP SC 205 Elem. Comp. Prog. 3 (3,0)	COMP SC 308 Data Processing
ENGL 101 English Composition, 3 (3,0)	for Business Applications 3 (3,0)
HIST 172 or 173 West. Civ.2 3 (3,0)	ECON 200 Economic Concepts 2 . 3 (3,0)
MATH 106 Cal. of One Var. I 4 (4,0)	ENGL 102 English Composition . 3 (3,0)
<u> </u>	MATH 108 Cal. of One Var. II . 4 (4,0)
17	
	17

SOPHOMORE YEAR

COMP SC 321 Assembly Language			COMP SC 322 Systems Prog 3
Programming	3	(3,0)	MATH 208 Engineering Math. I. 4
MATH 206 Calculus of Sev. Var.	4	(4,0)	MATH 411 Linear Algebra 3
MATH 301 Stat. Theory and			Literature Requirement 1 3
Meth. I			Elective 3 3
Literature Requirement 1	3	(3,0)	
Elective	3		16
-	_		

16

IUNIOR YEAR

COMP SC 409 Introduction to Numerical Analysis I MATH 350 Intro. to Math. Models PHYS 122 Phys. with Cal. I Modern Language Elective 3	3 (3,0) 3 (2,2) 4 (3,1) 3 -	ENGL 301 Public Speaking MATH 402 Theory of Probability MATH 412 Intro. to Mod. Algebra or MATH 419 Discrete Math. Structures I Modern Language Elective 3	3(3,0) 3(3,0) 3(3,0)

SENIOR YEAR

MATH 453 Advanced Calculus I 3 (3,0) or MATH 463 Math. Analysis I 3 (3,0) Computer Science Elective 5 3 Mathematics Elective 4	MATH 454 Advanced Calculus II 3 (3,0) or MATH 464 Math. Analysis II 3 (3,0) Computer Science Elective 5 3 Elective 310
_	16
16	130 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209.
² Those qualifying for advance placement in languages or wanting to take languages the freshman year may take them in place of these courses.
³ Electives approved by adviser should include one of the following sequences: Phys 221, 222, 224; Biol 103, 104, 105, 106; Econ 314, Mgt Sc 311.
⁴ To be selected from the following: Math 403, 404, 405, 452.
⁵ Select from 400-level computer science courses.

MEDICAL TECHNOLOGY

Registered (ASCP) medical technologists are professionals whose broad knowledge gained from college science courses and clinical laboratory training gives them the ability to perform complex analyses used in the modern clinical laboratory. The quality of performance coming from the medical laboratory is controlled by the registered medical technologists. They are responsible for their own work as well as for the work of those under their area of supervision. In the hospital laboratory, medical technologists are directly responsible to the pathologist. In addition to jobs in the hospital laboratory, medical technologists are employed by private, state, and federal health laboratories and by pharmaceutical companies.

The program in Medical Technology at Clemson University consists of three years of lectures and laboratories on the Clemson campus and one year of clinical training at an accredited school of medical technology. The courses required in the first three years of the program must be completed before the student can begin the clinical (fourth) year. The student must also have a grade-point ratio of 2.0 or higher before entering the fourth year. Clemson University is presently affiliated with three schools of medical technology. They are located at Anderson Memorial Hospital, Greenville General Hospital, and Self Memorial Hospital at Greenwood. Students are selected by the schools of medical technology on a competitive basis. Applications for the schools of medical technology should be made at the beginning of the sophomore year.

Upon satisfactory completion of the requirements of the curriculum, the student will receive the Bachelor of Science degree in Medical Technology from Clemson University.

FRESHMAN YEAR

First Semester

BIOL 110 Prin. of Biology I 5	5 (4,3)
CH 101 General Chemistry 4	4 (3,3)
ENGL 101 English Composition 3	
MATH 106 Cal. of One Var. I . 4	1 (4,0)
MED TECH 101 Introduction to	
Medical Technology	1 (1,0)
_	
15	7

Second Semester

BIOL 111 Prin. of Biology II 5 (4,3) CH 112 General Chemistry 4 (3,3) ENGL 102 English Composition 3 (3,0) Mathematics Requirement 23-4 Elective	
18	

SOPHOMORE YEAR

CH 223 Organic Chemistry 3 (3,0) CH 227 Organic Chemistry Lab 1 (0,3) HIST 172 Western Civilization 3 (3,0) MICRO 305 General Microbiology 4 (3,3) Literature Requirement 1	CH 224 Organic Chemistry
17 19	17-18
17-18	17-10

IUNIOR YEAR

CH 317 Quantitative Anal. Lab. 1 (0,3) Op or CH 310 Elem. Chem. Instr. 4 (2,6) Soc	umanities Elective 3 3 ption Requirement 3 8 ocial Science Elective 3 3 lective
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SENIOR YEAR

(52 Weeks)

	Credit Hours	Lecture Hours	Seminar Hours	Clinical Practice Hours
MED TECH 401 Serology and Immunology	. 4	21	10	49
MED TECH 402 Microbiology	. 7	59	6	470
MED TECH 403 Hematology	. 5	12	32	276
MED TECH 404 Blood Bank	. 3	8	20	132
MED TECH 407 Urinalysis	. 2	10	8	102
MED TECH 408 Chemistry	. 10	40	50	470
MED TECH 409 Radioisotopes	. 1	2	0	7
	20			

133-135 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209, 2 To be selected from Comp Sc 205, Ex St 301, Math 108, 301. ³ To be chosen from courses required to complete an alternate degree should the student not be accepted to a hospital school after completion of the academic requirement for the baccalaureate degree in Medical Technology.

MICBOBIOLOGY

Microbiology deals with the study of bacteria, viruses, yeasts, filamentous fungi, protozoa, and unicellular algae. The microbiologist seeks to describe these organisms in terms of their structures, functions and processes of reproduction, growth and death, at both the cellular and molecular levels. He is also concerned with their ecology, particularly in regard to their pathological effects on man. and with their economic importance.

The Microbiology major provides a thorough training in the basic microbiological skills. Furthermore, the student receives instruction in mathematics, physics, chemistry, and biochemistry, all of which are essential to the training of a modern-day microbiologist. Through a wide choice of electives, the program allows a student to prepare for a variety of careers. The Microbiology curriculum with Molecular Biology option is recommended for students planning postgraduate programs. The microbiology graduate may enter graduate school in the fields of microbiology, biochemistry, bioengineering or related disciplines; he may enter a medical or dental school; or pursue a career in one of the many industries or public service departments dependent upon microbiology. Some of these are the fermentation and drug industries, medical and public health microbiology, various food industries, and agriculture.

Microbiology majors planning to apply for admission to a medical or dental school should inform their advisers immediately upon entering the Microbiology program.

FRESHMAN YEAR

First Semester

BIOL 110 Prin. of Biology I 5 (4,3) CH 101 General Chemistry 4 (3,3) ENGL 101 English Composition. 3 (3,0) MATH 106 Cal. of One Var. I 4 (4,0) 16	BIOL 111 Prin. of Biology II5 (4,3)CH 112 General Chemistry4 (3,3)ENGL 102 English Composition3 (3,0)MICRO 100 Microbes and HumanAffairsAffairs1 (1,0)Mathematics Requirement 2
	16-17

SOPHOMOBE YEAR

CH 223 Organic Chemistry 3 (3,0) CH 227 Organic Chemistry Lab. 1 (0,3) MICRO 305 General Microbiology 4 (3,3) Literature Requirement 1 3 (3,0) Mathematics or Sci. Elective 33-4 Social Science Elective	BIOCH 301 Molecular Biology 3 (3,0) CH 224 Organic Chemistry 3 (3,0) CH 228 Organic Chemistry Lab 1 (0,3) Literature Requirement 1 3 (3,0) Mathematics or Sci. Elective 34-3 Microbiology Elective 4 3 17-16				
TINION MELD					

JUNIOR YEAR

ENGL 301 Public Speaking 3 (3,0) MICRO 401 Adv. Bacteriology 4 (2,6) Physics Elective 5	GEN 302 Genetics 4 (3,3) MICRO 412 Bacterial Physiology. 4 (3,3) Physics Elective 5 4 Social Science Elective 3 Elective 3 18
SENIOR	YEAR
Social Science Elective 3 Elective 414-13	MICRO 411 Path. Bacteriology 4 (3,3) Elective 4
17-16	16

134 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. 2 Math 108 is required for the Microbiology-Molecular Biology option. Microbiology majors may select from Comp Sc 205, Ex St 301, Math 108, 301. ³ To be selected from Ex St 301, Geol 101, Math 108, or any course at the sophomore level or above offered by the College of Sciences, excluding microbiology. ⁴ A minimum of 15 credits must be selected from the following courses: Bot 411, 413, Micro 400, 403, 405, 410, 413, 414, 415, 416, 491, Pl Pa 456, PS 458, Zool 403, 456. ⁵ To be selected from the following courses. First semester, either Phys 122 or 207; and second semester either Phys 208 or 221, 223. This curriculum provides a minimum of 22 open approved electives. Military science or aerospace studies may be elected if desired.

aerospace studies may be elected if desired.

MICROBIOLOGY - MOLECULAR BIOLOGY OPTION

See Microbiology curriculum for Freshman Year.

SOPHOMORE YEAR

First Semester

CH 223 Organic Chemistry CH 227 Organic Chemistry Lab	1	(0,3)
MICRO 305 General Microbilogy Mathematics Requirement 3 Literature Requirement 1	3	
Social Science Elective	3	(-,-,

17

Second Semester

Second Semester

BIOCH 301 Molecular Biology	3 (3,0) (0,3) 4 (3,3) 3 (3,0)
17	7

JUNIOR YEAR

ENGL 301 Public Speaking	CH 330 Intro. to Physical Chem. 3 (3,0) or PHYS 417 Intro. to Biophys. I 3 (3,0) MICRO 411 Path. Bacteriology . 4 (3,3) MICRO 412 Bacterial Physiology . 4 (3,3) Physics Elective 4
Elective 5	

SENIOR YEAR

BIOCH 423 Prin. of Biochemistry 3 (3,0) MICRO 415 Microbial Genetics 4 (3,3) MICRO 416 Introductory Virology 3 (3,0) Social Science Elective 3 Elective 5	BIOCH 424 Prin. of Biochemistry . 3 (3,0) MICRO 491 Special Problems 2 (0,6) Social Science Elective 3 Elective 5
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¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² To be selected from the following courses: Bot 411, 413; Micro 400, 403, 405, 410, 413; Pl Pa 456; PS 458; Zool 403, 456. ³ To be selected from Comp Sc 205, Ex St 301, Math 301. ⁴ To be selected from the following course sequences: Either Phys 207, 208 or 122,

134 Total Semester Hours

221. 223.

221, 223.
 5 Should include one of the following courses: Ch 313, 317, Comp Sc 205, Ex St 301.
 Note: Recommended electives in addition to those listed above are Bioch 425, 426,
 BioE 401, Math 206, Phys 471, 473, Zool 459.
 This option provides 17 semester hours of open approved electives. Military science or aerospace studies may be elected if desired.

PHYSICS-PHYSICAL AND MATHEMATICAL SCIENCES **OPTIONS**

Physics is the most fundamental of the natural sciences, and it forms the basis upon which the study of other branches of science is founded. Physics is concerned with the fundamental behavior of matter and energy. Classical physics encompasses the fields of mechanics, heat and thermodynamics, electricity and magnetism, acoustics and optics. Modern physics is concerned with the study of atoms and molecules, atomic nuclei, elementary particles, and the properties of liquids, crystalline solids, and other materials. It also includes the areas of relativity, cosmology, and the large-scale structure of the universe.

The undergraduate Physics curricula are designed to provide students with a strong background in the classical areas of physics as well as a basic introduction into the more important aspects of modern physics. The B.S. in Physics curriculum is directed toward preparing students for graduate study ultimately leading to the Ph.D. degree or toward research and development work in industrial or governmental laboratories. It also provides a good background for graduate study or industrial work in many areas of engineering and applied science. Experimental modern physics is strongly emphasized.

FRESHMAN YEAR

First Semester

Second Semester

CH 101 General Chemistry 4 (i ENGL 101 English Composition. 3 (i HIST 172 or 173 West. Civilization 3 (i MATH 106 Cal. of One Var. I . 4 (4 PHYS 101 Current Topics in Modern Physics	3,0) 1 3,0) 1 4,0) 1	CH 112 General Chemistry ENGL 102 English Composition MATH 108 Cal. of One Var. II . PHYS 122 Phys. with Cal. I Elective	3 4 3	(3,0) (4,0) (2,2)
	-,-/	1	0	

SOPHOMOBE YEAR

FR 101 Elementary French 2 4 (3,1) or GER 101 Elem. German 2 4 (3,1) MATH 206 Calculus of Sev. Var. 4 (4,0) PHYS 221 Phys. with Cal. II 3 (2,2) PHYS 223 Physics Lab. I 1 (0,3) Literature Requirement 1 3 (3,0) 15	FR 102 Elementary French 2 4 (3,1) or GER 102 Elem. German 2 4 (3,1) MATH 208 Engineering Math. I . 4 (4,0) PHYS 222 Phys. with Cal. III 3 (2,2) PHYS 224 Physics Lab. II 1 (0,3) Literature Requirement 1 3 (3,0) Elective
	18

IUNIOR YEAR

MATH 309 Engineering Math. II 3 3 (3,0) PHYS 321 Mechanics I 3 (3,0) PHYS 325 Exper. Physics I 4 (2,6) Option 3 Elective 3)) PHYS 326 Exper. Physics II 4 (2,6)
16	16
10	10

SENIOR YEAR

PHYS 441 Elec. and Magnetism II 3 (3,0) PHYS 455 Quantum Physics I 3 (3,0) PHYS 465 Therm. and Stat. Mech. 3 (3,0)	Physics (as approved) 3 (3,0) Option 3 Approved Elective 4 9
Option 3 Approved Elective 4	15
	10
15	128 Total Semester Hours

OPTIONS

A to should be	Geophysics
Astrophysics	
ASTR 301 General Astronomy 3 (3,0)	GEOL 101 Physical Geology, 4 (3,2)
ASTR 302 General Astronomy 3 (3,0)	GEOL 306 Mineralogy 3 (2,3)
ASTR 407 Intro. to Astrophysics . 3 (3,0)	Any two:
ASTR 408 Intro. to Galactic Astr. 3 (3,0)	GEOL 309 Petrology 3 (2,3)
	GEOL 402 Struc. Geology 3 (2,2)
12	PHYS 446 Solid State Physics. 3 (3,0)
	13
Chemical Physics	Computer Science
CH 331 Physical Chemistry 3 (3,0)	COMP SC 205 Elem. Comp. Prog. 3 (3,0)
CH 332 Physical Chemistry \ldots 3 (3,0)	COMP SC 321 Assembly
On ODE Inystear Onemistry O (0,0)	CONTRACT OF CARE INSCITIONY

CH 331 Physical Unemistry	0	(0,0)
CH 332 Physical Chemistry	3	(3,0)
CH 402 Inorganic Chemistry	3	(3,0)
or PHYS 456 Quantum Physics II	3	(3,0)
CH 435 Spec. and Molec. Struc	3	(3,0)
-		

CH 332 Physical Chemistry 3 (3,0) CH 402 Inorganic Chemistry 3 (3,0) or PHYS 456 Quantum Physics II 3 (3,0) CH 435 Spec. and Molec. Struc 3 (3,0) 12	COMP SC 321 Assembly Language Programming 3 (3,0) COMP SC 409 Intro. to Num. Anal. I
Electronics E&CE 202 Electric Circuits I 3 (2,2) E&CE 301 Electric Circuits II 3 (2,2) E&CE 320 Electronics I 3 (2,2) E&CE 330 Elec, Sys, Anal 3 (3,0) I2	Mathematical Physics MATH 457 Applied Math. I 3 (3,0) MATH 458 Applied Math. II 3 (3,0) PHYS 456 Quantum Physics II 3 (3,0) Mathematics (as approved) 3 (3,0) 12

Physics PHYS 446 Solid State Physics3 (3,0)PHYS 456 Quantum Physics II3 (3,0)Mathematics (as approved)6

12

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209. ² Russ 101, 102 may be substituted. ³ Math 411 may be taken in lieu of Math 309. ⁴ A minimum of 12 hours of electives must be chosen from course offerings in the humanities and social sciences.

PHYSICS - BIOPHYSICS OPTION

The Biophysics option offers an excellent preparation for medical school or graduate work in biological science. It requires a total of 25 credits of approved electives in chemistry, biological science, physics, or mathematics.

FRESHMAN YEAR

First Semester

CH 101 General Chemistry ENGL 101 English Composition . MATH 106 Cal. of One Var. I	3	(3,0)
PHYS 101 Current Topics in Modern Physics Biology Elective		(0,2)
ī	15	

$\begin{array}{cccccccccccccccccccccccccccccccccccc$
17

Second Semester

SOPHOMORE YEAR

MATH 206 Calculus of Sev. Var. 4 (4,0) PHYS 221 Phys. with Cal. II	MATH 208 Engineering Math. I. 4 (4,0) PHYS 222 Phys. with Cal. III 3 (2,2) PHYS 224 Physics Lab. II 1 (0,3) Literature Requirement 1 3 (3,0) Biophysics Elective
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JUNIOR YEAR

FR 101 Elementary French 2 4 (3,1) or GER 101 Elem. German 2 4 (3,1) HIST 172 Western Civilization 3 (3,0) PHYS 321 Mechanics 1 3 (3,0) PHYS 325 Experimental Physics I 4 (2,6) Biophysics Elective	FR 102 Elementary French 2 4 (3,1) or GER 102 Elem. German 2 4 (3,1) PHYS 322 Mechanics II 3 (3,0) PHYS 340 Elec. and Magnetism I 3 (3,0) Biophysics Elective 3 Elective 3
17	16

SENIOR YEAR

PHYS 455 Quantum Physics I 3 (3,0) PHYS 465 Thermodynamics and Statistical Mechanics 3	Physics (as approved) 3 (3,0) Biophysics Elective
16	129 Total Semester Hours

1 To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209.
2 Russ 101, 102 may be substituted.
3 An approved physics course may be substituted for Phys 465 if the student satisfactorily completes Ch 331, 332.
4 A minimum of 12 hours of electives must be chosen from course offerings in the humanities and social sciences.

PREPROFESSIONAL HEALTH STUDIES

The health professions, such as medicine and dentistry, need individuals with a diversity of educational backgrounds and a wide variety of talents and interests. The philosophies of education. the specific preprofessional course requirements, the noncognitive qualifications for enrollment, and the systems of training vary among the professional health schools, but all recognize the desirability of a broad education—a good foundation in the natural sciences (biology, chemistry, mathematics, and physics), highly developed communication skills, and a solid background in the humanities and social sciences. The absolute requirements for admission to professional health schools are purposely limited to allow latitude for developing individualized undergraduate programs of study: however, all schools of medicine and dentistry require sixteen semester hours of chemistry, including organic chemistry, eight semester hours of biological sciences, eight semester hours of physics. and at least one course in calculus. These requirements in the natural sciences should be balanced with courses in vocabulary building, the humanities (literature, music, art, history, philosophy). and social sciences (economics, political science, psychology, sociology). The basic requirements in the natural sciences and as many as possible of the courses in the humanities and the social sciences should be completed by the third year of study so that the student will be prepared to take the Dental Admission Test or the Medical College Admission Test prior to making application to a professional school.

Undergraduates may prepare also to study optometry, podiatry, and other health professions. While the basic requirements for these professional schools are essentially the same as those for schools of medicine and dentistry, specific requirements for individual schools in these professions vary somewhat; consequently, the interested student is advised to consult with the Coordinator for Preprofessional Health Studies.

At Clemson, rather than having a separate, organized preprofessional health study program, it is felt that an undergraduate student should be allowed to major in any curriculum, so long as the basic entrance requirements of the chosen professional health school are fulfilled. These schools are not so much concerned about a student's major as they are concerned that the student does well in whichever curriculum he chooses.

Professional health schools have neither preferences nor prejudices concerning any curriculum, which is evidenced by the fact that their entering students represent a broad spectrum of curricula. The emphasis is placed on the student doing well in the curriculum chosen, and this becomes critical as competition increases for the limited number of places available in professional health schools.

PREPHYSICAL THERAPY

Physical Therapy is a transfer, baccalaureate degree program at the Medical University of South Carolina. Students may acquire the prerequisites for the two-year professional training by following the suggested curriculum offered by Clemson University.

FIRST YEAR

First Semester	Second Semester
BIOL 110 Prin. of Biology I 5 (4,3) CH 101 General Chemistry 4 (3,3) ENGL 101 English Composition 3 (3,0) MATH 105 Algebra and Trig 5 (5,0) 17	BIOL 111 Prin. of Biology II 5 (4,3) CH 102 General Chemistry 4 (3,3) ENGL 102 English Composition 3 (3,0) PSYCH 201 Gen. Psychology 3 (3,0) Elective 3 (3,0) Ia 18 18
SECONI) YEAR
PHYS 207 General Physics I 4 (3,2)PSYCH 321 Develop. Psychology 3 (3,0)ZOOL 202 Vertebrate Zoology 4 (3,3)Elective 1	PHYS 208 General Physics I 4 (3,2) Elective 112 16
17	68 Total Semester Hours

¹ If psychology is chosen for social science electives, the following courses are suggested: Psych 302, 303, 305, 402, 425.

PREPHARMACY

Pharmacy is a five-year program, the first two years of which can be taken at Clemson. The student who follows the Prepharmacy curriculum will transfer, as a rule, to the School of Pharmacy at the Medical University of South Carolina, where the final three years will be completed and by which institution the degree in Pharmacy will be awarded.

FIRST YEAR

First Semester

BIOL 103 General Biology I	3	(3,0)
BIOL 105 General Biology Lab. I	1	(0,3)
CH 101 General Chemistry	4	(3,3)
ENGL 101 English Composition.	3	(3,0)
HIST 172 Western Civilization		
MATH 105 Algebra and Trig	5	(5,0)

Second Semester

BIOL 104 General Biology II	3	(3,0)
BIOL 106 General Biology Lab. II	1	(0,3)
CH 112 General Chemistry	4	(3,3)
ENGL 102 English Composition.	3	(3,0)
HIST 173 Western Civilization	3	(3,0)
MATH 106 Cal. of One Var. I.	4	(4,0)
	_	

18

SECOND YEAR

19

$\begin{array}{cccccccccccccccccccccccccccccccccccc$	CH 224 Organic Chemistry 3 (3,0) CH 228 Organic Chemistry Lab 1 (0,3) PHYS 208 General Physics II 4 (3,2) SOC 202 Social Problems 3 (3,0) Literature Requirement 1 3 (3,0) Elective 3
17	17
	71 Total Semester Hours

¹ To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209.

166 Degrees and Curricula

ZOOLOGY

Biology is the study of life. Within this broad field, there is a variety of areas and disciplines in which one can become interested. The modern descriptive, experimental, and predictive study of animal biology is known as zoology. It is a broad area of scientific activity, including the study of all aspects of animal life from the structure and function of the whole organism down to the cellular level of organization, and up through the behavior and interactions of several organisms to the integrated existence of life on the entire planet. Descriptive, functional, and evolutionary questions are investigated at all possible levels.

Majors in Zoology receive broad classroom, laboratory, and field training in classical and modern animal biology with an emphasis on chemistry, mathematics and statistics, and physics as necessary tools. Specialized options in the Zoology curriculum include preparatory training leading to graduate school, the health professions (medicine, dentistry, etc.), veterinary medicine, biomedical engineering, biochemistry, biomathematics, and biophysics.

FRESHMAN YEAR

Second Semester

First Semester

BIOL 110 Prin. of Biology I \ldots 5 (4,3) CH 101 General Chemistry \ldots 4 (3,3) ENGL 101 English Composition \ldots 3 (3,0) MATH 106 Cal. of One Var. I \ldots 4 (4,0) Elective \ldots 1	BIOL 111 Prin. of Biology II 5 (4,3) CH 112 General Chemistry 4 (3,3) ENGL 102 English Composition 3 (3,0) Elective 6
	18
17	10

SOPHOMORE YEAR

or ZOOL 202 Vertebrate Zoology 4 (3,3) Literature Requirement 1 3 (3,0)	BIOCH 301 Molecular Biology 3 (3,0) BIOCH 302 Molecular Biol. Lab. 1 (0,3) CH 224 Organic Chemistry 3 (3,0) ZOOL 202 Vertebrate Zoology 4 (3,3) or ZOOL 201 Invert. Zoology 4 (3,3) Literature Requirement 1 3 (3,0) Elective
16	16

JUNIOR YEAR

PHYS 207 General Physics I 4 (3,2) ZOOL 340 Cell Biology 3 (3,0) Botany Elective 3 Elective 3 7	MATH 301 Stat. Theory and Meth. I 3 (3,0) PHYS 208 General Physics II 4 (3,2) ZOOL 350 Develop. Biology 4 (3,3) Elective 3 6
and the second se	
17	17

SENIOR YEAR

17

17

135 Total Semester Hours

 1 To be selected from the following: Engl 202, 203, 204, 205, 206, 207, 208, 209, 2 Zool 457 or 458 may substitute for Zool 459 with the approval of the adviser. 3 Electives:

- 3 Electives:
 (a) A minimum of 6 elective hours must be chosen from course offerings in social sciences (economics, history, political science, psychology, and sociology).
 (b) A minimum of 6 elective hours must be chosen from course offerings in the humanities (foreign languages, humanities, literature, philosophy, and religion).
 (c) A minimum of 6 elective hours must be chosen from course offerings in the Department of Zoology. An additional 6 hours may be taken either in the Department of Zoology or in departments offering zoology-related courses approved by the student's adviser. These 12 hours must be in courses numbered 300 or higher.





Description of Courses

This list of courses includes for each course the catalog number, title of course, credit in semester hours, class laboratory hours per week, and the description of the course. In general, courses numbered 100-199 are freshman courses; 200-299, sophomore courses; 300-399, junior courses; and 400-499, senior courses. Courses numbered 600 or above are graduate courses and are open only to students admitted to the Graduate School, except that seniors with exceptional records may be enrolled with special permission. Where courses are offered on a schedule, there is a designation F, S, or SS following the title of each course, indicating whether it is customarily offered in the fall, spring, or summer school.

Accounting

Professors: C. C. Davis, Head; J. A. Turner, Jr., J. M. Wannamaker Associate Professors: F. R. Gray, J. A. Kimbell, Jr., J. D. Sheriff, A. M. Sibley Assistant Professors: J. D. Acker, G. S. Carew, L. S. Clark, A. C. Drews, H. A. Hobson, R. W. Rouse, C. D. Wiggins

Lecturer: N. E. Byerley

Visiting Professor: G. B. Vasen

Visiting Assistant Professors: C. T. Deal, A. D. Love

Visiting Instructors: P. A. Brown, V. D. Guide, C. E. Wiggins, Jr.

ACCT 200 BASIC ACCOUNTING 3 cr. (3 and 0)

This course is designed as a general survey of accounting for non-Accounting majors. (Course not open to Accounting and Financial Management majors.)

ACCT 201 PRINCIPLES OF ACCOUNTING 3 cr. (3 and 0)

An introduction to accounting theory with an emphasis on basic accounting procedures and financial statements preparation.

ACCT 202 PRINCIPLES OF ACCOUNTING 3 cr. (3 and 0)

Continuation of Acct 201 with a survey of managerial accounting theory in cost accounting, budgeting, and cost-volume-profit analyses. *Prerequisite:* Acct 201.

ACCT 301 INTERMEDIATE ACCOUNTING 3 cr. (3 and 0)

A course in the theory of accountancy designed to follow introductory theory presented in the basic principles courses. Intermediate accounting seeks to broaden the student's knowledge of financial accounting theory and practice. *Prerequisite:* Acct 202.

ACCT 302 INTERMEDIATE ACCOUNTING 3 cr. (3 and 0)

A continuation of Acct 301 with emphasis on managerial accounting. Prerequisite: Acct 301.

ACCT 303 COST ACCOUNTING 3 cr. (3 and 0)

The application of cost analysis to manufacturing and distributing problems. Analysis of the behavior characteristics of business costs and a study of principles involved in standard cost systems. Lectures and problems. *Prerequisite:* Acct 202.

ACCT 305 INCOME TAXATION 3 cr. (3 and 0)

Interpretation of Federal Income Tax laws, regulations and court decisions with practice in application of these laws to the returns of individuals, partnerships, and corporations. *Prerequisite:* Junior standing.

ACCT 307 MANAGERIAL ACCOUNTING 3 cr. (3 and 0)

Emphasizes internal use of accounting data by the manager in establishing plans and objectives, in controlling operations, and in making decisions involved with management of an enterprise. Course cannot be taken for credit by those students required to complete Acct 303 and 410. *Prerequisite:* Acct 202.

ACCT 403 ACCOUNTING RESEARCH 2 cr. (2 and 0)

A directed research course for those students interested in a career in accounting. *Prerequisite:* Acct 302.

ACCT 405, 605 ADVANCED FEDERAL TAXES 3 cr. (3 and 0)

Tax planning and research. Advanced phases of income taxation with emphasis on special problems applicable to corporations, partnerships, estates and trusts. *Prerequisite:* Acct 305.

ACCT 407 ACCOUNTING RESEARCH 1 cr. (1 and 0)

A directed research course for those students interested in a career in accounting. *Prerequisite:* Acct 302.

ACCT 410, 610 BUDGETING AND EXECUTIVE CONTROL 3 cr. (3 and 0)

The study and application of selected techniques used in the planning and control functions of business organizations. *Prerequisite:* Acct 303.

ACCT 411, 611 ADVANCED ACCOUNTING 3 cr. (3 and 0)

A study of accounting principles and practices emphasizing parent-subsidiary accounting. *Prerequisite:* Acct 302.

ACCT 415, 615 AUDITING 3 cr. (3 and 0)

Professional and practical auditing theory. Review of internal controls, audit procedures, and development of audit programs for various types of businesses; consideration of auditor's professional and ethical standards. *Prerequisite:* Acct 302.

ACCT 416, 616 AUDITING PRACTICE AND PROCEDURE 3 cr. (3 and 0)

Practical application of auditing theory through case studies and preparation of work papers in a simulated audit. Special emphasis on audit adjustments, sampling and testing techniques, internal control and flow charting. *Prerequisite:* Acct 415.

ACCT 420 CERTIFIED PUBLIC ACCOUNTANT REVIEW 3 cr. (3 and 0)

Intensive practice in analyzing and solving certified public accountant level accounting problems. *Prerequisite:* Acct 411 or permission of instructor.

ACCT 425 CONTEMPORARY ACCOUNTING THEORY 3 cr. (3 and 0) Contemporary accounting theory emphasizes the major challenges and controversies within the field of accounting today. Attention is given to theoretical and conceptual issues underlying current financial reporting as well as pragmatic conventions. The evolution of accounting objectives and standards, as evidenced by the pronouncements of professional organizations, will receive special emphasis. *Prerequisite:* Acct 302.

Aerospace Studies

Professor: Col. C. R. Lakins, Head

Assistant Professors: Maj. L. J. Gregory, Jr., Maj. J. F. Griffin, Capt. B. W. Donovan

AS 109 WORLD MILITARY SYSTEMS I 1 cr. (1 and 1) F

An introduction to factors of national power, principles and nature of war; legislation, organization and function of the Department of Defense; history, missions, and organization of the United States Air Force. Corps Training includes drill fundamentals, customs and courtesies of the service.

AS 110 WORLD MILITARY SYSTEMS II 1 cr. (1 and 1) S

Surveys the history and development of U.S. strategic offensive and defensive forces including their missions, functions and organization; conventional and nuclear weaponry, civil defense, aircraft and missile defense, concepts of present and projections of future strategic offensive requirements. Corps Training includes drill and ceremonies and Air Force career opportunities.

AS 209 GROWTH AND DEVELOPMENT OF AEROSPACE POWER 1 cr. (1 and 1) F

This course examines the growth and development of various concepts, doctrine, technology, and organization of aerospace power during the first fortyseven years of the twentieth century. Leadership laboratory provides experience in guiding, directing, and controlling an Air Force unit.

AS 210 A QUARTER-CENTURY OF AEROSPACE POWER 1 cr. (1 and 1) S

A continuation of the study of growth and development of aerospace power, placing special emphasis on the contributions of the U.S. Air Force to the history of aerospace power during the period from 1948 to the present. Leadership laboratory provides experience in guiding, directing, and controlling an Air Force unit.

AS 311 CONCEPTS OF AIR FORCE LEADERSHIP 3 cr. (3 and 1) F A study of military professionalism, leadership, and discipline. Covers leadership theory and practice. Compares leadership in the military with private enterprise. Corps Training provides cadets experience in the guiding, directing, and controlling of an Air Force unit.

AS 312 CONCEPTS OF AIR FORCE MANAGEMENT 3 cr. (3 and 1) S A continuation of the study of professionalism with stress on management principles and functions. This includes an introduction to systems, approaches to decision-making, resource control and problem-situation exercises. The course concludes by preparing cadets for active duty in the Air Force. Corps Training emphasizes advanced leadership functions.

AS 411 AMERICAN DEFENSE POLICY 3 cr. (3 and 1) F

An analysis of the role and function of the professional military officer in a democratic society and the complex relationships involved in civil-military interactions. Flight instruction and ground school for pilot candidates. Corps Training laboratory provides experience in guiding, directing, and controlling an Air Force unit.

AS 412 CONTEMPORARY NATIONAL SECURITY POLICY 3 cr.

(3 and 1)

An examination of the environmental context in which American defense policy is formulated. Special themes include political, economic, and social constraints upon the national defense structure; and the impact of technological and international developments on the defense policy-making process. Corps Training laboratory provides experience in guiding, directing, and controlling an Air Force unit.

Agricultural Economics

Professors: J. E. Faris, *Head*; J. C. Hite, J. W. Hubbard, W. J. Lanham, E. L. McLean, J. F. Pittman, G. R. von Tungeln

Associate Professors: L. L. Bauer, R. K. DeHaven, B. L. Dillman, J. S. Lytle, C. S. Thompson

Assistant Professors: E. H. Kaiser, S. E. Miller, D. L. Thomas, G. J. Wells

AG EC 202 AGRICULTURAL ECONOMICS 3 cr. (3 and 0) F, S

An analytical survey of the various subdivisions of agricultural economics, to include farm organization, enterprise analysis, land economics, marketing, farm prices, governmental farm policies, and the relation of agriculture to the national and international economy.

AG EC 302 MANAGEMENT OF AGRICULTURAL ENTERPRISES 3 cr. (2 and 3) F, S

Economic principles underlying the organization and operation of agricultural firms and related business enterprises. Particular emphasis is directed to management aspects of the farm as a production unit. *Prerequisite:* Ag Ec 202 or Econ 202.

AG EC 305 AGRICULTURAL BUSINESS ANALYSIS 3 cr. (2 and 3) F, S

The principles of financial statement analysis applied to management of farms and other agricultural business firms. Emphasis is placed on enterprise analysis, profitability determination, and other aspects of internal financial operations. *Prerequisite:* Ag Ec 202 or Econ 202.

AG EC 309 ECONOMICS OF AGRICULTURAL MARKETING 3 cr. (3 and 0) F, S

A general course in marketing agricultural commodities with particular emphasis upon food products. Efficiency criteria, consumer behavior, market organizations and institutions, and marketing functions are analyzed. *Prerequisite:* Ag Ec 202 or Econ 202.

AG EC 351 ADVERTISING AND MERCHANDISING 3 cr. (3 and 0) F A general introduction to advertising and merchandising theories and some practice with basic techniques. A partial list of subjects covered includes: function of advertising, propriety in advertising, institutions, media, market research, consumer appeals, loss leaders, mass displays, trademarks and brands, writing copy, color, layout, agencies and integrated advertising campaigns. *Prerequisite:* Junior standing.

AG EC 352 PUBLIC FINANCE 3 cr. (3 and 0) F, S, SS

Principles of financing government, sources of public revenue, objects of public expenditures, problems of fiscal administration, and the application of fiscal policies in stabilizing the national economy.

AG EC 402, 602 ECONOMICS OF AGRICULTURAL PRODUCTION 3 cr. (3 and 0) F

An economic analysis of agricultural production involving (a) the concept of the farm as a firm, (b) principles for decision making, (c) the quantitative nature and use of production and cost functions and their interrelations and application of these principles to resource allocation in farms and among areas. *Prerequisite:* Econ 314 or permission of instructor.

AG EC 403, 603 LAND ECONOMICS 3 cr. (3 and 0)

A study of the characteristics of land and of the physical, legal, social and economic principles and problems relating to the control and use of land resources. *Prerequisite:* Permission of instructor.

AG EC 405 SEMINAR 1 cr. (1 and 0) F

An examination of the relation of economics and sociology to specific problems. *Prerequisite:* Major in Agricultural Economics.

AG EC 406 SEMINAR 1 cr. (1 and 0) S

A continuation of Ag Ec 405.

AG EC 451, 651 AGRICULTURAL COOPERATION 2 cr. (2 and 0) F

The principles and practices of business organization and management governing the successful operation of cooperative business enterprises. Major emphasis is placed upon cooperative selling, processing, purchasing, and service enterprises that serve farm people. *Prerequisite:* Econ 201.

AG EC 452, H452, 652 AGRICULTURAL POLICY 3 cr. (3 and 0) F, S

A review of public agricultural policy programs in the United States and a critical examination of current and proposed government policies and programs affecting the agricultural sector of the economy. Included are economic considerations as related to past and current farm price and income problems. *Prerequisite:* Ag Ec 202 or Econ 202.

AG EC 456, H456, 656 PRICES 3 cr. (3 and 0) F, S

A review of the basic theory of price under competitive conditions and various modifications; nature, measurement and causes of daily, seasonal and cyclical price fluctuations; geographical price relationships; nature, function and behavior to future markets; government price programs. *Prerequisite:* Ag Ec 202 or Econ 200 or 202.

AG EC 460, 660 AGRICULTURAL FINANCE AND RURAL APPRAISAL 3 cr. (3 and 0)

A study of principles and techniques of financing and appraisal in the agricultural sector. Topics include agricultural financial management, capital markets, lending agencies, and rural appraisal. Prerequisite: Acct 201, Ag Ec 202.

- AG EC 701 AGRIBUSINESS MANAGEMENT PRINCIPLES 3 cr. (3 and 0)
- AG EC 791 SELECTED TOPICS IN AGRICULTURAL ECONOMICS 1-3 cr. (1-3 and 0)
- AG EC 802 PRODUCTION ECONOMICS 3 cr. (3 and 0)
- AG EC 804 WATER RESOURCE POLICIES 3 cr. (3 and 0)

AG EC 805 SEMINAR IN MARINE RESOURCES MANAGEMENT AND POLICY 3 cr. (3 and 0)

- AG EC 806 ECONOMIC DEVELOPMENT IN AGRICULTURAL AREAS 3 cr. (3 and 0)
- AG EC 807 MARKET STRUCTURE IN AGRICULTURAL INDUSTRIES 3 cr. (3 and 0)

AG EC 808 APPLIED QUANTIFICATIONS IN AGRICULTURAL ECONOMICS 3 cr. (3 and 0)

- AG EC 809 ADVANCED NATURAL RESOURCE ECONOMICS 3 cr. (3 and 0)
- AG EC 814 CONTEMPORARY PUBLIC POLICY 3 cr. (3 and 0)
- AG EC 851 SEMINAR IN RESEARCH METHODOLOGY 1 cr. (1 and 0)
- AG EC 881 INTERNSHIP IN COMMUNITY AND RESOURCE DEVELOPMENT 1-6 cr.
- AG EC 891 MASTER'S RESEARCH. Credit to be arranged.
- AG EC 904 SEMINAR IN RESOURCE ECONOMICS 3 cr. (3 and 0)
- AG EC 906 SEMINAR IN AREA ECONOMIC DEVELOPMENT 3 cr. (3 and 0)
- AG EC 907 AGRICULTURAL MARKETING PROBLEMS 3 cr. (3 and 0)
- AG EC 991 DOCTORAL RESEARCH. Credit to be arranged.

Agricultural Education

Professors: E. T. Carpenter, Head; J. A. Hash, J. H. Rodgers Associate Professor: L. H. Blanton Assistant Professor: J. H. Daniels

AG ED 100 ORIENTATION AND FIELD EXPERIENCE 1 cr. (0 and 2) Supervised observations and explanations of vocational agriculture teaching while serving as teacher aides. One full week of field experience in representative high schools is required.

AC ED 200 SUPERVISED FIELD EXPERIENCE I 1 cr. (0 and 3)

Actual participation in vocational agriculture teaching activities plus conferences with local supervising teachers and college supervisors. One full week

NOTE: Agricultural Education is jointly administered by the College of Agricultural Sciences and the College of Education.

of field experiences in specialized high school programs or area vocational centers is required.

AG ED 201 INTRODUCTION TO AGRICULTURAL EDUCATION 3 cr. (2 and 3) F

Principles of education, development of agricultural education, and an introduction to the formulation of instructional programs for the teaching of agricultural courses.

AG ED 300 SUPERVISED FIELD EXPERIENCE II 1 cr. (0 and 3)

A continuation of Ag Ed 200 with special emphasis on filling gaps in existing knowledge and experiences of the students. The primary focus will be on becoming acquainted with the student teaching center well in advance of the customary eight-week directed teaching experience.

AG ED 401, 601 METHODS IN AGRICULTURAL EDUCATION 3 cr. (2 and 3) S

Appropriate methods of teaching vocational agriculture in high schools. The course includes procedures for organizing teaching programs, teaching high school students, and directing F.F.A. activities.

AG ED 406 DIRECTED TEACHING 6 cr. (0 and 18) S

Guided participation in the professional responsibilities of a teacher of vocational agriculture including an intensive study of the problems encountered and the competencies developed. A half semester of directed teaching in selected schools is required. *Prerequisite:* Ag Ed 401.

AG ED 423, 623 CURRICULUM 2 cr. (2 and 0) S

Curriculum goals and related planning for career and continuing education programs.

AG ED 425, 625 TEACHING AGRICULTURAL MECHANICS 2 cr. (1 and 3) S

Organizing course content, conducting and managing an agricultural mechanics laboratory, shop safety, microteaching demonstrations of psychomotor skills, and methods of teaching manipulative abilities.

AG ED 431, 631 METHODS IN ENVIRONMENTAL EDUCATION 3 cr. (3 and 0) SS

A study of various techniques appropriate for teaching environmental education. Instruction is applicable to elementary, high school, and adult-level teachers. Offered in Summer School only.

AG ED 450, 650 MODERN TOPICS AND ISSUES 3 cr. (3 and 0)

A major area of concern to teachers of agriculture and county agents will be selected for intensive study at least one semester prior to offering the course. Team teaching with faculty from other departments in the College of Agricultural Sciences will be utilized when feasible. *Prerequisite:* Senior standing or relevant experience.

AG ED 463, 663 ADVANCED CONSERVATION EDUCATION 3 cr. (3 and 0)

The broader aspects of conservation education. The course includes historical, geographical, and national conservation problems. Offered in Summer School only. AG ED 465, 665 PROGRAM AND CURRICULUM DEVELOPMENT 3 cr. (3 and 0) F, Even-numbered years.

Each student will determine needs and resources in a specific community and plan a program and curriculum to meet these needs. Instruction is appropriate for agricultural, extension, and vocational personnel.

AG ED 467, 667 ADULT EDUCATION IN AGRICULTURE 3 cr. (2 and 3) S. Odd-numbered years.

Principles and practices appropriate to the solution of problems encountered in instructional programs for adult farmers.

- AG ED 726 AGRICULTURAL MECHANIZATION FOR INSERVICE TEACHERS 3 cr. (3 and 0)
- AG ED 727 AGRICULTURAL EDUCATION SHOP MANAGEMENT 3 cr. (1 and 6)
- AG ED 736 INTERNSHIP: TEACHING 3 cr. (1 and 6)
- AG ED 737 INTERNSHIP IN AGRIBUSINESS FIRMS 3 cr. (1 and 6)
- AG ED 803 EVALUATION OF INSTRUCTIONAL PROGRAMS 3 cr. (2 and 3)
- AG ED 804 SPECIAL PROBLEMS 3 cr. (2 and 3)

AG ED 805 ADMINISTRATION AND SUPERVISION IN AGRICULTURAL EDUCATION 3 cr. (3 and 0)

- AG ED 815 TEACHING AGRICULTURAL AND POWER MECHANICS 3 cr. (2 and 3)
- AG ED 820 TEACHING YOUNG FARMERS 3 cr. (3 and 0)
- AG ED 825 SUPERVISION OF STUDENT TEACHING 3 cr. (3 and 0)
- AG ED 869 SEMINAR 1-3 cr. (1-3 and 0)
- AG ED 889 INTRODUCTION TO RESEARCH IN EDUCATION 3 cr. (3 and 0)

Agricultural Engineering

Professors: T. H. Garner, C. E. Hood, Jr., J. R. Lambert, J. T. Ligon, B. K. Webb, Head; T. V. Wilson

Associate Professors: J. T. Craig, R. O. Hegg, E. B. Rogers, Jr.

Assistant Professors: W. H. Allen, J. B. Davis, G. E. Miles

AGE 181 AGRICULTURAL ENGINEERING CONCEPTS 1 cr. (0 and 3)

This course utilizes computers and basic engineering concepts to solve typical agricultural engineering problems. Tours, guest speakers, and films are used to acquaint the student with problems in engineering practice. The topics covered prepare the student to use the computer in subsequent courses. *Prerequisite:* Engr 180 or permission of instructor.

AGE 212 FUNDAMENTALS OF MECHANIZATION 3 cr. (2 and 3) S Functional analysis of selected agricultural equipment and the economic performance of machine systems; also, the utility and principles of applied

NOTE: Agricultural Engineering is jointly administered by the College of Agricultural Sciences and the College of Engineering.

technology and processes essential to providing a background for engineering design, research and development. *Prerequisite:* EG 109.

AGE 221 SOIL AND WATER RESOURCES ENGINEERING I 3 cr. (2 and 3) F

Physical relationships of factors governing rainfall disposition are used as bases for defining the hydrology of agricultural watersheds. The surveying necessary for design and application of resource management measures and structures is taught. *Prerequisite:* Math 106.

AGE 353 COMPUTATIONAL SYSTEMS 2 cr. (1 and 3)

Digital and analog techniques are used to solve agricultural engineering problems, including simulation of biological systems. Hybrid and advanced digital computational methods are studied. *Prerequisite:* Engr 180, Math 208.

AGE 355 ENGINEERING ANALYSIS AND CREATIVITY 2 cr. (1 and 3)

The creative and analytical portions of the engineering design process are developed in a problem approach. Application of physical and mathematical principles, analytical and experimental modeling and intelligent assumption making are stressed. Students are also introduced to the techniques of systems analysis. *Prerequisite*: Math 208, Phys 221.

AGE 362 ENERGY CONVERSION IN AGRICULTURAL SYSTEMS 3 cr. (2 and 3) S

The energy requirements of agricultural systems with emphasis upon energy conversion methods. Characteristics of various sources of energy will be considered including economic aspects. The present energy conversion mechanisms used in agriculture will be studied and their limitations considered. *Prerequisite:* ME 311.

AGE 364 AGRICULTURE WASTE-MANAGEMENT SYSTEMS 2 cr. (2 and 0)

The course will include planning and design of waste-management systems which employ physical, biological, and chemical processes for the treatment and utilization of agricultural wastes. Solid, liquid, and gaseous wastes are considered. Presentation is relevant to current agricultural practices and legal and social restraints.

AGE 416 AGRICULTURAL MACHINERY DESIGN 3 cr. (2 and 3) S

Engineering analysis of machines and basic agricultural operations and systems requiring machine functions. Fundamentals of machine design with applications to agricultural machinery. Velocity and acceleration, analyses, dimension determination, power transmission, and vibrations in machinery are studied. *Prerequisite:* EM 304.

AGE 422 SOIL AND WATER RESOURCES ENGINEERING II 3 cr. (2 and 3) S

Basic soil-water-plant relationships are used to establish criteria for the analysis and design of facilities and structures for conservation, water control, drainage and irrigation. Engineering relationships involved in the design of such facilities are emphasized. *Prerequisite:* EM 320, Math 208.

AGE 431, 631 AGRICULTURAL STRUCTURES DESIGN 3 cr. (2 and 3) F

Analytic and synthetic design of building components, including fastening devices, as determined by both live and dead loads with emphasis on statically determinant members and their positions and utilization in frames and trusses. Major materials considered are wood, steel, and concrete. *Corequisite:* EM 304.

AGE 433, 633 DESIGN CRITERIA FOR PLANT AND ANIMAL ENVIRONMENT 2 cr. (2 and 0)

This course evaluates, develops, and interprets criteria for the environmental design of selected agricultural production facilities by studying environment as it relates to the physiology of plants and animals. Simulation of physiological systems will be emphasized. *Prerequisite:* Course in animal science or plant science or plant science or permission of instructor.

AGE 442 AGRICULTURAL PROCESS ENGINEERING 3 cr. (2 and 3) S

Design of unit operations components used in agricultural processing. Engineering principles and instrumentation as applied to control systems, heat transfer, materials handling, storage and related subjects are emphasized. *Prerequisite:* E&CE 308, ME 311.

AGE 465 ENGINEERING PROPERTIES OF BIOLOGICAL MATERIALS 2 cr. (1 and 3) S

The thermal, electrical, mechanical, and chemical characteristics of biological materials, organisms, and metabolic processes are studied in relationship to engineering analysis and synthesis. The effects of environmental factors imposed by engineering processes are evaluated. *Prerequisite:* Math 208.

AGE 471 UNDERGRADUATE RESEARCH 1 cr. (0 and 3) F

A course to acquaint senior students in Agricultural Engineering with the scientific method. Literature investigations, planning and executing of an experiment are integral parts of the course. *Prerequisite:* Senior standing in Agricultural Engineering.

AGE 473, H473 SPECIAL TOPICS IN AGRICULTURAL ENGINEERING 3 cr. (3 and 0)

A comprehensive study of special topics in the field of agricultural engineering not covered in other courses. Special emphasis will be placed on independent pursuit of detailed investigations.

AGE 781 SPECIAL PROBLEMS 1-3 cr.

AGE 811 TILLAGE AND SOIL DYNAMICS 3 cr. (3 and 0)

AGE 822 WATER MOVEMENT IN SOILS 3 cr. (3 and 0)

AGE 865 HEAT AND MOISTURE TRANSFER IN BIOLOGICAL MATERIALS 3 cr. (3 and 0)

- AGE 871 SELECTED TOPICS IN AGRICULTURAL ENGINEERING 1-3 cr.
- AGE 882 SYSTEMS ENGINEERING 3 cr. (2 and 3)
- AGE 891 MASTER'S RESEARCH. Credit to be arranged.
- AGE 991 DOCTORAL RESEARCH. Credit to be arranged.

Agricultural Mechanization

Professors: T. H. Garner, C. E. Hood, Jr., J. R. Lambert, J. T. Ligon, B. K. Webb, Head; T. V. Wilson

Associate Professors: J. T. Craig, R. O. Hegg, E. B. Rogers, Jr. Assistant Professors: W. H. Allen, I. B. Davis, G. E. Miles

AGM 205 PRINCIPLES OF FARM SHOP 3 cr. (2 and 3)

Principles, techniques, and methods in the selection, proper use and maintenance of hand and power tools. Principal topics include: welding, tool fitting, metalwork, woodworking, finishing and preserving, pipe fitting, and farm masonry.

AGM 206 AGRICULTURAL MECHANIZATION 3 cr. (2 and 3)

The agricultural student is taught to apply physical principles and sound reasoning to the mechanization of modern agricultural production and processing enterprises. Planning efficient operational systems and wise selection of equipment, based on function and economic suitability are stressed. *Prerequisite:* Math 105, Phys 207.

AGM 301 SOIL AND WATER CONSERVATION 3 cr. (2 and 3)

Water management in agriculture is studied by applying principles of elementary surveying, mathematics and fluid flow as related to soil-watervegetation complexes in erosion control, conservation, drainage, and irrigation.

AGM 303 CALCULATIONS FOR MECHANIZED AGRICULTURE 2 cr. (2 and 0)

A course dealing primarily with principles and techniques for solving problems associated with mechanized farming. Topics include the use of slide rules and nomographs, graphical presentation of results, and simple force analyses.

AGM 404 FARM STRUCTURES 3 cr. (2 and 3)

Farmstead planning, including space and environmental needs for livestock and poultry. Additional topics include elements of crop processing, materials handling, and animal waste disposal.

AGM 406, 606 MECHANICAL AND HYDRAULIC SYSTEMS 3 cr. (2 and 3)

This course deals with power transmission systems for agricultural production with emphasis on mobile equipment. The characteristics, requirements, and design of both V-belt drives and roller-chain drives are presented. Emphasis is placed on hydraulic power transmission systems, including pumps, actuators, control devices, and hydraulic circuitry. *Prerequisite:* AgM 206 or permission of instructor.

AGM 408 EQUIPMENT SALES AND SERVICE 3 cr. (3 and 0)

Agricultural equipment sales and service techniques, inventory and accounting procedures followed by the farm machinery industry.

AGM 452, 652 FARM POWER 3 cr. (2 and 3)

A study of tractors with emphasis upon internal combustion engine principles and the support systems necessary for its proper functioning. The application of power, maintenance, adjustment, and general repair are also considered. AGM 460, 660 FARM AND HOME UTILITIES 3 cr. (2 and 3)

A course for undergraduate and graduate students in Agriculture and related curricula, involving a study of electric and other utilities on the farm and in the home. Selection, installation, and maintenance of wiring systems, lighting systems, motors, controls, water systems, and waste disposal systems are emphasized. *Prerequisite:* Junior standing.

AGM 712 FARM MACHINERY MANAGEMENT 3 cr. (2 and 3)

AGM 733 ANALYSIS OF AGRISTRUCTURES 3 cr. (3 and 0)

- AGM 771 SELECTED TOPICS IN AGRICULTURAL MECHANIZATION 1-3 cr. (1-3 and 0)
- AGM 781 SPECIAL PROBLEMS 1-3 cr. (1-3 and 0)
- AGM 851 SIMULATION OF AGRICULTURAL SYSTEMS 3 cr. (3 and 0)

Agriculture

Professors: B. D. Barnett, G. R. Craddock, W. M. Epps, J. E. Faris, S. B. Hays, J. C. Hite, J. T. Lazar, Jr., T. L. Senn, B. J. Skelton, G. R. von Tungeln, R. F. Wheeler, J. R. Woodruff

Associate Professors: M. W. Jutras, J. C. McConnell, Jr.

Assistant Professor: D. R. Sloan

AGRIC 103 INTRODUCTION TO ANIMAL INDUSTRIES 3 cr. (2 and 3) F, S

Fundamental and descriptive aspects of the animal industries as applied biology and major segments of food production and distribution systems. The subject matter will be presented by Animal Science, Dairy Science, and Poultry Science Departments.

AGRIC 104, H104 INTRODUCTION TO PLANT SCIENCES 3 cr. (2 and 3) F, S

A fundamental course in plant sciences, including agronomic and horticultural crops of the major agricultural areas of the world and emphasizing the crops of South Carolina. The laboratory exercises are self-tutorial.

AGRIC 301 INTERNATIONAL AGRICULTURE 3 cr. (3 and 0) F

This course is designed to acquaint the student with the systems of agriculture of the world. The approach is evolutionary. Main emphasis is on production as related to world climates and world population. Various geographical areas are considered. *Prerequisite:* Ag Ec 202 or Econ 201.

AGRIC 401 INTERNATIONAL AGRICULTURE SEMINAR 1 cr. (1 and 0) S

A colloquium on current issues in world agriculture. Topics include population growth, food policy, technology transfer, and international trade. With permission of instructor, the course may be repeated for a total of two credits.

AGRIC H491 SENIOR HONORS RESEARCH 3 cr. (1 and 6)

Senior Division Honors research in an agricultural sciences curriculum. Open to approved Honors Program students only. In consultation with and under the direction of a professor, the student will select a research topic, conduct experiments, record data, and make an oral presentation of results to the College Honors Program Committee.

AGRIC H492 SENIOR HONORS RESEARCH 3 cr. (1 and 6)

Continuation of Agric H491. Senior Division Honors research in an agricultural sciences curriculum. Upon termination of the research project, the student will submit a formal written report and make a final oral presentation of results to the College Honors Program Committee. Professor-student discussions of additional selected topics will be arranged.

Agronomy-Crops and Soils

Professors: G. R. Craddock, Head; B. J. Gossett, W. D. Graham, Jr., C. M. Jones, U. S. Jones, K. S. LaFleur, J. R. Woodruff

Associate Professors: E. B. Eskew, M. W. Jutras, E. F. McClain, J. D. Maxwell, J. S. Rice, E. A. Rupert, H. D. Skipper, B. R. Smith

Assistant Professor: V. L. Quisenberry

Lecturer: P. B. Gibson

Visiting Professor: J. A. Martini

Visiting Instructor: D. A. Knauft

AGRON 202 SOILS 3 cr. (2 and 2) F, S

An introduction to world land resources, soil formation, classification, and mineralogy. Emphasis is placed upon the basic chemical and physical properties of soil. Soil microorganisms, plant nutrients, and fertilization are discussed. Soil properties are related to plant growth. *Prerequisite:* Ch 101, 102, or a geology sequence including Geol 101, or permission of instructor.

AGRON 301, 601 FERTILIZERS 3 cr. (3 and 0) F

Production, marketing, and use of minerals and chemicals that are sources of elements essential for plant growth. How these elements are taken by roots from the soil and converted to plants for food, fiber, shelter, and ornamentals.

AGRON 402, 602 LAND POLLUTION CONTROL 3 cr. (3 and 0) S, Odd-numbered years.

Application of the principles of soil science to the use of land for disposal of pollutants and wastes from an increasing population of animals, plants, and man. Waste utilization, waste disposal methods, and capacity of land to consume wastes will be discussed. *Prerequisite:* Agron 202, 403, or permission of instructor.

AGRON 403, 603 SOIL GENESIS AND CLASSIFICATION 2 cr. (1 and 3) F

Presentation of the processes and factors involved in the genesis and morphology of soils; study of soil classification; practical field problem of soil mapping. *Prerequisite:* Agron 202 or permission of instructor.

AGRON 404, 604 SOILS AND LAND USE 2 cr. (1 and 3) F

Soils interpretations for nonagricultural purposes and facilities. Emphasis upon use of modern soil surveys and properties and features of soils important in nonfarm land uses. Not open to Agronomy majors.

AGRON 405, 605 PLANT BREEDING 3 cr. (2 and 2) S

The application of genetic principles to the development of improved crop plants. Principal topics include the genetic and cytogenetic basis of plant breeding, mode of reproduction, techniques in selfing and crossing, methods of breeding, inheritance in the major crops, and biometrical methods. AGRON 407, 607 PRINCIPLES OF WEED CONTROL 3 cr. (2 and 2) F Weeds, their introduction, ecology, methods of reproduction, dissemination, and control; chemistry and mode of action of herbicides, equipment and techniques of application; a characterization of the common weeds of the Southeast. *Prerequisite:* Agric 104, Agron 202, or permission of instructor.

AGRON 421, 621 FIELD CROPS—MONOCOTS AND SPECIALTY CROPS 3 cr. (3 and 0)

The principles involved in the production and utilization of corn, wheat, oats, barley, rye, grain sorghum, rice, and the millets, with special emphasis on their importance in South Carolina agriculture. The role of other oil, fiber, seed, drug, sugar, and other crops will be treated from the standpoint of worldwide production and utilization. *Prerequisite:* Agric 104, Agron 202.

AGRON 422, 622 FIELD CROPS-DICOTS 3 cr. (3 and 0) S

The principles involved in the production and utilization of cotton, soybeans, tobacco, and peanuts with special emphasis on their importance in South Carolina agriculture. *Prerequisite:* Agric 104, Agron 202.

AGRON 423, 623 FIELD CROPS-FORAGES 3 cr. (3 and 0) S

The characteristics, establishment, utilization, and maintenance of crops for hay, silage, and pasture. Crops valuable in South Carolina are emphasized. *Prerequisite:* Agric 104, Agron 202, or permission of instructor.

AGRON 424, 624 ADVANCED FIELD CROPS LABORATORY 1 cr. (0 and 2) S

Identification and management of the important forage and row crops of the Southeast, nation, and the world. Course is self-tutorial. *Prerequisite:* Agric 104.

AGRON 452, 652 SOIL FERTILITY AND MANAGEMENT 2 cr. (2 and 0) S

Principles of crop rotations, soil fertility, soil management, and other factors necessary for the practical utilization of soils. *Prerequisite:* Agron 202 or permission of instructor.

AGRON 453, 653 SOIL FERTILITY LABORATORY 1 cr. (0 and 3) S The evaluation and interpretation of soil fertility and plant nutrition by laboratory diagnostic methods used in the management of soils for crop production. *Prerequisite:* Agron 202 or permission of instructor.

AGRON 455 SEMINAR 1 cr. (1 and 0) F

Student presentation of current agronomic topics of special interest in crop production appearing in recent scientific journals and other publications.

AGRON 456 SEMINAR 1 cr. (1 and 0) S

Student presentation of current topics of special interest in the field of soil science appearing in recent scientific journals and other publications.

AGRON 475, 675 SOIL PHYSICS AND CHEMISTRY 3 cr. (2 and 3) S A study of the principles of soil physics and chemistry and their applications. Topics include soil texture, structure, compaction, water relations, solute movement, mineral composition, adsorption phenomenon, and soil acidity. *Prerequisite:* Agron 202, a course in sophomore chemistry and physics, or permission of instructor.

AGRON 490, 690	SOIL	ORGANISMS	IN	CROP	PRODUCTION	3	cr.
(2 and 3) F							

Interrelationships of soil organisms, soil properties, and crop production. Aspects of biological nitrogen fixation, mycorrhizae, and microbial-pesticide interactions. Biochemical and nutrient transformations related to plant growth. *Prerequisite:* Agron 202. Micro 305 or Pl Pa 401, or permission of instructor.

AGRON 801	CROP PHYSIOLOGY AND NUTRITION 3 cr. (3 and 0)
AGRON 802	PEDOLOGY AND SOIL CLASSIFICATION 3 cr. (2 and 3)
AGRON 804 (3 and 0)	THEORY AND METHODS OF PLANT BREEDING 3 cr.
AGRON 805	SOIL FERTILITY 3 cr. (3 and 0)
AGRON 806	SPECIAL PROBLEMS 1-3 cr. (0 and 3-9)
AGRON 807	SOIL PHYSICS 4 cr. (3 and 3)
AGRON 808	SOIL CHEMISTRY 3 cr. (2 and 3)
AGRON 812	CROP ECOLOGY AND LAND USE 3 cr. (3 and 0)
AGRON 820 (3 and 0)	PESTICIDE RESIDUES IN THE ENVIRONMENT 3 cr.
AGRON 825	SEMINAR 1 cr. (1 and 0)
AGRON 891	MASTER'S RESEARCH. Credit to be arranged.
AGRON 991	DOCTORAL RESEARCH. Credit to be arranged.

Animal Physiology

(See courses listed under Animal Science, Dairy Science, Entomology, Poultry Science, and Zoology)

Professors: T. R. Adkins, Jr., B. D. Barnett, J. F. Dickey, S. A. Gauthreaux, Jr., S. B. Hays, C. W. Helms, D. M. Henricks, J. R. Hill, Jr., K. A. Holleman, J. E. Jones, R. F. Wheeler

Associate Professors: D. L. Cross, R. L. Hays, B. L. Hughes, R. Noblet, C. E. Thompson, D. E. Turk

Assistant Professors: J. W. Dick, A. R. Ellicott, D. R. Helms, B. F. Jenny, L. I. Park, E. B. Pivorun

Visiting Instructor: T. Gimenez

AN PH 301 PHYSIOLOGY AND ANATOMY OF DOMESTIC ANIMALS 3 cr. (2 and 3)

A study of the physiology and associated anatomy of the body systems, including nervous, skeletal and muscular, respiratory, digestive, circulatory, urinary, reproductive, and endocrine systems. This course is designed primarily for students in Animal Science, Dairy Science, and Poultry Science. *Prerequisite:* Biol 103, 104, 105, 106 or 110, 111.

- AN PH 801 ELECTRON MICROSCOPY OF ANIMAL AND PLANT TISSUES 3 cr. (1 and 6)
- AN PH 802 DIGESTIVE AND EXCRETORY PHYSIOLOGY 3 cr. (2 and 3)

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AN PH 803 4 cr. (3 an	CARDIOVASCULAR AND RESPIRATORY PHYSIOLOGY d 3)
AN PH 804	MUSCLE AND NERVE PHYSIOLOGY 4 cr. (3 and 3)
AN PH 805	PHARMACOLOGY 3 cr. (2 and 3)
AN PH 806	EXPERIMENTAL ANIMAL PHYSIOLOGY 3 cr. (1 and 6)
AN PH 807	SPECIAL PROBLEMS IN ANIMAL PHYSIOLOGY 1-3 cr.
AN PH 808 (3 and 0)	MAMMALIAN AND AVIAN ENDOCRINOLOGY 3 cr.
AN PH 851	ANIMAL PHYSIOLOGY SEMINAR I 1 cr. (1 and 0)
AN PH 852	ANIMAL PHYSIOLOGY SEMINAR II 1 cr. (1 and 0)
AN PH 991	DOCTORAL RESEARCH. Credit to be arranged.

Animal Science

Professors: J. R. Hill, Jr., G. C. Skelley, Jr., R. F. Wheeler, Head
Associate Professors: D. L. Cross, R. L. Edwards, D. L. Handlin, L. W. Hudson, J. C. McConnell, Jr., C. E. Thompson
Assistant Professor: A. R. Ellicott
Visiting Instructor: T. Gimenez

AN SC 202 INTRODUCTION TO ANIMAL SCIENCE 3 cr. (2 and 3) This course deals with basic principles concerning the breeding, feeding, management, and marketing of beef cattle, swine, and horses. The laboratory is designed to demonstrate the basic elements of livestock breeding, feeding, and management. Beef cattle, swine, and horses will be used. Evaluation of slaughter animals and carcasses is included.

AN SC 205 LIGHT HORSE MANAGEMENT 2 cr. (1 and 3)

The light horse industry—development of breeds and their uses. Breeding, feeding, and management of light horses. Fundamental instruction in equitation.

AN SC 301, H301 FEEDS AND FEEDING 3 cr. (3 and 0) F, S

Feed nutrients, digestion, metabolism of feedstuffs, feeding standards, and the balancing of rations. *Prerequisite:* An Sc 202 or equivalent, and Ch 201, or permission of instructor.

AN SC 303 LIVESTOCK EVALUATION 2 cr. (1 and 3)

This course is concerned with identification and determination of body traits that will ultimately affect the market grades and economic value of live animals and their carcasses. *Prerequisite:* An Sc 202.

AN SC 305 MEAT GRADING AND SELECTION 2 cr. (1 and 3) F, Even-numbered years.

Classification, grading and selection of beef, lamb and pork carcasses, and wholesale cuts. Factors influencing quality and value. Students enrolled in this course are eligible to compete in Intercollegiate Meat Judging Contests. *Prerequisite:* An Sc 202.

AN SC 306 LIVESTOCK SELECTION AND JUDGING 2 cr. (1 and 3) S Selection and breed characteristics of beef cattle, sheep, swine, and horses will be studied. Livestock terms useful for livestock breeders will be used. Students enrolled in this course are eligible to compete in the Southeastern Intercollegiate Livestock Judging Contest. *Prerequisite:* An Sc 202, 303.

AN SC 351 MEAT IDENTIFICATION AND UTILIZATION 1 cr. (0 and 3)

Selection of meat and identification of cuts, processing techniques, nutritive value, meat preservation, research techniques, muscles, and bones.

AN SC 353, H353 MEATS 2 cr. (2 and 0) F

The chemical and physical composition of meat, meat hygiene, nutritive value, curing, freezing, and meat by-products. *Prerequisite:* An Sc 202.

AN SC 355 MEATS LABORATORY 1 cr. (0 and 3) F

The selection and grading of meat animals and carcasses. Practical work in slaughtering of animals and in the cutting, curing, and freezing of meats. Emphasis is placed on the identification of wholesale and retail cuts. *Prerequisite:* An Sc 202.

AN SC 401, H401, 601 BEEF PRODUCTION 3 cr. (3 and 0) F

Breeding, feeding, management, and grading of beef cattle. Emphasis is placed on year-round grazing. *Prerequisite*: An Sc 301 or permission of instructor.

AN SC 403, H403, 603 BEEF PRODUCTION LABORATORY 1 cr. (0 and 3) F

Practical application of beef production practices. *Prerequisite:* An Sc 301 or permission of instructor.

AN SC 405 ADVANCED LIVESTOCK SELECTION AND EVALUATION 1 cr. (0 and 3) F, Odd-numbered years.

A continuation of An Sc 306 for students who are interested in participating in judging contests or in receiving special training in the selection of breeding cattle, sheep, and swine. Judging and grading of market classes are considered. *Prerequisite:* An Sc 306.

AN SC 406 SEMINAR 2 cr. (2 and 0) S

Special problems in animal production. Each student is given a subject on which he makes weekly reports before a seminar group. *Prerequisite:* An Sc 301 or permission of instructor.

AN SC 408, H408, 608 PORK PRODUCTION 3 cr. (3 and 0) S

Feeding, breeding, management, and marketing of hogs. Emphasis is placed on winter and summer forages, protein supplements, mineral mixtures, and sanitation practices. *Prerequisite:* An Sc 301 or permission of instructor.

AN SC 410, H410, 610 PORK PRODUCTION LABORATORY 1 cr. (0 and 3) S

Practical application of swine production practices are demonstrated. Grading, selection, feeding, management, and care of swine are given attention. *Prerequisite:* An Sc 301 or permission of instructor. AN SC 412, H412 HORSE SCIENCE 3 cr. (2 and 3)

Anatomy and physiology of the horse, emphasizing nutrition, reproduction, genetics, and management. Selection, unsoundness, parasites, and diseases are discussed. *Prerequisite:* An Sc 202 or permission of instructor.

AN SC 452, H452, 652 ANIMAL BREEDING 3 cr. (3 and 0) S

The fundamental principles relating to the breeding and improvement of livestock including variation, heredity, selection, line-breeding, inbreeding, crossbreeding, and other related subjects. *Prerequisite:* Gen 302.

AN SC 802 TOPICAL PROBLEMS 1-3 cr. (1-3 and 0)

AN SC 803 MEAT TECHNOLOGY 3 cr. (3 and 0)

AN SC 804 METHODS IN ANIMAL BREEDING 3 cr. (3 and 0)

AN SC 805 NUTRITION OF MEAT ANIMALS 3 cr. (3 and 0)

AN SC 891 MASTER'S RESEARCH. Credit to be arranged.

Architecture

Professors: J. E. Dalton, C. Fera, J. P. Holschneider, P. R. Lee, H. E. McClure, G. C. Means, Jr., K. J. Russo, G. B. Witherspoon, *Head*; J. L. Young

Associate Professors: D. L. Collins, R. D. Eflin, R. B. Norman, W. A. Phillips, G. M. Polk, Jr., J. R. Washburn

Assistant Professors: M. A. Davis, M. R. Hudson, J. D. Jacques, G. W. Patterson

Instructors: H. C. Harritos, R. T. Huff

Visiting Professor: F. G. Roth

Visiting Assistant Professor: L. Butera

ARCH 101 ARCHITECTURAL ANALYSIS 3 cr. (1 and 6)

An introduction to concepts and principles of architecture, construction, and visual arts through lectures, demonstrations and studio exercises.

ARCH 102 ARCHITECTURAL ANALYSIS 3 cr. (1 and 6) Continuation of Arch 101.

ARCH 253 ARCHITECTURAL DESIGN I 5 cr. (0 and 15)

Studio work with adjunct demonstrations and lectures concerned with basic architectural design problems. *Prerequisite:* Arch 102 or permission of instructor.

ARCH 254 ARCHITECTURAL DESIGN II 5 cr. (0 and 15) Continuation of Arch 253.

ARCH 353 ARCHITECTURAL DESIGN III 5 cr. (0 and 15)

Studio work with adjunct demonstrations and lectures concerned with intermediate architectural design problems. *Prerequisite:* Arch 254.

ARCH 354 ARCHITECTURAL DESIGN IV 5 cr. (0 and 15) Continuation of Arch 353. ARCH 403, 603 SEMINAR IN THE ANALYSIS AND CRITICISM OF ARCHITECTURAL AND TOWN BUILDING WORKS 3 cr. (3 and 0)

A seminar in the analysis and criticism of architectural and town building works. The course sequence will include historic and contemporary examples, literary searches, field trips, essays, and oral reports. *Prerequisite:* Fourth year design standing or permission of instructor.

ARCH 404, 604 CURRENT DIRECTIONS IN ARCHITECTURE 3 cr. (3 and 0)

The critical analysis of the development and current directions of modern movements in architecture. *Prerequisite:* Senior standing or permission of instructor.

ARCH 421 ARCHITECTURAL SEMINAR 3 cr. (3 and 0)

Lectures and seminars dealing with pertinent topics related to environmental and technological considerations in architecture and the building industry. *Prerequisite:* Senior standing or permission of instructor.

ARCH 453 ARCHITECTURAL DESIGN V 5 cr. (0 and 15)

Studio work with adjunct demonstrations and lectures concerned with advanced architectural design problems. *Prerequisite:* Arch 354.

ARCH 454 ARCHITECTURAL DESIGN VI 5 cr. (0 and 15) Continuation of Arch 453.

ARCH 481, 681 ARCHITECTURAL OFFICE PRACTICE 3 cr. (3 and 0) General consideration of architectural office procedure. Study of the professional relationship of the architect to client and contractor, including problems of ethics, law, and business.

ARCH 485, 685 HEALTH CARE DELIVERY SYSTEMS AND HEALTH CARE FACILITIES SEMINAR 3 cr. (3 and 0)

This course introduces the concepts, organization, and direction of health and health care services within the context of health care delivery systems. Special emphasis is placed on mental and physical health care facilities concepts.

ARCH 488, 688 HEALTH CARE FACILITIES PROGRAMMING TECHNIQUES 3 cr. (2 and 3)

Seminar on recent research and innovations in health care facilities programming, and original investigation of assigned programming problems.

ARCH 490 DIRECTED STUDIES 1-5 cr.

Comprehensive studies and research of special topics not covered in other courses. Emphasis will be placed on field studies, research activities, and current developments in architecture.

ARCH 553 ARCHITECTURAL DESIGN VII 9 cr. (3 and 18)

City planning design and the development of complex building solutions.

ARCH 554 ARCHITECTURAL DESIGN VIII 9 cr. (3 and 18)

The programming and solution of complex building design problems including interior and site development.

Note: A minimum grade of C is prerequisite for advancement to the next level design studio (Arch 101, 102, 253, 254, 353, 354, 453, 454).

ARCH 559 TERMINAL PROJECT IN ARCHITECTURE 9 cr. (1 and 24) The student will select an appropriate architectural problem, conduct adequate research, prepare a comprehensive program, and make a complete oral, written, and visual presentation of his solution.

ARCH 853 ARCHITECTURAL STUDIES 6-9 cr. (0 and 18-27)

ARCH 854 ARCHITECTURAL STUDIES 6-9 cr. (0 and 18-27)

ARCH 857 ARCHITECTURAL STUDIES 9 cr. (0 and 27)

- ARCH 858 PRELIMINARY THESIS OR TERMINAL PROJECT 3 cr. (1 and 6)
- ARCH 859 TERMINAL PROJECT 1-12 cr. (0 and 3-36)

ARCH 886 HEALTH CARE FACILITIES COMPONENTS AND FUNCTIONS 3 cr. (2 and 3)

ARCH 890 DIRECTED STUDIES 1-5 cr.

ARCH 891 ARCHITECTURAL THESIS 1-12 cr. (0 and 3-36)

Architecture Overseas Program

At the Overseas Center for Building Research and Urban Study in Genoa, Italy, courses are offered to fifth-year students in Architecture, City and Regional Planning, and Visual Studies and fourth-year students in Building Science.

CA 412, 612 DIRECTED RESEARCH IN ARCHITECTURAL HISTORY 3 cr. (1 and 6)

Original investigations and research related to specific historic structures; studies may include measured drawings, restoration, and proposals for adaptive use. Required course for all participants of the Overseas Program. *Prerequisite:* Postgraduate or graduate standing in the College of Architecture, Senior standing in Building Science or acceptance in the Bachelor of Architecture program.

CA 420, 620 VISUAL STUDIO 3 cr. (0 and 9)

Field drawing and sketching and other documentation of important European architectural and landscape subjects. The course content will include gallery visits and adjunct lectures. (May be substituted for one semester of undergraduate or graduate visual arts studio.) *Prerequisite:* Postgraduate or graduate standing in the College of Architecture, Senior standing in Building Science, or acceptance in the Bachelor of Architecture program.

CA 442, 642 BUILDING SCIENCE STUDIO 9 cr. (3 and 18)

Comparative studies of European and American methods of building construction and construction management and may include appropriate construction drawings. (May be substituted for BldSc 402, 442.) *Prerequisite:* Senior standing in Building Science.

CA 550 ARCHITECTURAL STUDIO 9 cr. (3 and 18)

Comprehensive architectural studio programs for central city structures. Problems will be related to other studio project areas concurrent in Overseas Center. (May be substituted for Arch 553, 554. Limited to Bachelor of Architecture degree candidates or postgraduates.) *Prerequisite:* Postgraduate standing in the College of Architecture or acceptance in the Bachelor of Architecture program.

- CA 850 ARCHITECTURAL STUDIO 9 cr. (3 and 18)
- CA 860 PLANNING STUDIO 9 cr. (3 and 3-18)

CA 880 VISUAL ARTS STUDIO 9 cr. (3 and 18)

Art and Architectural History

Professors: J. T. Acorn, Head; H. N. Cooledge, Jr., V. S. Hodges, R. H. Hunter Associate Professors: T. E. McPeak, I. G. Regnier, S. Wang

Assistant Professors: M. R. Hudson, J. B. Mulholland, J. A. Stockham, M. V. Vatalaro

AAH 215 ARCHITECTURAL HISTORY I 3 cr. (3 and 0)

Total Environment: its demands and restrictions, as evidenced by the building and planning of men from ancient times to the present.

AAH 216 ARCHITECTURAL HISTORY II 3 cr. (3 and 0) Continuation of AAH 215.

AAH 303 EVOLUTION OF VISUAL ARTS I 3 cr. (3 and 0)

A consideration of man's necessity for and development of the visual arts in the Western World from ancient times to the Renaissance. Illustrated lectures and collateral reading.

AAH 304 EVOLUTION OF VISUAL ARTS II 3 cr. (3 and 0)

Development and utilization of the visual arts in the Western World from the Renaissance through modern times; illustrated lectures and collateral reading.

AAH 315 ARCHITECTURAL HISTORY III 3 cr. (3 and 0)

Cultural Focus: its problems and expression, as evidenced by selected examples of architecture and planning from ancient times to the present, considered in depth. *Prerequisite:* AAH 216.

AAH 316 ARCHITECTURAL HISTORY IV 3 cr. (3 and 0) Continuation of AAH 315.

AAH 411, 611 DIRECTED RESEARCH IN ART HISTORY 3 cr. (3 and 0)

Comprehensive studies and research of special topics not covered in other courses. Emphasis will be placed on field studies, research activities, and current developments in art history.

AAH 412, 612 DIRECTED RESEARCH IN ART HISTORY 3 cr. (3 and 0)

Continuation of AAH 411.

AAH 413, 613 TWENTIETH CENTURY VISUAL ARTS 3 cr. (3 and 0) A consideration of the visual arts in the 20th century in relation to the factors that have influenced the artist and the consequence of his/her production to society.

AAH 417, 617 STUDIES IN THE ART AND ARCHITECTURE OF THE ANCIENT WORLD I 3 cr. (3 and 0)

A consideration of the visual arts and architectural monuments of the Ancient World (Egypt, the Near East, Greece, and Rome), with a study in depth of selected examples from the period. Prerequisite: AAH 316 or permission of instructor.

AAH 418, 618 STUDIES IN THE ART AND ARCHITECTURE OF THE ANCIENT WORLD II 3 cr. (3 and 0)

A consideration of the visual arts and architectural monuments of the Ancient World (Egypt, the Near East, Greece, and Rome), with a study in depth of selected examples from the period. *Prerequisite:* AAH 417.

AAH 419, 619 STUDIES IN THE ART AND ARCHITECTURE OF THE EARLY MIDDLE AGES 3 cr. (3 and 0)

A consideration of the visual arts and architectural monuments of the Early Middle Ages (Byzantium and Western Europe from the 4th through 12th centuries), with a study in depth of selected examples from the period. *Prerequisite:* AAH 316 or permission of instructor.

AAH 420, 620 STUDIES IN THE ART AND ARCHITECTURE OF THE LATE MIDDLE AGES 3 cr. (3 and 0)

A consideration of the visual arts and architectural monuments of the Late Middle Ages (Western Europe from the 12th through the 15th centuries), with a study in depth of selected examples from the period. *Prerequisite:* AAH 419.

AAH 423, 623 STUDIES IN THE ART AND ARCHITECTURE OF THE RENAISSANCE I 3 cr. (3 and 0)

A consideration of the visual arts and architectural monuments of the Renaissance (Western Europe from the 15th through the 18th centuries), with a study in depth of selected examples from the period. *Prerequisite:* AAH 316 or permission of instructor.

AAH 424, 624 STUDIES IN THE ART AND ARCHITECTURE OF THE RENAISSANCE II 3 cr. (3 and 0)

A consideration of the visual arts and architectural monuments of the Renaissance (Western Europe from the 15th through the 18th centuries), with a study in depth of selected examples from the period. *Prerequisite:* AAH 423.

AAH 429, 629 STUDIES IN THE ART AND ARCHITECTURE OF INDIA AND THE FAR EAST 3 cr. (3 and 0)

A consideration of the visual arts and architectural monuments of India and the Far East, with a study in depth of selected examples from the period. *Prerequisite:* AAH 316 or permission of instructor.

AAH 815 HISTORY SEMINAR I 3 cr. (3 and 0)

AAH 816 HISTORY SEMINAR II 3 cr. (3 and 0)

Astronomy

Professors: B. B. Bookmyer, J. R. Ray Assistant Professor: T. F. Collins

ASTR 101 SOLAR SYSTEM ASTRONOMY 3 cr. (3 and 0)

A descriptive survey of the universe, with emphasis on basic physical concepts and the objects in our solar system, is presented. Related topics of current interest will be included. For nonscience majors. This course may not be taken by a student who has completed Astr 301.

ASTR 102 STELLAR ASTRONOMY 3 cr. (3 and 0)

A descriptive survey of the universe, with emphasis on basic physical concepts and galatic and extragalactic objects, is presented. Related topics of current interest will be included. For nonscience majors. This course may not be taken by a student who has completed Astr 302.

ASTR 103 SOLAR SYSTEM ASTRONOMY LABORATORY 1 cr.

(0 and 2)

Optional laboratory to accompany Astr 101. Demonstrations, laboratory exercises, planetarium visits, and a night laboratory, using a small telescope, will supplement the lecture course. *Corequisite*: Registration in Astr 101.

ASTR 104 STELLAR ASTRONOMY LABORATORY 1 cr. (0 and 2)

Optional laboratory to accompany Astr 102. Demonstrations, laboratory exercises, planetarium visits, and a night laboratory, using a small telescope, will supplement the lecture course. *Corequisite:* Registration in Astr 102.

ASTR 208 SELECTED TOPICS IN MODERN ASTRONOMY 3 cr. (3 and 0)

Discrete topics of current interest to be selected by participants and lecturers from such areas as distance determination, pulsars, quasars, radio astronomy, current space program, instellar communication, meteorites, nucleosynthesis, variable stars, stellar evolution. *Prerequisite:* One semester of astronomy or permission of instructor.

ASTR 301 GENERAL ASTRONOMY 3 cr. (3 and 0)

Basic physical concepts necessary to an understanding of the objects in our solar systems are presented. Films, planetarium visits, and one observing session with a small telescope supplement the text. For physical science, mathematical sciences, or engineering majors. This course may not be taken by a student who has completed Astr 101. *Prerequisite:* Math 106.

ASTR 302 GENERAL ASTRONOMY 3 cr. (3 and 0)

Basic physical concepts necessary to an understanding of our stellar system and the observable universe beyond our galaxy are discussed. Films, planetarium visits, and one observing session with a small telescope supplement the text. For physical science, mathematical sciences, or engineering majors. This course may not be taken by a student who has completed Astr 102. *Prerequisite:* Math 106.

ASTR 307 COSMOLOGY 3 cr. (3 and 0)

A study of the large-scale structure of the universe. Discussion of experimental results includes optical, microwave, and radio observations. Evolutionary models which agree with current observations are discussed. *Prerequisite:* Astr 102. ASTR 407, 607 INTRODUCTION TO ASTROPHYSICS 3 cr. (3 and 0) Selected topics in astrophysics including motions and magnitudes of stars, radiation laws, and details of stellar spectra. *Prerequisite:* Astr 302 or permission of instructor.

ASTR 408, 608 INTRODUCTION TO GALACTIC ASTRONOMY 3 cr. (3 and 0)

Survey of the fundamental observational data necessary to an understanding of the structure of our Milky Way system. Emphasis on the physical properties of stars, stellar distribution, distance determination, and solar motion. *Prerequisite:* Astr 302 or permission of instructor.

ASTR 412, 612 SPHERICAL ASTRONOMY 3 cr. (3 and 0)

Selected topics in spherical astronomy, including the applications of spherical trigonometry to the celestial sphere. Time, refraction, aberration, precession, nutation, stellar motions, and instrumental errors will be discussed. *Prerequisite:* Astr 302.

ASTR 421, 621 INTRODUCTION TO RADIO ASTRONOMY 3 cr. (3 and 0)

A survey of the fundamentals of radio astronomy. Wave propagation, polarization, emission mechanisms and receiver characteristics are discussed. A summary of astronomical radio sources will be included. *Prerequisite:* Astr 302.

ASTR 701 SOLAR SYSTEM ASTRONOMY FOR HIGH SCHOOL TEACHERS 3 cr. (3 and 0)

ASTR 711 STELLAR ASTRONOMY FOR HIGH SCHOOL TEACHERS 3 cr. (3 and 0)

ASTR 875 SEMINAR IN CONTEMPORARY ASTRONOMY 1-3 cr. (1-3 and 0)

Automatic Control

AC 410, 610 INTRODUCTION TO DIGITAL CONTROL 3 cr. (3 and 0) Digital and sampled data systems including impulse modulation and Ztransforms; basic logic circuits; minicomputer architecture, organization and programming; interfacing concepts and application and operation of digital computers in a realtime environment. *Prerequisite*: ME 302 or equivalent.

AC 810 MODELING AND CONTROL OF ENGINEERING SYSTEMS 3 cr. (3 and 0)

- AC 811 MODERN CONTROL THEORY 3 cr. (3 and 0)
- AC 815 NONLINEAR CONTROLS 3 cr. (3 and 0)
- AC 820 DIGITAL CONTROL 3 cr. (3 and 0)
- AC 910 ADAPTIVE AND OPTIMAL CONTROL 3 cr. (3 and 0)

Biochemistry

Professors: D. M. Henricks, J. M. Shively, Head

Associate Professors: J. J. Jen, G. L. Powell, J. K. Zimmerman

Assistant Professors: C. S. Brown, D. R. Helms, R. H. Hilderman, D. C. Speckhard

Adjunct Professors: E. E. Baillie, J. H. Keffer

BIOCH 101 MOLECULES AND MAN 1 cr. (1 and 0)

An introduction to the structure and function(s) or effect(s) of some biological molecules important to man.

BIOCH 102 MOLECULES AND MAN 1 cr. (1 and 0)

An introduction to the structure and function(s) or effect(s) of some biological molecules important to man.

BIOCH 210 ELEMENTARY BIOCHEMISTRY 4 cr. (3 and 3)

A discussion of the kinds of compounds found in living organisms, their biochemical reactions and significance. The laboratory work parallels class-room study. *Prerequisite:* Ch 102.

BIOCH 301 MOLECULAR BIOLOGY 3 cr. (3 and 0)

An introduction to the nature, production, and replication of biological structure at the molecular level and its relation to function. *Prerequisite:* Organic chemistry.

BIOCH 302 MOLECULAR BIOLOGY LABORATORY 1 cr. (0 and 3)

A laboratory to accompany Bioch 301. An introduction to fundamental laboratory techniques in biochemistry and molecular biology and a demonstration of some of the fundamental principles of molecular biology discussed in Bioch 301. *Prerequisite:* Organic chemistry. *Corequisite:* Bioch 301.

BIOCH 406, 606 PHYSIOLOGICAL CHEMISTRY 3 cr. (3 and 0)

The chemical basis of the mammalian physiological processes of muscle contraction, nerve function, respiration, kidney function, and blood homeostasis is studied. Composition of specialized tissue such as muscle, nerve, blood and bone, and regulation of water, electrolytes and acid-base balance is discussed. *Prerequisite:* Bioch 210 or organic chemistry.

BIOCH 408, 608 PHYSIOLOGICAL CHEMISTRY LABORATORY 1 cr. (0 and 3)

Experiments will be conducted that illustrate biochemical methodology. The use of radioisotopes, chromatography, and procedures used in the clinical biochemical laboratory will be emphasized. *Prerequisite:* Registration in Bioch 406.

BIOCH 422, 622 A PHYSICAL APPROACH TO BIOCHEMISTRY 3 cr. (3 and 0)

The study of chemical and physical properties of amino acids, lipids, nucleic acids, sugars and their biopolymers. Physical and mathematical analyses will be correlated with biological structure and function. *Prerequisite:* Organic chemistry and one semester of physical chemistry.

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BIOCH 423, 623 PRINCIPLES OF BIOCHEMISTRY 3 cr. (3 and 0) The study of the chemistry of amino acids, monosaccharides, fatty acids, purines, pyrimidines and associated compounds leads to an understanding of their properties and the relationship between structure and function that make them important in biological processes. The use of modern techniques is stressed. Prerequisite: Ch 224 or equivalent. BIOCH 424, 624 PRINCIPLES OF BIOCHEMISTRY 3 cr. (3 and 0) A continuation of Bioch 423. BIOCH 425, 625 GENERAL BIOCHEMISTRY LABORATORY 1 cr (0 and 3)Experiments selected to illustrate current methods used in biochemical research. BIOCH 426, 626 GENERAL BIOCHEMISTRY LABORATORY 1 cr. (0 and 3)A continuation of Bioch 425. BIOCH 491 SPECIAL PROBLEMS IN BIOCHEMISTRY 1-3 cr. (0 and 3-9)Orientation: i.e., experimental planning, execution, and reporting in biochemical research. Prerequisite: Senior standing. BIOCH 810 ADVANCED BIOCHEMICAL TECHNIOUES 1-3 cr. (0 and 3-9)BIOCH 815 LIPIDS AND BIOMEMBRANES 3 cr. (3 and 0) CHEMISTRY AND METABOLISM OF HORMONES BIOCH 817 3 cr. (3 and 0)BIOCH 819 REGULATION OF INTERMEDIARY METABOLISM 3 cr. (3 and 0)BIOCH 820 NUCLEIC ACIDS AND PROTEIN BIOSYNTHESIS 3 cr. (3 and 0)PROTEINS 3 cr. (3 and 0) BIOCH 821 BIOCH 822 ENZYMES 3 cr. (3 and 0)BIOCH 824 CELLULAR REGULATION AT THE MOLECULAR LEVEL 3 cr. (3 and 0) BIOCH 831 PHYSICAL BIOCHEMISTRY 3 cr. (3 and 0) BIOCH 851 BIOCHEMISTRY SEMINAR 1 cr. (1 and 0) ADVANCED TOPICS 1-3 cr. (1-3 and 0) BIOCH 871 BIOCH 891 MASTER'S RESEARCH. Credit to be arranged. PIOCH 991 DOCTORAL RESEARCH. Credit to be arranged

Bioengineering

Professors: D. W. Bradbury, W. E. Castro, J. S. Wolf

Associate Professors: F. W. Cooke, Head; G. H. Kenner, D. D. Moyle, H. Scott, F. R. Sias, Jr.

Assistant Professors: B. P. Keane, J. B. Park

Visiting Instructor: E. M. O'Brien

Adjunct Professors: J. P. Boineau, J. S. Dusenbury, Jr., T. S. Hargest, E. M. Lunceford, Jr., R. R. Moore, J. R. Pruitt, F. H. Stelling

BIOE 233 INTRODUCTION TO ENGINEERING IN SPORTS 3 cr. (3 and 0)

Application of engineering concepts and methods to sports, including the design of sports equipment (e.g., playing surfaces, helmets, pads, and shoes), biomechanical analyses of sports injuries, and rehabilitation. *Prerequisite:* Sophomore standing or permission of instructor.

BIOE 301 ENGINEERING ASPECTS OF BIOLOGY AND MEDICINE 2 cr. (2 and 0)

The relationships of various branches of engineering to biology and medicine. Structural engineering, fluid flow, and mass transfer in living systems. Artificial organs, biomaterials, implants, instrumentation, and other engineering challenges are discussed.

BIOE 302 BIOMATERIALS 2 cr. (2 and 0)

Engineering testing and classification of biomaterials (stress, strain, viscosity, impact resistance, ductility, corrosion resistance, wear resistance); prostheses; artificial organs; effect of body environment on synthetic materials; methods for designing new materials. *Prerequisite:* BioE 301.

BIOE 303 ARTIFICIAL ORGANS 3 cr. (3 and 0)

This course is designed to provide engineering, and biological and physical science students with an insight into the problems associated with replacing parts of the human body with artificial devices. Lectures will be supplemented with demonstrations, medical films, and field trips. *Prerequisite:* Junior standing or permission of instructor.

BIOE 320 INTRODUCTION TO STRUCTURAL BIOMECHANICS 2 cr. (2 and 0)

Introduction to the analysis of the mechanical function of the human body and the effect of external forces on the body. Includes movement of the musculo-skeletal system (e.g., walking) and effect of vibration and impact. *Prerequisite:* BioE 301.

BIOE 401, 601 COMPUTERS FOR BIOSCIENTISTS 1 cr. (1 and 0)

Analog and digital simulation of biochemical and biological processes. Systems approaches, dynamic analysis, interactions between laboratory research and computer models. *Prerequisite:* One semester of calculus or permission of instructor.

BIOE 402, 602 MEDICAL APPLICATIONS OF ENGINEERING 3 cr. (3 and 0)

A survey of the applications of physical principles to health science. Topics included are production and detection of X-rays, diagnostic radiology and radiation therapy, nature of radioactive emissions, relative biological effective-

radiation therapy, nature of radioactive emissions, relative biological effectiveness, nuclear medicine, radiation protection, surgical uses of lasers, cryogenics, cryobiology and cryosurgery, ultrasound, electrosurgery. *Prerequisite:* General chemistry.

BIOE 415, 615 DENTAL MATERIALS 2 cr. (2 and 0)

An interdisciplinary course which reviews the biological and engineering aspects of dental materials. Topics: Properties and Structure of Materials (polymers, metals, alloys, ceramics, composites, degradation of materials in oral environment) and Applied Dental Materials (cement, amalgam, impression materials, gypsum compounds, waxes, gold and its alloys, base metal alloys, polymers applied in dentistry, recent advances in dental implant materials). *Prerequisite:* CH 220 or CH 223 and Phys 208.

BIOE 450, 650 SPECIAL TOPICS IN BIOMEDICAL ENGINEERING 1-4 cr. (0-4 and 12-0)

A comprehensive study of a topic of current interest in the field of biomedical engineering. May be taken for credit more than one time. *Prerequisite:* Permission of instructor.

BIOE 800 SEMINAR IN BIOENCINEERING 1 cr. (1 and 0)

BIOE 801 BIOMATERIALS 3 cr. (3 and 0)

BIOE 802 RESEARCH TECHNIQUES IN BIOMATERIALS EVALUATION 3 cr. (1 and 6)

BIOE 803 POLYMERS AS BIOMATERIALS 3 cr. (3 and 0)

BIOE 820 STRUCTURAL BIOMECHANICS 3 cr. (3 and 0)

BIOE 846 ELEMENTS OF BIOENGINEERING I 3 cr. (3 and 0)

BIOE 847 ELEMENTS OF BIOENGINEERING II 3 cr. (3 and 0)

BIOE 850 SPECIAL TOPICS IN BIOMEDICAL ENGINEERING 1-4 cr. (0-4 and 12-0)

BIOE 870 BIOINSTRUMENTATION 3 cr. (2 and 2)

BIOE 880 APPLIED HEALTH ENGINEERING LABORATORY 1 cr. (0 and 3)

BIOE 882 EXPERIMENTAL SURGERY 3 cr. (1 and 4)

BIOE 890 INTERNSHIP 1-5 cr. (0 and 8-40)

BIOE 891 MASTER'S RESEARCH. Credit to be arranged.

BIOE 991 DOCTORAL RESEARCH. Credit to be arranged.

Biology

Assistant Professors: D. R. Helms, S. B. Miller Instructors: M. M. Allan, R. N. Holmes

BIOL 103 GENERAL BIOLOGY I 3 cr. (3 and 0)

The first course in a two-semester sequence on the fundamentals of biology. The course emphasizes the structural, molecular, and energetic basis of cellular activities and the classical and modern investigations that illustrate plants as functional units.

BIOL 104 GENERAL BIOLOGY II 3 cr. (3 and 0)

A continuation of Biol 103 that emphasizes animals as functional units, the principles and mechanisms of evolution, diversity of organisms, and the principles of ecology. *Prerequisite:* Biol 103.

BIOL 105 GENERAL BIOLOGY LABORATORY I 1 cr. (0 and 3)

A laboratory course that illustrates through experimentation, observation, and demonstration the structure and activities of cells and plants. The course is strongly recommended for students taking Biol 103. *Corequisite:* Biol 103.

BIOL 106 GENERAL BIOLOGY LABORATORY II 1 cr. (0 and 3)

A laboratory course that illustrates through experimentation, observation, and demonstration the structure and function of animals, some concepts of genetics, evolution, ecology, and the diversity of microbes, plants, and animals. The course is strongly recommended for students taking Biol 104. *Corequisite:* Biol 104.

BIOL 110 PRINCIPLES OF BIOLOGY I 5 cr. (4 and 3)

An introductory course designed for students that major in biological disciplines of the College of Sciences. The course integrates lecture and laboratory and emphasizes a modern, quantitative and experimental approach to explanations of the structure, composition, dynamics, interactions, and evolution of cells, organisms, populations, and communities. *Corequisite:* Ch 101.

BIOL 111 PRINCIPLES OF BIOLOGY II 5 cr. (4 and 3) A continuation of Biol 110. *Prerequisite:* Biol 110.

Botany

Professors: R. P. Ashworth, N. D. Camper, C. J. Umphlett, Head; J. B. Whitney, Jr.

Associate Professors: C. R. Dillon, L. A. Dyck, T. M. McInnis, Jr.

Assistant Professors: R. E. Ballard, J. E. Fairey III, S. B. Miller

Instructor: R. N. Holmes

Adjunct Professor: L. J. Tilly

BOT 145 ENVIRONMENTAL DYNAMICS 2 cr. (2 and 0)

A nontechnical ecology course designed to aid in understanding the natural world and how it operates. Taught in the jargon of the mass media, it is designed for nonbiologists though biology students may find that it helps in assimilation of the major ecological concepts.

BOT 201 FIELD BOTANY 3 cr. (1 and 4)

An introductory study of the classification, ecology, and natural history of plants native to South Carolina. Emphasis is on fieldwork which requires visits to many terrestrial and aquatic environments for observation and study of plant diversity. *Prerequisite:* Introductory biology.

BOT 202 SURVEY OF THE PLANT KINGDOM 4 cr. (3 and 3)

A survey of the major groups of plants, their structure, development, and reproduction. Evolutionary relationships as exemplified by comparisons of body organization and life cycles will be emphasized. *Prerequisite:* Introductory biology.

Note: Credit toward a degree will be given for only one sequence of the following: Biol 110 or 103, 105 followed by Biol 111 or 104, 106 dependent on the requirements for the major.

BOT 221 MEDICAL BOTANY 2 cr. (2 and 0) S

A nontechnical course dealing with plant-originated drugs and substances used in modern treatment of physical and mental maladies of man will be studied along with plant products historically associated with folk medicine. Plants producing substances which are remedial, psychoactive, poisonous, carcinogenic, antibiotic, hallucinogenic, and others are included in this study. *Prerequisite:* Biol 103, 105 or 110, 111, or permission of instructor.

BOT 254 PLANT STRUCTURE 2 cr. (2 and 0) S, Odd-numbered years.

Consideration of the structure of seed plants, including external and internal organization of seeds, roots, stems, leaves, flowers, and fruits. Designed for students desiring a basic knowledge of plant organization; not open to Botany majors.

BOT 331, 631 INTRODUCTORY PLANT TAXONOMY 3 cr. (2 and 3) The identification, classification, distribution, and interrelationships of vascular plants, with emphasis on the flora of South Carolina. *Prerequisite:* Introductory biology.

BOT 411, 611 INTRODUCTORY MYCOLOGY 3 cr. (2 and 3) F, Evennumbered years.

An introduction to all the groups of fungi and some related organisms with considerations of the morphology, cytology, growth, reproduction, and culture of selected forms. *Prerequisite:* Bot 202 or Zool 201, or permission of instructor.

BOT 413, 613 PHYCOLOGY 3 cr. (2 and 3) S, Odd-numbered years.

An introduction to the biology of algae. Consideration is given to the structure, classification, evolution, natural history, physiology, and ecology of all algal groups. Laboratory emphasizes collection and identification of both freshwater and marine organisms. *Prerequisite*: Introductory biology or permission of instructor.

BOT 421, 621 PLANT PHYSIOLOGY 4 cr. (3 and 3)

The relations and processes which have to do with the maintenance, growth, and reproduction of plants, including absorption of matter and energy, water relations of the plant, utilization of reserve products and liberation of energy. *Prerequisite:* Ch 101, 102, Phys 207 or 221 and 223.

BOT 432, 632 PLANT GEOGRAPHY 3 cr. (3 and 0) S, Odd-numbered years.

A descriptive study of the origin, distribution, and adaptations of plants and associations of plants as influenced by certain factors including climate, genetics, and cultural developments. Emphasis will be on the major flora provinces of North America. *Prerequisite:* Introductory biology or permission of instructor.

BOT 435, 635 PLANT BIOSYSTEMATICS 3 cr. (3 and 0)

Examination of species concepts and factors affecting the formation of species. *Prerequisite:* Bot 331, Gen 302, or permission of instructor.

BOT 437, 637 PHYLOGENY OF ANGIOSPERMS 3 cr. (3 and 0) F, Even-numbered years.

A study of the origin, evolution, dispersal, morphological specialization, and geologic history of the angiosperms. *Prerequisite:* Bot 331, 455, or permission of instructor.

BOT 441, 641 PLANT ECOLOGY 3 cr. (2 and 3)

Detailed study of the effect of environment on plants and plants on environment. Identification and analysis of interrelated biotic and abiotic factors which affect the structure and distribution of plant systems and consideration of plant systems dynamics through levels of increasing biological complexity. *Prerequisite:* Introductory biology.

BOT 446, 646 BIOLOGICAL OCEANOLOGY 4 cr. (3 and 3)

A study of the biological constituents of the oceans and the chemical and physical characteristics of salt water as related to the marine biota. Laboratories will provide practical experience in the analysis of biological communities and the physical-chemical factors controlling them. *Prerequisite:* Bot 202, Zool 201, general chemistry, or permission of instructor.

BOT 451, 651 PLANT ANATOMY 4 cr. (3 and 3)

Studies of the origin, development, and comparative structures of tissues, systems, and organs of higher plants. *Prerequisite:* Introductory biology, Bot 202, or permission of instructor.

BOT 455, 655 VASCULAR PLANT MORPHOLOGY 4 cr. (3 and 3)

Consideration of the structure, reproduction, and phylogenetic relationships of representative vascular plants. *Prerequisite:* Introductory biology, Bot 202, or permission of instructor.

BOT 456, 656 PLANT MICROTECHNIQUE 2 cr. (0 and 6) S, Evennumbered years.

Application of the principles of microtechnique involved in the fixing, cutting, and staining of plant tissues. *Prerequisite:* Bot 451, 455, or permission of instructor.

BOT 461, 661 CYTOLOGY 3 cr. (3 and 0) S, Even-numbered years.

Detailed consideration of the general and ultrastructural morphology of plant cells, cell division, and cell differentiation. A lecture course considering both the classical and contemporary knowledge of cell structure and development. *Prerequisite:* Introductory biology.

BOT 491 SPECIAL PROBLEMS IN BOTANY 2-4 cr. (0 and 6-12)

Research problems in selected areas of botany to provide an introduction to research planning and techniques for Botany majors. *Prerequisite:* Senior standing and permission of the department head.

BOT 701 EVOLUTIONARY BOTANY FOR TEACHERS 3 cr. (2 and 3)

BOT 702 MODERN BOTANICAL CONCEPTS FOR TEACHERS 3 cr. (3 and 0)

BOT 805 SPECIAL PROBLEMS IN BOTANY. Credit to be arranged.

- BOT 807 SEMINAR 1 cr. (1 and 0)
- BOT 811 ADVANCED MYCOLOGY I 4 cr. (3 and 3)
- BOT 812 ADVANCED MYCOLOGY II 4 cr. (3 and 3)
- BOT 815 PHYCOLOGY COLLOQUIUM 3 cr. (3 and 0)
- BOT 821 INORGANIC PLANT METABOLISM 4 cr. (3 and 3)
- BOT 822 ORGANIC PLANT METABOLISM 3 cr. (3 and 0)

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BOT 823 PLANT GROWTH AND DEVELOPMENT 3 cr. (3 and 0)

BOT 824 MODE OF ACTION OF GROWTH SUBSTANCES 4 cr. (3 and 3)

BOT 826 PHYSIOLOGY OF THE FUNGI 3 cr. (3 and 0)

BOT 831 ADVANCED PLANT TAXONOMY 3 cr. (2 and 3)

BOT 861 PLANT CELL BIOLOGY 3 cr. (3 and 0)

BOT 891 MASTER'S RESEARCH. Credit to be arranged.

BOT 991 DOCTORAL RESEARCH. Credit to be arranged.

Building Science

Professor: R. E. Knowland, Head

Associate Professors: C. L. Addison, N. L. Book, L. H. Brown, M. D. Egan, C. R. Mitchell, H. W. Webb

BLDSC 201 BUILDING SCIENCE I 3 cr. (3 and 0)

A study of physical and environmental requirements for architectural spaces with emphasis on a conceptual understanding of structural behavior and construction principles.

BLDSC 202 BUILDING SCIENCE II 3 cr. (2 and 2)

Introduction to structural theory with an emphasis on conceptual understanding and behavior and construction principles. *Prerequisite:* BldSc 201, Math 106.

BLDSC 241 CONSTRUCTION MANAGEMENT I 5 cr. (3 and 6)

Introduction to construction methods and materials. Study of construction documents including working drawings, specifications, and contracts. Preparation of quantity surveys and participation in field studies. *Prerequisite:* Sophomore standing.

BLDSC 242 CONSTRUCTION MANAGEMENT II 5 cr. (3 and 6)

Critical analysis of construction methods with specific emphasis on estimating, scheduling, and resource leveling. *Prerequisite:* BldSc 241.

BLDSC 301 BUILDING SCIENCE III 3 cr. (3 and 0)

Theory of acoustical design and control in the built environment. Theory of human thermal comfort and principles of heating and air conditioning buildings. *Prerequisite:* Junior standing.

BLDSC 302 BUILDING SCIENCE IV 3 cr. (3 and 0)

Theory and design of simple determinate steel and wood structures with emphasis on the conceptual understanding of structural systems. *Prerequisite*: BldSc 202.

BLDSC 341 CONSTRUCTION MANAGEMENT III 5 cr. (3 and 6)

Continuation of BldSc 242 with emphasis on the application of cybernetics to the construction industry. *Prerequisite:* BldSc 242.

BLDSC 342 CONSTRUCTION MANAGEMENT IV 5 cr. (3 and 6)

Study of labor and management relations in the construction industry with emphasis on work improvement and those factors that influence productivity. *Prerequisite:* Junior standing. BLDSC 401 BUILDING SCIENCE V 3 cr. (3 and 0)

Theory and design of simple reinforced concrete structures with emphasis on the conceptual understanding of structural systems. *Prerequisite*: BldSc 302.

BLDSC 402 BUILDING SCIENCE VI 3 cr. (3 and 0)

Theory of illumination for the built environment. Basic theory of fire protection and life safety in buildings. Design concepts for building energy conservation. *Prerequisite:* Senior standing.

BLDSC 432, 632 CONSTRUCTION MANAGEMENT V 3 cr. (3 and 0)

Design and erection of formwork for reinforced concrete. Selection, financing, and management of construction equipment. *Prerequisite:* BldSc 202. *Corequisite:* BldSc 441.

BLDSC 441 CONSTRUCTION MANAGEMENT VI 5 cr. (3 and 6)

A study of construction economics with specific emphasis on capital budgeting, decision making and investment theory. *Prerequisite:* Acct 202, Econ 202, and Senior standing.

BLDSC 442 CONSTRUCTION MANAGEMENT VII 5 cr. (3 and 6)

Preparation of detailed estimates, resource allocation, scheduling and contractual documents. Comprehensive studies and research in special topics selected by individual students. *Prerequisite:* BldSc 441, Law 312, or permission of instructor.

BLDSC 461, 661 CONSTRUCTION ECONOMIC SEMINAR 3 cr. (3 and 0)

Studies in urban and building economics.

BLDSC 471, 671 ARCHITECTURAL STRUCTURAL SEMINAR 3 cr. (3 and 0)

The application of structural theory to the development of building systems. *Prerequisite:* BldSc 401 or permission of instructor.

BLDSC 472, 672 ARCHITECTURAL STRUCTURAL SEMINAR 3 cr. (3 and 0)

Analysis of architectural structures with special emphasis on shells and space frames. *Prerequisite:* BldSc 471.

BLDSC 473, 673 ARCHITECTURAL STRUCTURAL SEMINAR 3 cr. (3 and 0)

The analysis of advanced structural problems as related to concurrent graduate design problems. *Prerequisite:* BldSc 471.

BLDSC 475, 675 BUILDING EQUIPMENT AND SYSTEMS 3 cr. (3 and 0)

The investigation of special topics in mechanical, electrical, illumination, and acoustical systems for buildings. *Prerequisite:* BldSc 301.

BLDSC 490 DIRECTED STUDIES 1-5 cr.

Comprehensive studies and research of special topics not covered in other courses. Emphasis will be placed on field studies, research activities, and current development in building sciences.

Ceramic Arts

Professor: G. C. Robinson Associate Professor: H. G. Lefort

CR AR 101 POTTERY MATERIALS 3 cr. (2 and 3)

The occurrence and properties of pottery raw materials. Attention is devoted to the occurrence of natural pottery materials in South Carolina and the methods and equipment used in preparing these materials.

CR AR 102 POTTERY DRYING AND FIRING 3 cr. (3 and 0)

The drying and firing processes used in pottery making. A discussion is included on the design and construction of simple pottery kilns and the student is required to build and operate a small outdoor kiln. The laboratory work demonstrates the drying and firing behavior of pottery.

Ceramic Engineering

Professors: C. C. Fain, G. C. Robinson, Head; H. H. Wilson Associate Professors: W. W. Coffeen, H. G. Lefort, T. D. Taylor

CRE 201 INTRODUCTION TO CERAMIC ENGINEERING 2 cr. (2 and 0)

An introduction to ceramic engineering together with a study of ceramic forming operation. Exercises are provided in the analysis of processing problems, the evaluation of background information and the creation of new solutions to processing problems.

CRE 202 CERAMIC MATERIALS 3 cr. (3 and 0)

The properties and uses of commonly used ceramic materials. Equilibrium diagrams are used to gain an understanding of the effect of heat on the materials.

CRE 204 LABORATORY PROCEDURES 1 cr. (0 and 3)

An introduction to ceramic laboratory procedures. Primary consideration will be given to the evaluation of sources of error and significance of measurement in the major ceramic test procedures.

CRE 302 THERMO-CHEMICAL CERAMICS 3 cr. (3 and 0)

High-temperature equilibrium using the laws of physical chemistry as applied to ceramic systems in both solid and liquid states. An introduction to the crystal chemistry of ceramic raw materials, and the effect of crystalline form on their high-temperature behavior.

CRE 303 MATERIALS TECHNOLOGY IN PRODUCT SELECTION BY CONSUMERS 2 cr. (2 and 0)

This course is intended to convey to the consumer a sufficient understanding of the properties of materials—metals, plastics, and ceramics—to enable the customer to make intelligent buying decisions. Property characteristics are related to cost and performance. Specific cases involving decisions are used to illustrate fundamental principles. Simple tests to determine material properties are suggested for consumer use.

CRE 304 EXPERIMENT DESIGN 2 cr. (1 and 3)

An exercise in the planning and organization of experiments in the ceramic field.

CRE 306 FUELS COMBUSTION AND HEAT TRANSFER 1 cr. (0 and 3) Combustion devices, the calculation of combustion problems and heat transfer.

CRE 307 THERMAL PROCESSING OF CERAMICS 3 cr. (3 and 0)

The accomplishment of changes in structure and composition through the application of thermal energy. The course includes a study of simultaneous transfer of heat and mass, fluid flow, determinants of rates in a variety of reactions and calculations of the energy requirements to accomplish change in structure or composition.

CRE 309 RESEARCH METHODS 2 cr. (0 and 6)

The planning and solution of selected research problems.

CRE 310 INTRODUCTION TO MATERIAL SCIENCE 3 cr. (3 and 0) A beginning course in material science designed primarily for engineering students. The course is a study of the relation between the electrical, mechanical and thermal properties of products and the structure and composition of these products. All levels of structure are considered from gross structures easily visible to the eye through electronic structure of atoms.

CRE 402, 602 SOLID STATE CERAMICS 3 cr. (3 and 0)

The effects of the composition, form, and shape of ceramic raw materials on the manufacturing processes and final properties of ceramic products. Included are fundamental studies of such phenomena as deflocculation, plasticity, sintering and the behavior of ceramic products in electrical circuits. *Prerequisite:* Junior standing.

CRE 403, 603 GLASSES 3 cr. (3 and 0)

Glass structure and composition and their relation to the properties of glasses. Consideration is given to the processing variables which control the properties of glasses including glass products, enamels, glazes, and vitreous bonds.

CRE 404, 604 CERAMIC COATINGS 3 cr. (3 and 0)

The raw materials, methods of manufacture, and properties of ceramic coatings. *Prerequisite:* CrE 302.

CRE 406 CERAMIC PROJECT 2 cr. (0 and 6)

The completion of an original research into a ceramic problem. *Prerequisite:* CrE 302.

CRE 407 PLANT DESIGN 3 cr. (1 and 6)

The application of the fundamentals of ceramic engineering to problems in plant design. *Prerequisite:* Senior standing in Ceramic Engineering.

CRE 410, 610 ANALYTICAL PROCESSES 3 cr. (2 and 3)

An introductory course on the theory and use of X-ray diffraction and spectroscopic methods. *Prerequisite:* Junior standing.

CRE 412, 612 RAW MATERIAL PREPARATION 3 cr. (3 and 0)

The equipment and processes used in the crushing and grinding of raw materials, the separation and classification of particle sizes, and the separation and purification of minerals by mineral dressing methods. CRE 416, 616 ELECTRONIC CERAMICS 3 cr. (3 and 0)

The theory and measurement of the electronic properties of ceramic products.

CRE 418, 618 PROCESS CONTROL 3 cr. (3 and 0)

Process control techniques and apparatus with particular emphasis on temperature measurement and control systems. The application of laboratory techniques to the control of product quality and process efficiency is included. *Prerequisite:* Junior standing.

CRE 419, H419, 619 SCIENCE OF ENGINEERING MATERIALS 3 cr. (3 and 0)

This course is planned to acquaint engineers with the thermal, electrical, and chemical characteristics of engineering materials. It emphasizes fundamental consideration of the structure of matter in the solid and glassy states, solid state reactions, and the influence of particle and aggregate structure to speed of reaction and product properties. The reasons for the properties of materials at elevated temperatures and room temperatures are related to these fundamentals.

CRE 420, 620 SCIENCE OF ENGINEERING MATERIALS 3 cr. (3 and 0)

A continuation of CrE 419 with emphasis on application of fundamentals in nuclear reactors and nuclear power plants. Consideration is given to the development of ceramics for fuel elements, moderator materials, control rods, shielding and radioactive waste disposal.

- CRE 701 SPECIAL PROBLEMS 3 cr. (1-3 and 0)
- CRE 807 SPECIALIZED CERAMICS 3 cr. (3 and 0)
- CRE 809 HIGH-TEMPERATURE MATERIALS 3 cr. (3 and 0)
- CRE 814 CERAMIC PHYSICAL PROCESSING 3 cr. (3 and 0)
- CRE 815 COLLOIDAL AND SURFACE SCIENCE 3 cr. (3 and 0)
- CRE 816 CONSTITUTION AND STRUCTURE OF GLASSES 3 cr. (3 and 0)
- CRE 821 ANALYTICAL PROCEDURES AND EQUIPMENT I 3 cr. (2 and 3)
- CRE 822 ANALYTICAL PROCEDURES AND EQUIPMENT II 3 cr. (2 and 3)
- CRE 824 MECHANICAL PROPERTIES OF CERAMIC MATERIALS 3 cr. (3 and 0)
- CRE 825 MAGNETIC AND ELECTRICAL CERAMIC MATERIAL 3 cr. (3 and 0)
- CRE 826 CERAMIC COATINGS 3 cr. (3 and 0)
- CRE 828 SOLID STATE CERAMIC SCIENCE 3 cr. (3 and 0)
- CRE 891 MASTER'S RESEARCH. Credit to be arranged.

Chemical Engineering

Professors: F. C. Alley, W. B. Barlage, Jr., Head; R. C. Harshman, J. C. Mullins Associate Professors: J. N. Beard, Jr., W. F. Beckwith, D. D. Edie, S. S. Melsheimer

Assistant Professors: J. M. Haile, W. H. Talbott

CHE 201 INTRODUCTION TO CHEMICAL ENGINEERING 3 cr. (2 and 3)

An introduction to the concepts of chemical engineering and a study of PVT relations for gases and vapors, material and energy balances, equilibria in chemical systems, and combined material and energy balances. *Prerequisite:* Ch 112 and Engr 180.

CHE 202 STAGEWISE SEPARATION OPERATIONS 4 cr. (3 and 3)

A first course in the theory and design of separation operations using the stagewise technique. Specific operations studied will be distillation and solvent extraction. A feature of the course is the inclusion of engineering graphical communication by sketching of laboratory separations equipment. *Prerequisite:* ChE 201.

CHE 210 DIGITAL COMPUTATION AND NUMERICAL METHODS 3 cr. (3 and 0)

An introduction to digital computational techniques using a specific procedure oriented language and the use of numerical methods for the solution of chemical engineering problems. The course will introduce students to computational methods to be used in subsequent chemical engineering courses. *Prerequisite:* ChE 201, Engr 180, Math 108.

CHE 301 UNIT OPERATIONS THEORY I 3 cr. (3 and 0)

The general principles of chemical engineering and a study of the following unit operations: Fluid Flow, Fluid Transportation, Heat Transmission and Evaporation. Special emphasis is placed on theory and its practical application to design. *Prerequisite:* ChE 202, 210, and Junior standing.

CHE 302 UNIT OPERATIONS THEORY II 3 cr. (3 and 0)

A study of selected unit operations based on diffusional phenomena. Primary attention will be given to differential contact operations such as absorption, humidification, and gas-liquid contact. *Prerequisite:* ChE 301 and Junior standing.

CHE 306 UNIT OPERATIONS LABORATORY I 1 cr. (0 and 3)

Laboratory work in the unit operations of fluid flow, heat transfer, and evaporation. Stress is laid on the relation between theory and experimental results and on report writing. *Prerequisite:* ChE 301 and Junior standing.

CHE 331, H331 CHEMICAL ENGINEERING THERMODYNAMICS I 3 cr. (3 and 0)

A first basic course in static equilibria. Topics include the First and Second Law of Thermodynamics, real and ideal gases, thermodynamic properties of fluids, phase changes, and heats of reaction. *Prerequisite:* Ch 331, ChE 202, 210, Math 208, and Junior standing or permission of the department head.

CHE 352 CHEMICAL ENGINEERING SYSTEMS ANALYSIS 4 cr. (3 and 3)

Mathematical modeling of lumped and distributed parameter chemical engineering systems and analog computer solutions. The modeling of large-scale systems and an introduction to optimization. *Prerequisite:* ChE 301 and Math 208 or permission of instructor. CHE 401, H401, 601 TRANSPORT PHENOMENA 3 cr. (3 and 0)

Heat, mass, and momentum transport with emphasis being laid on how the three processes are related. A firmer theoretical foundation is laid for the previous work in unit operations. *Prerequisite:* ChE 302, 352, and Senior standing.

CHE 407, 607 UNIT OPERATIONS LABORATORY II 2 cr. (0 and 6) Laboratory work for the diffusional unit operations. Competent technical reports are required. *Prerequisite:* ChE 302 and Senior standing.

CHE 415, 615 INTRODUCTION TO NUCLEAR ENGINEERING 3 cr. (3 and 0)

Designed to acquaint the nonnuclear engineer with some of the engineering aspects of nuclear science. Topics include a brief survey of particle physics; nuclear reactions; energy transformations; nuclear reactors, their design, construction and use; radiation damage to materials of construction; and special problems in nuclear engineering peculiar to the basic engineering disciplines. *Prerequisite:* Junior or Seníor standing in engineering, chemistry, or physics.

CHE 421, 621 PROCESS DEVELOPMENT, DESIGN, AND OPTIMIZATION OF CHEMICAL ENGINEERING SYSTEMS I 3 cr. (2 and 3)

A study of the steps in creating a chemical process design from the original concept to successful completion and operation of the plant. Topics include engineering economics, systems analysis, simulation, optimization, process equipment sizing and selection, and the application of analog and digital computers. *Prerequisite:* Completion of all required 200- and 300-level courses in chemistry, chemical engineering, and mathematics.

CHE 422, 622 PROCESS DEVELOPMENT, DESIGN, AND

OPTIMIZATION OF CHEMICAL ENGINEERING SYSTEMS II

3 cr. (0 and 9)

A continuation of ChE 421. The principles of process development, design, and optimization are applied in a comprehensive problem carried from a general statement of the problem to detailed design and economic evaluations. *Prerequisite:* ChE 421, 430, 450.

CHE 424, 624 INTRODUCTION TO INDUSTRIAL POLLUTION 3 cr. (3 and 0)

An introduction to air and water pollution problems associated with chemical processing, transportation and power generation. Basic processes and mechanisms utilized in the control of liquid and gaseous wastes are discussed from a standpoint of equipment design and economics. Present and future trends in pollution legislation are reviewed. *Prerequisite:* Senior standing or permission of instructor.

CHE 430, 630 CHEMICAL ENGINEERING THERMODYNAMICS II 3 cr. (3 and 0)

A continuation of ChE 331. Subjects include heat engines, compressors, refrigeration, phase equilibria, and chemical reaction equilibria. *Prerequisite:* ChE 331.

CHE 440 SENIOR INSPECTION TRIP 0 cr.

A three- or four-day trip is made to visit selected chemical plants. Using lectures by plant personnel supplemented by conducted tours of chemical plant installations, the student is introduced to current industrial practice. *Pre-requisite:* Senior standing in chemical engineering.

CHE 450, 650 CHEMICAL ENGINEERING KINETICS 3 cr. (3 and 0) An introduction to the kinetics of chemical reactions. Topics include homogeneous and heterogeneous reactions, batch and flow reaction systems, catalysis, and design of industrial reactors. *Prerequisite:* Completion of all 200and 300-level courses in chemistry, chemical engineering, and mathematics.

CHE 453, 653 PROCESS DYNAMICS 3 cr. (3 and 0)

Basic process control and the effect of feedback in various systems. The mathematical analysis of the dynamic response of process systems to step and sinusoidal changes. Determination of the optimum settings for various combinations of proportional, reset and derivative control. *Prerequisite:* Junior or Senior standing in engineering, physics, or chemistry, and Math 309, or permission of department head.

CHE 454 PHYSIOLOGICAL CONTROL SYSTEMS 3 cr. (3 and 0)

Classical control theory will be introduced to the level that frequency domain analysis of physiological control systems can be used. Emphasis will be placed on the study of cardiovascular and pulmonary system dynamics and the superimposed autoregulatory action. *Prerequisite:* Junior or Senior standing, physics or chemistry and Math 208, or permission of department head.

CHE 491, H491 SPECIAL PROJECTS IN CHEMICAL ENGINEERING 1-3 cr. (1-3 and 0)

As a need arises, special topics requested by students or offered by the faculty will be taught. Review of current research in an area, technological advances and national engineering goals are possible topic areas.

- CHE 802 PROCESS DYNAMICS AND CONTROL 3 cr. (3 and 0)
- CHE 803 HEAT, MASS, AND MOMENTUM TRANSFER 3 cr. (3 and 0)
- CHE 804 CHEMICAL ENGINEERING THERMODYNAMICS 3 cr. (3 and 0)
- CHE 805 CHEMICAL ENGINEERING KINETICS 3 cr. (3 and 0)
- CHE 806 PROCESS SYSTEMS ANALYSIS AND SIMULATION 3 cr. (3 and 0)
- CHE 812 POLYMER ENGINEERING 3 cr. (3 and 0)
- CHE 814 APPLIED NUMERICAL METHODS IN PROCESS SIMULATION 3 cr. (3 and 0)
- CHE 818 POLYMER PROCESSING 3 cr. (3 and 0)
- CHE 821 HEAT TRANSPORT 3 cr. (3 and 0)
- CHE 822 MASS TRANSFER AND DIFFERENTIAL CONTACT OPERATIONS 3 cr. (3 and 0)
- CHE 823 MASS TRANSFER AND STAGEWISE CONTACT OPERATION 3 cr. (3 and 0)
- CHE 845 SELECTED TOPICS IN CHEMICAL ENGINEERING 3 cr. (3 and 0)
- CHE 846 SELECTED TOPICS IN CHEMICAL ENGINEERING 3 cr. (3 and 0)
- CHE 891 MASTER'S RESEARCH. Credit to be arranged.

- CHE 904 CHEMICAL ENGINEERING THERMODYNAMICS 3 cr. (3 and 0)
- CHE 945 SELECTED TOPICS IN CHEMICAL ENGINEERING 3 cr. (3 and 0)
- CHE 946 SELECTED TOPICS IN CHEMICAL ENGINEERING 3 cr. (3 and 0)

CHE 991 DOCTORAL RESEARCH. Credit to be arranged.

Chemistry

Professors: R. A. Abramovitch, Head; A. L. Beyerlein, F. B. Brown, J. C. Fanning, J. H. Hobson, J. W. Huffman, O. J. Jacobus, F. J. Lindstrom, N. P. Marullo, A. R. Pinder, G. B. Savitsky, H. G. Spencer

Associate Professors: J. F. Allen, R. H. Bailey, Jr. C. B. Bishop, M. B. Bishop, J. F. Geldard, K. S. Landers, J. R. Salley, Jr., J. L. von Rosenberg, Jr.

Assistant Professors: D. C. Beer, H. K. McDowell, G. B. Park

Visiting Instructors: C. W. Jarvis, A. L. Miller, J. B. Wooten

CH 101 GENERAL CHEMISTRY 4 cr. (3 and 3)

Students are introduced to the elementary concepts of chemistry through classroom and laboratory experience. The course emphasizes chemical reactions and the use of symbolic representation, the mole concept and its applications and molecular structure.

CH 102, H102 GENERAL CHEMISTRY 4 cr. (3 and 3)

A continuation of Ch 101, treating solutions, rates of reactions, chemical equilibrium, electrochemistry, chemistry of selected elements, and an introduction to organic chemistry. For students taking one year of chemistry or continuing in Ch 201.

CH 112 GENERAL CHEMISTRY 4 cr. (3 and 3)

A continuation of Ch 101 which emphasizes solutions, thermodynamic concepts, kinetics and oxidation-reduction reactions. The laboratory emphasizes solution chemistry and qualitative analyses. Recommended for students continuing in Ch 223.

CH 201 GENERAL CHEMISTRY 4 cr. (3 and 3)

A continuation of Ch 102 which extends the introduction to organic chemistry and includes the chemistry of carbohydrates, lipids, and proteins and their role in metabolic processes. *Prerequisite:* Ch 102 or permission of instructor.

CH 223 ORGANIC CHEMISTRY 3 cr. (3 and 0)

An introductory course covering the principles of organic chemistry and the derivation of these principles from a study of the properties, preparations, and interrelationships of the important classes of organic compounds. *Prerequisite:* Ch 112 or permission of instructor.

CH 224 ORGANIC CHEMISTRY 3 cr. (3 and 0)

A continuation of Ch 223. Prerequisite: Ch 223.

CH 225 ORGANIC CHEMISTRY LABORATORY 2 cr. (0 and 6)

The laboratory techniques involved in the synthesis, separation and purification, and characterization of typical examples of the classes of organic compounds. *Prerequisite:* Registration in Ch 223.

CH 226 ORGANIC CHEMISTRY LABORATORY 2 cr. (0 and 6) A continuation of Ch 225. *Prerequisite*: Registration in Ch 224.

CH 227 ORGANIC CHEMISTRY LABORATORY 1 cr. (0 and 3)

The synthesis and properties of typical examples of the classes of organic compounds. *Prerequisite:* Registration in Ch 223.

CH 228 ORGANIC CHEMISTRY LABORATORY 1 cr. (0 and 3) A continuation of Ch 227. *Prerequisite:* Registration in Ch 224.

CH 229 ORGANIC CHEMISTRY LABORATORY 1 cr. (0 and 3)

A one-semester laboratory for chemical engineering students. *Prerequisite*: Ch 223.

CH 310 ELEMENTARY CHEMICAL INSTRUMENTATION 4 cr. (2 and 6)

The elementary principles of instruments and their use in chemical analysis, especially of biological systems, will be presented. Emphasis is on the actual use of the instruments. *Prerequisite:* Ch 224.

CH 313 QUANTITATIVE ANALYSIS 3 cr. (3 and 0)

The fundamental principles of volumetric, gravimetric and certain elementary instrumental chemical analyses. *Prerequisite:* Organic chemistry.

CH 315 QUANTITATIVE ANALYSIS LABORATORY 2 cr. (0 and 6)

The laboratory techniques of volumetric, gravimetric, and elementary instrumental analysis.

CH 317 QUANTITATIVE ANALYSIS LABORATORY 1 cr. (0 and 3)

The standard techniques of analytical chemistry-gravimetric, volumetric, and instrumental.

CH 330 INTRODUCTION TO PHYSICAL CHEMISTRY 3 cr. (3 and 0)

A one-semester treatment of physical chemistry which emphasizes topics that are especially useful in the life sciences, agriculture and medicine, chemical thermodynamics, equilibrium, solutions, kinetics, electrochemistry, macromolecules, and surface phenomena. *Prerequisite:* One semester of calculus.

CH 331, 631 PHYSICAL CHEMISTRY 3 cr. (3 and 0)

Includes the gaseous state, thermodynamics, chemical equilibria, and atomic and molecular structure, from both experimental and theoretical points of view. *Prerequisite:* Math 206, physics.

CH 332, H332, 632 PHYSICAL CHEMISTRY 3 cr. (3 and 0)

Continuation of Ch 331 including chemical kinetics, liquid and solid state, phase equilibria, solutions, electrochemistry and surfaces.

CH 339, 639 PHYSICAL CHEMISTRY LABORATORY 1 cr. (0 and 3) Experiments are selected to be of maximum value to Chemistry and Chem-

ical Engineering majors. Prerequisite: Registration in Ch 331.

CH 340, 640 PHYSICAL CHEMISTRY LABORATORY 1 cr. (0 and 3) A continuation of Ch 339. *Prerequisite:* Registration in Ch 332.

CH 402, H402, 602 INORGANIC CHEMISTRY 3 cr. (3 and 0)

The basic principles of inorganic chemistry are discussed with special emphasis on atomic structure, chemical bonding, solid state, coordination chemistry, organometallic chemistry and acid-base theories. The chemistry of certain selected elements is treated. *Prerequisite:* Ch 331, 332.

CH 411, 611 INSTRUMENTAL ANALYSIS 4 cr. (2 and 6)

Demonstration and operation of modern optical and electronic precisionmeasuring devices as they apply to the processes of analytical, physical and organic chemistry. *Prerequisite:* Physical chemistry.

CH 421, H421, 621 ADVANCED ORGANIC CHEMISTRY 3 cr. (3 and 0)

A survey of modern organic chemistry with an emphasis on synthesis and mechanisms. *Prerequisite:* Ch 224, 332, or equivalent.

CH 427, 627 ORGANIC SPECTROSCOPY 3 cr. (2 and 3)

A survey of modern spectroscopic techniques used in the determination of molecular structure. Emphasis is on interpretation of spectra: nuclear magnetic resonance, ultraviolet, infrared, and mass spectroscopy, optical rotatory dispersion and circular dichroism. *Prerequisite:* One year each of organic chemistry and physical chemistry.

CH 435, H435, 635 SPECTROSCOPY AND MOLECULAR STRUCTURE 3 cr. (3 and 0)

Molecular spectroscopy and structure as elucidated by elementary quantum mechanics. Topics covered include Planck's black-body radiation formulation leading to the quantum concept, solution of Schroedinger's equation for simple systems, microwave spectroscopy, infrared and Raman spectroscopy, Fourier transformed spectra, electronic spectra and structure, and elementary statistical thermodynamics. *Prerequisite:* Ch 331, 332, Math 208.

CH 441 GLASS MANIPULATION 2 cr. (0 and 6)

A course designed to teach the fundamentals of glass manipulation and its application to the construction and repair of simple laboratory apparatus.

CH 443 RESEARCH PROBLEMS 3 cr. (0 and 9)

Original investigation of an assigned problem in a fundamental branch of chemistry. This work must be carried out under the supervision of a member of the staff. *Prerequisite:* Senior standing in chemistry or permission of instructor.

CH 444 RESEARCH PROBLEMS 3 cr. (0 and 9)

A continuation of Ch 443.

CH 454, H454, 654 CHEMICAL SYNTHESIS 3 cr. (1 and 6)

This course is designed to introduce the student to modern research techniques in inorganic and organic chemistry. The experiments to be carried out involve the synthesis of various types of compounds by diverse experimental techniques. Modern instrumental methods will be used to characterize the products. *Prerequisite:* Organic chemistry. CH 491, H491, 691 INTRODUCTION TO RADIOCHEMISTRY 3 cr. (2 and 3)

A study of natural and synthetic isotopes, including atomic and nuclear structures, properties of radiation, tracer techniques and applications. The laboratory includes methods of detection and measurement of radiation, and applications of tracer techniques. *Prerequisite:* Senior or graduate standing, permission of instructor.

- CH 700 PHYSICAL SCIENCE IN ELEMENTARY SCHOOL-CHEM-ISTRY 3 cr. (2 and 3)
- CH 701 REVIEW OF GENERAL CHEMISTRY 3 cr. (3 and 0)
- CH 702 CHEMISTRY FOR HIGH SCHOOL TEACHERS 3 cr. (2 and 3)
- CH 703 SPECIAL PROBLEMS IN CHEMISTRY FOR SECONDARY SCHOOL TEACHERS 3-6 cr.
- CH 805 THEORETICAL INORGANIC CHEMISTRY 3 cr. (3 and 0)
- CH 807 CHEMISTRY OF THE TRANSITION ELEMENTS 3 cr. (3 and 0)
- CH 808 CHEMISTRY OF THE NONMETALLIC ELEMENTS 3 cr. (3 and 0)
- CH 811 ANALYTICAL CHEMISTRY 3 cr. (3 and 0)
- CH \$12 CHEMICAL SPECTROSCOPIC METHODS 3 cr. (2 and 3)
- CH S14 ELECTROANALYTICAL CHEMISTRY 3 cr. (2 and 3)
- CH S21 ORGANIC CHEMISTRY I 3 cr. (3 and 0)
- CH 822 ORGANIC CHEMISTRY II 3 cr. (3 and 0)
- CH 824 FUNDAMENTAL PRINCIPLES OF POLYMER CHEMISTRY 3 cr. (3 and 0)
- CH 825 CHEMISTRY OF HETEROCYCLIC COMPOUNDS 3 cr. (3 and 0)
- CH S31 CHEMICAL THERMODYNAMICS 3 cr. (3 and 0)
- CH \$34 STATISTICAL THERMODYNAMICS 3 cr. (3 and 0)
- CH 835 CHEMICAL KINETICS 3 cr. (3 and 0)
- CH 837 QUANTUM CHEMISTRY 3 cr. (3 and 0)
- CH S40 TECHNIQUES OF EXPERIMENTAL CHEMISTRY 3 cr. (1 and 6)
- CH 851 SEMINAR 0-2 cr.
- CH 861 PRINCIPLES OF BIOCHEMISTRY 3 cr. (3 and 0)
- CH S91 MASTER'S RESEARCH. Credit to be arranged.
- CH 910 SPECIAL TOPICS IN ANALYTICAL CHEMISTRY 1-4 cr. (1-4 and 0)
- CH 920 ADVANCED TOPICS IN ORGANIC CHEMISTRY 1-4 cr. (1-4 and 0)

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CH 930 ADVANCED TOPICS IN PHYSICAL CHEMISTRY 1-4 cr. (1-4 and 0)

CH 950 MICROANALYTICAL TECHNIQUES 3 cr. (1 and 6)

CH 991 DOCTORAL RESEARCH. Credit to be arranged.

City and Regional Planning

Professor: E. L. Falk Associate Professor: M. A. Clark, Head Assistant Professor: O. Ersenkal

CRP 411, 611 INTRODUCTION TO CITY AND REGIONAL PLANNING 3 cr. (3 and 0)

Overview of urban land-use planning. Analysis of current work in each significant phase of planning. Discussion of goal formulation, foundation studies, land-use planning methods and considerations, and continuing evaluation and modification of an urban-planning process. *Prerequisite:* Permission of instructor or department head.

CRP 421, 621 URBAN SOCIAL STRUCTURE 1-3 cr. (1-3 and 0)

The social, economic, and political aspects of communities of varying sizes and types. Elements will include housing, education, recreation, social services, governmental structure, and related community institutions. A maximum of three credit hours may be earned. *Prerequisite:* Permission of instructor or department head.

CRP 441, 641 HISTORY OF PLANNING 3 cr. (3 and 0)

The development of the urban plan from ancient to modern times. *Pre-requisite:* Permission of instructor or department head.

CRP 472, 672 IMPLEMENTATION OF THE LOCAL PLANNING PROCESS 3 cr. (3 and 0)

The organization and administration of types of planning agencies and their relationship to other governmental and private organizations. The function and relationship of the various implementing tools available to local government. *Prerequisite:* Permission of instructor or department head.

CRP 473, 673 GOVERNMENT AND PLANNING LAW 3 cr. (3 and 0) A complete coverage of the laws and ordinances relating to redevelopment,

subdivision control, zoning, official mapping, and other topics including interpretation, philosophy, enabling legislation, and model ordinances. The legal basis of current and long-range planning policy will be discussed. *Prerequisite:* Permission of instructor or department head.

CRP 483, 683 SEMINAR ON PLANNING COMMUNICATION 1-3 cr. (1-3 and 0)

Informal means open for plan implementation. The organization of effective public information and education programs, use of citizens' advisory committees, and application of other implementation techniques. Lectures, student reports, selected readings, and visiting speakers. *Prerequisite:* Permission of instructor or department head.

CRP 812 CITY AND REGIONAL PLANNING THEORY 3 cr. (3 and 0)

- CRP 821 INTERGOVERNMENTAL RELATIONS IN THE PLANNING PROCESS 1-3 cr. (1-3 and 0)
- CRP 822 URBAN SYSTEMS AND DESIGN 3 cr. (3 and 0)
- CRP 831 ECONOMICS OF LAND USE PLANNING 3 cr. (3 and 0)
- CRP 853 INTRODUCTION TO PLANNING STUDIO I 3 cr. (0 and 9)
- CRP 854 PLANNING STUDIO II 3 cr. (0 and 9)
- CRP 863 PLANNING STUDIO III 3-6 cr. (0 and 9-18)
- CRP 865 PLANNING STUDIO IV 3-9 cr. (0 and 9-27)
- CRP 871 SEMINAR ON PLANNING AND MANAGEMENT OF CHANGE 3 cr. (3 and 0)
- CRP 881 SEMINAR IN QUANTITATIVE METHODS I 3 cr. (3 and 0)
- CRP 882 SEMINAR IN QUANTITATIVE METHODS II 3 cr. (3 and 0)
- CRP 884 PUBLIC FACILITIES AND CAPITAL IMPROVEMENT PLANNING 3 cr. (3 and 0)
- CRP 890 DIRECTED STUDIES IN CITY AND REGIONAL PLANNING 1-5 cr.
- CRP 891 PLANNING THESIS 3-9 cr.
- CRP 893 CITY AND REGIONAL PLANNING INTERNSHIP 6 cr. (0 and 6)

Civil Engineering

Professors: S. C. Anand, H. W. Busching, "Head; B. L. Edge, J. C. McCormac, A. E. Schwartz

Associate Professors: W. Baron, R. H. Brown, J. E. Clark, Acting Head; R. E. Elling, J. L. Josey, R. F. Nowack, P. F. Rad, D. B. Stafford, P. B. Zielinski

Assistant Professors: M. L. Morrell, B. L. Sims

Visiting Professor: J. P. Rostron

CE 201 SURVEYING 3 cr. (2 and 3)

Elementary plane surveying for civil engineering and other students whose curriculum requires a basic knowledge of surveying. Coverage includes measurement of distance, angles and elevations, stadia, topography, area and volume calculations, construction surveying. Field exercises provide practice in the use of surveying instruments. *Prerequisite:* Math 106.

CE 205 CIVIL ENGINEERING METHODOLOGY 2 cr. (1 and 3)

An application of FORTRAN programming to typical civil engineering design and construction problems. *Prerequisite*: Engr 180.

CE 206 ELEMENTARY SURVEYING 2 cr. (1 and 3)

Application of surveying and geometrics to civil engineering problems including measurements of distances, angles, and elevations. *Prerequisite:* Math 106.

• On leave.

CE 301 STRUCTURAL ANALYSIS I 3 cr. (2 and 2)

Analysis of statically determinate structural elements and systems. Influence lines for beams and trusses. Calculation of rotations and deflections by moment area, conjugate beam, and unit load methods. Moment distribution and introduction to other methods of indeterminate analysis. *Prerequisite:* EM 304.

CE 302 STRUCTURAL STEEL DESIGN 3 cr. (2 and 2)

Design of steel tension members, beams, columns, beam-columns and connections by working stress method. Introduction to plastic analysis and design. Emphasis on AISC specification. *Prerequisite*; CE 301.

CE 310 TRANSPORTATION ENGINEERING 4 cr. (3 and 2)

Planning, location, design, operation, and administration of highways, railroads, airports and other transportation facilities, including economic considerations, pavement design, and digital computer applications to geometric and earthwork computation. *Prerequisite:* CE 206.

CE 320 CONCRETE AND BITUMINOUS MATERIALS 2 cr. (1 and 3)

Basic properties of portland cement and bituminous asphalt. Classification of aggregates on the basis of strength and size distribution. Mix design procedures, field control, and adjustments. Properties of fresh mixes and hardened concrete. Behavior of other construction materials including metals, composites, and plastics. Field trips to nearby plants. *Prerequisite:* EM 304 and Junior standing.

CE 330 SOIL MECHANICS 3 cr. (2 and 2)

Mechanical and physical properties of soils and their relation to soil action in problems of engineering, such as classification, permeability, shearing strength, consolidation, stress distribution and bearing capacity of soils. *Prerequisite:* EM 304 and Junior standing.

CE 402 REINFORCED CONCRETE DESIGN 3 cr. (2 and 2)

Analysis and design of reinforced concrete beams, columns, footings, and one-way slabs using the strength design method. Includes a brief introduction to the analysis and design of beams with the working stress method. *Prerequisite:* CE 301.

CE 403, 603 USE OF COMPUTERS IN STRUCTURAL ANALYSIS AND DESIGN 3 cr. (2 and 2)

Analysis and design of structures such as bridges, buildings, and towers using modern computer techniques; emphasis placed on use of available computer programs. *Prerequisite:* CE 301, 302, 402, or permission of instructor.

CE 404, 604 MASONRY STRUCTURAL DESIGN 3 cr. (3 and 0)

Fundamentals of masonry materials, construction, structural systems. Application of structural design principles to multistory structures. Lateral load resisting shear walls, loadbearing walls, columns and pilasters, connections. *Prerequisite:* CE 402.

CE 410, 610 TRAFFIC ENGINEERING: OPERATIONS 3 cr. (3 and 0) Basic characteristics of motor-vehicle traffic; techniques for making traffic engineering investigations; design and application of traffic control devices; traffic design of parking facilities; traffic laws and ordinances; public relations. *Prerequisite:* CE 310. CE 412, 612 URBAN TRANSPORTATION PLANNING 3 cr. (3 and 0) F

Urban travel characteristics; characteristics of transportation systems; transportation and land-use studies; trip distribution and trip assignment models; city patterns and subdivision layout. *Prerequisite:* CE 310.

CE 417, 617 AIRPHOTO INTERPRETATION I 3 cr. (2 and 3)

A brief review of the basic geometry of aerial photographs, characteristics of geologic and topographic features identifiable from aerial photographs, and site characteristics related to soil profile. Laboratory work includes soil mapping, selection of construction sites, and location of soil deposits for engineering purposes. *Prerequisite:* Junior standing.

CE 419, 619 GENERAL PHOTOGRAMMETRY 3 cr. (2 and 3) S

Fundamentals of mapping using aerial photographs; characteristics, production and use of aerial photographs; study of the operation of popular photogrammetric instruments including aerial cameras, stereoscopic viewing and plotting equipment; use of stereocomparagraph and multiplex plotting instruments; scale, tilt, and coordinate calculations; construction of photomosaics. *Prerequisite:* Math 108 and Junior standing.

CE 424 CONSTRUCTION METHODS 2 cr. (2 and 0)

A survey of the principal methods and equipment used in the construction industry. Critical path methods and construction management practices are included. *Prerequisite:* Senior standing.

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CE 425 ENGINEERING RELATIONS 3 cr. (3 and 0)

Business, legal, and ethical relations in engineering practice. *Prerequisite:* Senior standing.

CE 431, 631 APPLIED SOIL MECHANICS 3 cr. (2 and 2)

Relationship of local geology to soil formations, groundwater, planning of site investigation, sampling procedures, laboratory determination of design parameter, foundation design, and settlement analysis. *Prerequisite:* CE 330.

CE 434, 634 CONSTRUCTION COSTS AND ESTIMATES 3 cr. (2 and 2)

Interpretation of specifications and plan reading necessary for estimating quantities of materials and costs of engineering structures. The course is presented from the designer's and the constructor's viewpoint to prepare the young engineer with the essential material a construction engineer should have at his command. *Prerequisite:* Senior standing.

CE 435, 635 ENGINEERING PROJECT ANALYSIS 3 cr. (2 and 2)

Advanced analysis of engineering projects. Theory of economic, financial and intangible analysis of large-scale construction projects. Practical exercises in cost-benefit studies and construction decisions. *Prerequisite:* Permission of instructor.

CE 436, 636 SUBSURFACE CONSTRUCTION 3 cr. (3 and 0)

Classification and mechanical properties of hard and soft ground. Behavior of rock masses and stability of underground openings. Near surface and deep excavations. Fragmentation, materials handling, ground control and environmental support in typical operations. Empirical design procedures and details of field operations. *Prerequisite:* CE 424 or permission of instructor.

CE 441, 641 APPLIED HYDRAULICS 3 cr. (3 and 0)

The course is intended to present advanced concepts of hydraulics within a framework of relevant engineering problems. Topics included are flow in closed conduits, flow in open channels, hydraulic structures, flow measurements, fluid machinery, sediment transport, unsteady flow. *Prerequisite:* EM 320.

CE 453, 653 ADVANCED STRUCTURAL ANALYSIS 3 cr. (3 and 0)

Slopes and deflections of beams and trusses by energy methods. Analysis of statically indeterminate structures and construction of influence lines by virtual-work method. Application of moment distribution and slope deflection methods. *Prerequisite:* CE 301.

CE 462, 662 PORT AND HARBOR ENGINEERING 3 cr. (3 and 0)

A unified treatment of the basic principles used in design, construction, and operation of ports and harbors. Emphasis is placed on the philosophy behind port layout, optimal site and size selections, and optimal port operations. Topics include economic factors in harbor design, requirements for harbor maintenance, and design of protective structures.

CE 490, H490 SPECIAL PROJECTS 1-3 cr. (1-3 and 0)

Studies or laboratory investigations on special topics in the civil engineering field which are of interest to individual students and staff members. Arranged on a project basis with a maximum of individual student effort and a minimum of staff guidance. *Prerequisite:* Senior standing.

CE 499 CIVIL ENGINEERING DESIGN PROJECT 3 cr. (2 and 3)

Class members will complete one or more engineering design projects involving synthesis of several civil engineering specialty areas such as soil mechanics, transportation structures, fluids engineering, and others. Faculty, consulting engineers, and other resource persons will assist with instruction and design development. *Prerequisite:* Senior standing or permission of instructor.

CE 801 STRUCTURAL ENGINEERING 3 cr. (3 and 0)

- CE 802 PRESTRESSED CONCRETE ANALYSIS AND DESIGN 3 cr. (3 and 0)
- CE 803 REINFORCED CONCRETE STRUCTURAL SYSTEMS 3 cr. (3 and 0)
- CE 804 THEORY AND DESIGN OF THIN PLATES 3 cr. (3 and 0)
- CE 805 PLASTIC DESIGN OF STEEL STRUCTURES 3 cr. (3 and 0)
- CE 806 DESIGN OF STEEL MEMBERS 3 cr. (3 and 0)
- CE 807 NUMERICAL AND APPROXIMATE METHODS OF STRUCTURAL ANALYSIS 3 cr. (3 and 0)
- CE 808 FINITE ELEMENT METHODS IN STRUCTURAL ANALYSIS 3 cr. (3 and 0)
- CE 811 HIGHWAY GEOMETRIC DESIGN 3 cr. (2 and 3)
- CE 812 AIRPHOTO INTERPRETATION II 3 cr. (2 and 3)
- CE 813 HIGHWAY AND AIRPORT PAVEMENT DESIGN 3 cr. (3 and 0)
- CE 814 TRAFFIC FLOW THEORY 3 cr. (3 and 0)
- CE 815 HIGHWAY SAFETY ENGINEERING 3 cr. (3 and 0)

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- CE 816 HIGHWAY PLANNING 3 cr. (3 and 0)
- CE 817 MASS TRANSIT PLANNING 3 cr. (3 and 0)
- CE 818 AIRPORT PLANNING AND DESIGN 3 cr. (3 and 0)
- CE 819 TRANSPORTATION RESEARCH 2-4 cr.
- CE 822 AGGREGATES AS CONSTRUCTION MATERIALS 3 cr. (2 and 3)
- CE 830 ADVANCED SOIL MECHANICS 3 cr. (3 and 0)
- CE 831 FOUNDATION ENGINEERING 3 cr. (2 and 3)
- CE 889 SPECIAL PROBLEMS I 1-3 cr.
- CE 890 SPECIAL PROBLEMS II 1-3 cr.
- CE 891 MASTER'S RESEARCH. Credit to be arranged.
- CE 901 THEORY AND DESIGN OF SHELLS 3 cr. (3 and 0)
- CE 902 STRUCTURAL VIBRATIONS 3 cr. (3 and 0)
- CE 991 DOCTORAL RESEARCH. Credit to be arranged.

Coaching Education

C ED 341 COACHING AND OFFICIATING FOOTBALL AND BASKETBALL 3 cr. (2 and 3)

Designed to acquaint the student with the theoretical and practical principles, methods, and mechanics of coaching and officiating football and basketball.

C ED 342 COACHING AND OFFICIATING BASEBALL, TRACK AND FIELD 3 cr. (2 and 3)

Designed to prepare the student in the theoretical and practical phases of coaching and officiating in the designated areas.

C ED 442 PRACTICUM IN COACHING 3 cr. (1 and 6) Directed supervision in coaching.

Community and Rural Development

(See courses listed under Agricultural Economics and Rural Sociology)

Professors: J. E. Faris, Head; J. C. Hite, E. L. McLean, J. F. Pittman Associate Professor: B. L. Dillman

CRD 357 NATURAL RESOURCE ECONOMICS 3 cr. (3 and 0)

The principles and problems involved in the use of soil, water, forest, and mineral resources, with special emphasis on economic aspects of alternative methods of resource utilization.

CRD 411, 611 REGIONAL IMPACT ANALYSIS 3 cr. (2 and 3)

An intensive course in the theory and practice of estimating the impacts of public and private sector activities on rural communities and regions. Topics covered include economic-base measurements, regional multipliers, benefit-cost concepts and techniques, shift-share analysis, and input-output models. *Prerequisite:* Ag Ec 202 or equivalent.

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CRD 412, 612 REGIONAL ECONOMIC DEVELOPMENT POLICY 3 cr. (3 and 0)

A study of policy alternatives for regional economic development. Topics include regional economic accounts, central-place and growth-center theories, multistate regional development programs, and state and local development planning. *Prerequisite:* Ag Ec 202, Econ 201.

Comparative Literature

COMP LIT 401 MEDIEVAL-RENAISSANCE STUDIES 3 cr. (3 and 0) Comparative studies in Medieval and Renaissance literature. *Prerequisite:* Two years study of a foreign language and six credits in literature.

COMP LIT 403 MODERN STUDIES 3 cr. (3 and 0)

Comparative studies in modern literature. *Prerequisite:* Two years study of a foreign language and six credits in literature.

Computer Science

(Department of Mathematical Sciences)

Professors: J. V. Brawley, Jr., R. E. Haymond, A. T. Hind, Jr., T. G. Proctor Associate Professors: W. R. Boland, C. E. Kirkwood, Jr., M. C. Palmer, J. C. Peck

Assistant Professors: J. P. Jarvis, A. W. Madison, A. J. Turner, Jr., J. M. Westall, Jr.

Instructor: E. V. Bartmess

Lecturer: L. M. Lundberg

Visiting Instructors: A. C. Connor, P. W. Uselton

COMP SC 205 ELEMENTARY COMPUTER PROGRAMMING 3 cr. (3 and 0)

A detailed study of an algebraic computer programming language and its use in solving problems. FORTRAN language will be used.

COMP SC 206 ADVANCED PROGRAMMING IN FORTRAN 3 cr. (3 and 0)

A continuing study of computer programming with the FORTRAN language. Emphasis on subroutine computation with application to problems in science and engineering. *Prerequisite:* Comp Sc 205.

COMP SC 207 ADVANCED PROGRAMMING IN PL/1 3 cr. (3 and 0)

A programming course utilizing the advanced features of the PL/1 language. Topics include dynamic storage allocation, string manipulation, compile-time facilities, error handling, and list processing. *Prerequisite:* Comp Sc 205.

COMP SC 210 DIGITAL COMPUTATION AND NUMERICAL METHODS FOR ENGINEERS 3 cr. (3 and 0)

An introduction to digital computational techniques, using a specific procedure oriented language and the use of numerical methods for the solution of engineering problems. *Prerequisite:* ChE 201, Engr 180, Math 108.

COMP SC 308 DATA PROCESSING FOR BUSINESS APPLICATIONS 3 cr. (3 and 0)

An introduction to the COBOL language with application to business data processing. Emphasis is placed on the organization and processing of data files. *Prerequisite:* Comp Sc 205 or permission of instructor.

COMP SC 315 FUNDAMENTALS OF PROGRAMMING 3 cr. (3 and 0)

An introduction of programming techniques and methodology. Topics include structured programming, top-down design, stepwise refinement, modularization criteria, program testing, and techniques for large programs. *Prerequisite:* Comp Sc 205 or equivalent.

COMP SC 321 ASSEMBLY LANGUAGE PROGRAMMING 3 cr. (3 and 0)

An introduction to computer organization, machine language, and assembly language programming. The organization, machine language and assembly language of the IBM 370 will be studied. *Prerequisite:* Comp Sc 205 or equivalent.

COMP SC 322, H322 SYSTEMS PROGRAMMING 3 cr. (3 and 0)

A treatment of computer operating system facilities, with special attention being given to the local system. Topics include assembly language macros, job control language, data management, linkage editors, utilities and debugging techniques. *Prerequisite:* Comp Sc 321.

COMP SC 409, 609 INTRODUCTION TO NUMERICAL ANALYSIS I 3 cr. (3 and 0)

An introduction to the problems of numerical analysis emphasizing computational procedures and application. Topics include: polynomial interpolation, matrix methods, systems of linear equations, nonlinear equations, numerical solution of ordinary differential equations. *Prerequisite:* Comp Sc 205 or E&CE 299, Math 208.

COMP SC 410, 610 INTRODUCTION TO NUMERICAL ANALYSIS II 3 cr. (3 and 0)

A continuation of Comp Sc 409. Ordinary differential equations, boundary value problems, functional approximation, numerical solution of partial differential equations, and Monte Carlo techniques.

COMP SC 423, 623 INTRODUCTION TO OPERATING SYSTEMS 3 cr. (3 and 0)

A detailed study of the management techniques for the control of computer hardware resources. Topics include interrupt systems, primitive level I/0, functional characteristics of hardware and the management of memory, processor, devices, and data. Specific reference is made to the IBM 370. *Prerequisite:* Comp Sc 322.

COMP SC 428, 628 STRUCTURE OF PROGRAMMING LANGUAGES 3 cr. (3 and 0)

An overview of the control and data structures of various programming languages, including examples from existing languages. Formal grammars are studied as models of the syntax of programming languages. Compilation and interpretation considerations are also introduced, including parsing and runtime environment. *Prerequisite:* Comp Sc 321 or equivalent. COMP SC 429, 629 TRANSLATION OF PROGRAMMING LANGUAGES 3 cr. (3 and 0)

Techniques and considerations for compiling and interpreting programming languages. Topics include scanning, parsing, optimization, code generation and their theoretical foundations. The implementation of a compiler or a major component of a compiler normally will be a term project. *Prerequisite:* Comp Sc 322, 428.

COMP SC 440, 640 INTRODUCTION TO DATA STRUCTURES 3 cr. (3 and 0)

Basic concepts of data structures such as queues, stacks, and lists. This course includes the study of algorithms for the manipulation of data structures, the implementation of these algorithms in existing programming languages, and applications such as storage allocation and garbage collection. *Prerequisite:* Comp Sc 321 or equivalent.

COMP SC 460, 660 PERIPHERALS AND FILE DESIGN 3 cr. (3 and 0)

A study of peripheral devices and data management will be used as a basis for the design of information systems. Traditional data processing applications will be presented and evaluated in terms of efficiency and effectiveness. Problems using classical file organization and access techniques will be assigned. *Prerequisite:* Comp Sc 308.

COMP SC 462, 662 TELEPROCESSING AND DATA-BASE MANAGEMENT SYSTEMS 3 cr. (3 and 0)

An introduction to data base/data communications concepts as related to design of online information systems. Problems involving structuring, creating, maintaining and accessing multiple-user data bases will be presented and solutions developed. Comparison of several commercially available teleprocessing monitor and data-base management systems will be made. *Prerequisite:* Comp Sc 308.

COMP SC 481 SPECIAL TOPICS IN COMPUTER SCIENCE 3 cr. (3 and 0)

Attention will be focused upon areas of computer science in which nonstandard problems arise. Innovative approaches to problem solution which draw from a variety of support courses will be developed and implemented. Emphasis will be placed on independent study and projects. *Prerequisite:* Permission of instructor.

Dairy Science

Professors: J. F. Dickey, R. W. Henningson, V. Hurst, J. J. Janzen, J. T. Lazar, Jr., Acting Head; G. D. O'Dell

Associate Professors: C. C. Brannon, J. W. Kelly

Assistant Professor: B. F. Jenny

Instructor: E. M. Richardson

DY SC 101 DAIRY FOODS 1 cr. (1 and 0)

Dairy foods such as ice cream, yogurt, and various cheeses; the use of these foods for nutrition and pleasure. Sampling of various products will take place throughout the course.

DY SC 102 MAMMALIAN REPRODUCTION 1 cr. (1 and 0)

Physiology and endocrinology of the reproductive processes in male and female mammals with emphasis on farm animals. Control of reproductive cycles, diseases, sexuality, and effects of drugs on reproduction will be discussed.

DY SC 306, H306, 606 DAIRY TECHNOLOGY 3 cr. (2 and 3) S

The nature and properties of the major and minor components of milk, the effect of chemical and physical treatment on milk constituents, and techniques used in the analysis of milk and water in controlling guality of dairy products.

DY SC 307, H307, 607 MARKET MILK 3 cr. (2 and 3) F, Evennumbered years.

Composition, procurement, processing, distribution, quality control, public health aspects, basic chemistry and bacteriology of industrial milk supplies and cultured products. *Prerequisite:* Permission of instructor.

DY SC 310 DAIRY CATTLE SELECTION 1 cr. (0 and 3) F, Evennumbered years.

Emphasis is placed upon the selection of dairy cattle for profitable herd operations. Evaluations of herd classifications, fitting, showing, and true type are made.

DY SC 401 SPECIAL PROBLEMS 1-2 cr. (0 and 3-6)

Problems of special interest to the senior student. The course is designed to give experience with and independent study of selected dairy problems not covered in depth in other courses. *Prerequisite:* Senior standing.

DY SC 402, 602 DAIRY MANUFACTURERS 3 cr. (2 and 3) S, Even-numbered years.

The principles and practice of the manufacture of ice cream and related dairy products; the principles of the manufacture of condensed and evaporated milks and milk powders; and the physical, chemical, and biological factors involved. *Prerequisite:* Permission of instructor.

DY SC 404, 604 PLANT MANAGEMENT 3 cr. (2 and 3) S,

Even-numbered years.

The organization and operation of dairy and food plants and the coordination of all functions into an orderly business enterprise. Emphasis will be given to management's responsibility concerning the procurement, processing, quality control and distribution of food products. Business and industrial techniques are used to develop maximum efficiencies.

DY SC 409 DAIRY SCIENCE SEMINAR 2 cr. (2 and 0) F,

Odd-numbered years.

Special research problems in production and manufactures are studied. Individual topics not fully covered in classwork are assigned for special report before class and members of Dairy Science staff.

DY SC 410 DAIRY SCIENCE SEMINAR 1 cr. (1 and 0) S,

Even-numbered years.

A continuation of Dy Sc 409 with emphasis on current research literature and research methods. *Prerequisite:* Junior standing.

DY SC 452, 652 DAIRY CATTLE FEEDING AND MANAGEMENT 3 cr. (2 and 3) S, Odd-numbered years.

Fundamental principles in the care, feeding, and management of dairy cattle of all ages. Topics include general consideration in selecting a breed and the individual cow, calf raising, growth and development of dairy heifers, care and management of the milking herd and feeding for milk production.

DY SC 453, H453, 653 ANIMAL REPRODUCTION 3 cr. (3 and 0) F, S Reproductive physiology and endocrinology of mammals with emphasis on farm animals and frequent reference to reproduction in laboratory animals and humans. *Prerequisite:* Permission of instructor.

DY SC 455, 655 REPRODUCTIVE MANAGEMENT 1 cr. (0 and 3)

Application of management techniques such as artificial insemination, pregnancy detection, and computer recordkeeping for achieving a high level of reproductive efficiency in cattle. *Prerequisite:* To be taken concurrently or to follow Dy Sc 453.

DY SC 461, 661 PHYSIOLOGY OF LACTATION 2 cr. (2 and 0)

Anatomy and development of the mammary gland; physiological and biochemical regulation of mammary growth and milk secretion with emphasis on farm animals and reference to other mammals. *Prerequisite:* Bioch 210, Ch 223, or permission of instructor.

DY SC 801 TOPICAL PROBLEMS 1-3 cr.

DY SC 803 PHYSIOLOGY OF REPRODUCTION AND MILK SECRETION 3 cr. (3 and 0)

DY SC 808 INDUSTRIAL DAIRY SCIENCE 3 cr. (3 and 0)

DY SC 891 MASTER'S RESEARCH. Credit to be arranged.

Economics

Professors: H. H. Macaulay, Jr., R. D. Shannon, B. R. Skelton, W. D. Trevillian, W. C. Whitten, Jr., T. B. Yandle, Jr., *Head*

Associate Professors: R. D. Elliott, R. H. Mabry, R. B. McKenzie, H. H. Ulbrich

Assistant Professors: D. W. Blair, M. T. Maloney, J. M. Prinzinger

Instructor: A. M. O'Brien

Visiting Instructors: B. M. Hawkins, A. J. Hite, R. E. McCormick, D. L. Placone, T. N. Schaap, W. J. Schubert

ECON 200 ECONOMIC CONCEPTS 3 cr. (3 and 0)

A comprehensive course including both micro- and macro-economic concepts for the student not having theoretical course requirements beyond the principles level or for the student expecting to take a selected group of the 300-level courses in economics.

ECON 201, H201 PRINCIPLES OF ECONOMICS 3 cr. (3 and 0)

The fundamental principles of pricing, stabilization and growth in a modern economy. Topics include supply and demand, employment theory and fiscal policy, the banking system and monetary policy, and the economics of growth.

• On leave.

ECON 202, H202 PRINCIPLES OF ECONOMICS 3 cr. (3 and 0)

Continuation of Econ 201 with an intensive study of the economics of the firm, the pricing of resources, and international economic relations. The theory is given relevance through the analysis of current economic problems.

ECON 203 CONSUMER ECONOMICS 2 cr. (2 and 0)

A presentation of information and material to facilitate consumer decision making in such areas as home finance, insurance, banking, investments, taxation, budgeting, and other areas of immediate concern to the American consumer.

ECON 301 ECONOMICS OF LABOR 3 cr. (3 and 0)

The economics of the labor market, the problems of the industrial worker, and the methods of adjusting labor-management disputes. *Prerequisite:* Econ 200 or 201.

ECON 302, H302 MONEY AND BANKING 3 cr. (3 and 0)

Considers the function of money and banking in both the product and financial markets. Special emphasis is placed on monetary theory and current problems of monetary policy. *Prerequisite:* Econ 200 or 201, 202, and permission of instructor.

ECON 305 INVESTMENT ANALYSIS 3 cr. (3 and 0)

A study of techniques useful in analyzing alternative investment opportunities, with emphasis on corporate securities. Investment planning and portfolio management are considered. *Prerequisite*: Econ 200, 201, or permission of instructor.

ECON 306 RISK AND INSURANCE 3 cr. (3 and 0)

Studies the nature of risk and the role of insurance in risk management from individual and business viewpoints by considering insurance carriers, contracts, underwriting and regulation. *Prerequisite:* Econ 200, 201, or permission of instructor.

ECON 308 COLLECTIVE BARGAINING 3 cr. (3 and 0)

The practices, procedures, legal foundations, and legal structure associated with collective bargaining. The form and content of the labor contract, the grievance machinery, and the mediation and arbitration institutions will also be studied. *Prerequisite:* Econ 200 or 201.

ECON 309 GOVERNMENT AND BUSINESS 3 cr. (3 and 0)

The relationships between government and business, including among other topics, governmental efforts to enforce competition, to regulate public utilities, and to protect the special interests of laborers, farmers, and consumers. *Prerequisite:* Econ 200 or 201.

ECON 314, H314 INTERMEDIATE ECONOMIC THEORY 3 cr. (3 and 0)

An analytical study of the basic concepts of value and distribution under alternative market conditions. *Prerequisite*: Econ 201 and 202 or 200 and permission of instructor.

ECON 399 SENIOR SEMINAR IN ECONOMICS 1-3 cr. (1-3 and 0)

Current economic issues, research, and community service activities will provide the subject matter for the semester. Students may participate in the analysis of issues, development of research, and other activities requiring the use of skills acquired in their undergraduate programs.

ECON 403, 603 DEVELOPMENT OF ECONOMIC THOUGHT 3 cr. (3 and 0)

A study of the origin and evolution of economic ideas with some emphasis on the historical context, the problems which inspired these ideas, and the nature of the solutions which they provided: from ancient days to the present. *Prerequisite:* Econ 200 or 201 and 202.

ECON 404, 604 COMPARATIVE ECONOMIC SYSTEMS 3 cr. (3 and 0)

A comparative analytical and historical study of the principal economic systems which have been important in the modern world including among others, capitalism and socialism. *Prerequisite*: Econ 200 or 201 and 202.

ECON 407, H407, 607 NATIONAL INCOME AND EMPLOYMENT ANALYSIS 3 cr. (3 and 0)

An intensive study of selected economic theories with special emphasis on income and employment. Part of the course is devoted to the analysis of national income accounts and income. *Prerequisite:* Econ 200 or 201, 202, and permission of instructor.

ECON 408, 608 ARBITRATION 3 cr. (3 and 0)

Analysis of dispute settlement procedures with specific emphasis on mediation, factfinding, and arbitration as they are used to resolve labor-management disputes in the public and private sectors. *Prerequisite:* Permission of instructor.

ECON 410, 610 ECONOMIC DEVELOPMENT 3 cr. (3 and 0)

Consideration and analysis of economic and related problems of the underdeveloped countries. Attention will be given to national and international programs designed to accelerate solution of these problems. *Prerequisite:* Econ 200 or 201, 202.

ECON 412, H412, 612 INTERNATIONAL TRADE 3 cr. (3 and 0)

A study of economic principles particularly applicable to trade between nations. Topics covered include the balance of payments, determination of foreign exchange rates, price and income effects on the composition and level of trade, and commercial policy. *Prerequisite:* Econ 314 and permission of instructor.

ECON 419, 619 ECONOMICS OF DEFENSE 3 cr. (3 and 0)

Examines the American defense establishment in terms of resources utilized, alternative uses, and the contribution to the national economy and scientific progress generated by resources in a defense use. Discussed are economic problems inherent in shifting resources between defense and nondefense uses and among alternative defense uses. *Prerequisite:* Acct 200 or 201, Econ 200 or 201.

ECON 420, H420, 620 PUBLIC SECTOR ECONOMICS 3 cr. (3 and 0)

A study of the economic role of government in the economy. Effects of taxation, expenditures, and the provision of goods and services by the public sector will be analyzed. Contemporary public finance issues will be emphasized. *Prerequisite:* Econ 314 or permission of instructor.

ECON 421, 621 URBAN ECONOMICS 3 cr. (3 and 0)

Economic problems associated with the concentration of population in central places are examined. The historical development of cities and the associated economic implications for individuals, firms, and society are studied. Legislation of economic importance to urban living is analyzed. *Prerequisite:* Econ 200 or 201 and 202. ECON 422, H422, 622 MONETARY THEORY AND POLICY 3 cr. (3 and 0)

An intensive study of the role of monetary factors in economic change. Modern monetary theories and their empirical relevance for policy are developed against a background of monetary history and institutions. *Prerequisite:* Econ 302 or permission of instructor.

ECON 424, H424, 624 THE ORGANIZATION OF INDUSTRIES 3 cr. (3 and 0)

Empirical, historical, and theoretical analyses of market structure and concentration in American industry: the effects of oligopoly, monopoly, and cartelization upon price, output and other policies of the firm; antitrust and other public policies and problems will be studied. *Prerequisite:* Econ 314 or permission of instructor.

- ECON 750 ECONOMIC CONCEPTS AND CLASSROOM APPLICATIONS FOR TEACHERS 3 cr. (3 and 0)
- ECON 751 CURRENT ISSUES IN ECONOMICS FOR TEACHERS 3 cr. (3 and 0)
- ECON 802 ADVANCED ECONOMIC CONCEPTS AND APPLICATIONS I 3 cr. (3 and 0)
- ECON 803 ADVANCED ECONOMIC CONCEPTS AND APPLICATIONS II 3 cr. (3 and 0)
- ECON 806 INTERNATIONAL TRADE THEORY 3 cr. (3 and 0)
- ECON 808 SEMINAR IN PUBLIC EMPLOYEE LABOR RELATIONS 3 cr. (3 and 0)
- ECON 811 SEMINAR IN LABOR ECONOMICS 3 cr. (3 and 0)
- ECON 813 SEMINAR IN COMMUNITY GOODS AND ENVIRONMENTAL QUALITY 3 cr. (3 and 0)
- ECON 814 WELFARE ECONOMICS 3 cr. (3 and 0)
- ECON 821 ECONOMIC THEORY I 3 cr. (3 and 0)
- ECON 822 ECONOMIC THEORY II 3 cr. (3 and 0)
- ECON 831 SEMINAR IN URBAN DEVELOPMENT ECONOMICS 3 cr. (3 and 0)
- ECON 891 MASTER'S RESEARCH. Credit to be arranged.
- ECON 900 SEMINAR IN ADVANCED ECONOMIC THEORY 3 cr. (3 and 0)

Education

Professors: W. O. Corder, C. R. Freeze, E. B. Galloway, G. W. Gray, J. A. Hash, M. A. King, E. J. Kozma, *Head*; H. F. Landrith, J. E. Matthews, M. A. Packer, W. W. Pennscott

Associate Professors: L. H. Blanton, I. C. Briscoe, A. D. Brooks, S. L. Buckner, R. A. Ezzard, J. V. Hamby, D. F. Keller, O. R. Lumpkin, E. F. Olive, T. H. Parry, R. K. Peden, F. C. Raetsch, B. L. Sandberg, J. H. Walker, M. C. Woodson, Jr.

Assistant Professors: J. H. Adair, M. S. Crosby, L. B. Hart, V. K. Laycock, B. M. Raetsch, V. B. Stanley

Instructors: G. Y. Jones, S. W. Schalles

ED 100 ORIENTATION 1 cr. (1 and 0)

Lectures and discussions on teaching in addition to serving as teacher aides. Required of all students in Early Childhood Education, Elementary Education, Secondary Education, and Science Teaching.

ED 101 READING IMPROVEMENT 1 cr. (0 and 3)

Provides an individualized approach to developmental reading skills emphasizing comprehension, vocabulary, and rate.

ED 102 EFFICIENT READING 1 cr. (0 and 3)

Extends the reading skills of vocabulary, comprehension, and rate stressing skimming, scanning, flexibility, and critical reading.

ED 103 STUDY TECHNIQUES 1 cr. (0 and 3)

Aims at individual study skills in the content areas and makes application by using these techniques in college curricula. Priority given to freshmen.

ED 301, H301 PRINCIPLES OF AMERICAN EDUCATION 3 cr. (3 and 0)

A study of the legal basis, historical development, characteristics, and functions of educational institutions in the United States. *Prerequisite:* Junior standing or permission of instructor.

ED 302, H302 EDUCATIONAL PSYCHOLOGY 3 cr. (3 and 0)

The nature, capacities, equipment, growth, and development of the learner. *Prerequisite:* Junior standing or permission of instructor.

ED 334 CHILD GROWTH AND DEVELOPMENT 3 cr. (3 and 0)

A study of the physical and emotional growth and development of the child. *Prerequisite:* Ed 302 or Psych 201.

ED 335, H335 ADOLESCENT GROWTH AND DEVELOPMENT 3 cr. (3 and 0)

The physical and emotional growth and development of the adolescent. *Prerequisite:* Ed 302 or Psych 201.

ED 336 BEHAVIOR OF THE PRESCHOOL CHILD 3 cr. (2 and 3)

A study of behavior of the preschool child, including observation and participation. *Prerequisite:* Ed 302 or Psych 201.

ED 401, 601 THE COMMUNITY COLLEGE 3 cr. (3 and 0)

History and philosophy of the junior college, its functions, organization and administration.

ED 405, 605 PRINCIPLES OF GUIDANCE 3 cr. (3 and 0)

Principles, procedures, and policies of the guidance services. For all personnel workers. *Prerequisite:* Six semester hours in education or psychology.

ED 406, 606 HISTORY AND PHILOSOPHY OF EDUCATION 3 cr. (3 and 0)

An analysis of the development of modern education practices and philosophies with emphasis upon the historical and philosophical development in the United States.

ED 412 DIRECTED TEACHING IN SECONDARY SCHOOL SUBJECTS 6 cr. (1 and 15)

A program of supervised observation and teaching in cooperation with selected public schools in which opportunities are provided for prospective teachers to obtain experiences in the subject area. Students to be sectioned according to teaching fields: English, history, social sciences, mathematical sciences, modern languages, science. Enrollment is limited.

ED 424 METHODS AND MATERIALS IN SECONDARY SCHOOL INSTRUCTION 3 cr. (3 and 0)

Development of instructional practices and materials appropriate for the secondary school; familiarization with curriculum materials. Students to be sectioned according to teaching area: English, history, social science, mathematical sciences, modern languages, science.

ED 429, 629 TEACHER AS MANAGER 3 cr. (3 and 0)

Course designed to help teachers, principals, and other school personnel solve school problems by identifying and applying selected management techniques, and to better prepare educators for the added responsibilities demanded of them by the movement to measurable improvement in their management of learning.

ED 431, 631 SPECIAL INSTITUTE COURSE: EARLY CHILDHOOD EDUCATION 3 cr. (3 and 0)

Subject areas organized according to Institute needs.

ED 432, 632 SPECIAL INSTITUTE COURSE: ELEMENTARY SCHOOL 3 cr. (3 and 0)

Subject areas organized according to Institute needs.

ED 433, 633 SPECIAL INSTITUTE COURSE: SECONDARY SCHOOL 3 cr. (3 and 0)

Subject areas organized according to Institute needs.

ED 434, 634 SPECIAL INSTITUTE COURSE: CURRENT PROBLEMS IN EDUCATION 3 cr. (3 and 0) Subject areas organized according to Institute needs.

ED 435, 635 SPECIAL INSTITUTE COURSE: CURRICULUM 3 cr.

(3 and 0) Subject areas organized according to Institute needs.

ED 436, 636 SPECIAL INSTITUTE COURSE: SUPERVISION AND ADMINISTRATION 3 cr. (3 and 0)

Subject areas organized according to Institute needs.

ED 458 HEALTH EDUCATION 3 cr. (3 and 0)

A study of the information needed for effective cooperation with parents, physicians and public health agencies in the promotion and improvement of community health, including problems of personal hygiene, health records, immunization, and control of communicable disease.

ED 459, 659 FUNDAMENTALS OF BASIC READING 3 cr. (2 and 2) Study of reading skills in relation to the psychological bases; developmental principles; historical and current issues in reading practices.

ED 460, 660 CURRICULUM DEVELOPMENT IN THE ELEMENTARY SCHOOL 3 cr. (3 and 0)

An analysis and evaluation of newer practices in curriculum planning in the elementary school.

ED 461, 661 TEACHING READING IN THE ELEMENTARY SCHOOL 3 cr. (2 and 3)

Study of the various phases of reading and their relation to the elementary program. Emphasis on modern practices in the classroom teaching of reading. Includes observation and participation in the elementary classroom. *Prerequisite:* For student teachers or permission of instructor.

ED 462, 662 READING DIAGNOSIS AND REMEDIATION 3 cr. (2 and 3)

A clinical course in diagnostic and remedial procedures in the teaching of reading. Practice in the use of diagnostic instruments, interpretation of results, and case studies, with recommended remediation. Laboratory hours to be arranged with each individual. *Prerequisite:* Three semester hours in reading or permission of instructor.

ED 465, 665 SECONDARY SCHOOL CURRICULUM 3 cr. (3 and 0)

A study of the principles, techniques, and trends in secondary school curriculum development and evaluation.

ED 466 CURRICULUM FOR EARLY CHILDHOOD EDUCATION 3 cr. (2 and 2)

Overview of Early Childhood curriculum for nursery schools, kindergartens, and primary grades. Laboratory hours to be arranged in preschool and primary grades.

ED 469, 669 CHARACTERISTICS OF CHILDREN WITH EMOTIONAL HANDICAPS 3 cr. (3 and 0)

Intensive study of the meaning and concepts associated with emotionally handicapped. Analysis of the causes and characteristics of emotionally handicapped. *Prerequisite:* Ed 302 or Psych 201 and Ed 471, or permission of instructor.

ED 470, 670 CHARACTERISTICS OF CHILDREN WITH LEARNING DISABILITIES 3 cr. (3 and 0)

The nature and extent of perceptual, motor, and conceptual impairments are examined. Team functions, community role, and family needs are emphasized. *Prerequisite:* Ed 302 or Psych 201 and Ed 471, or permission of instructor.

ED 471, 671 THE EXCEPTIONAL CHILD 3 cr. (3 and 0)

Survey of exceptionality including handicapped and gifted children; nature, cause, and treatment of difficulties; educational problems.

ED 472, 672 PSYCHOLOGY OF MENTAL RETARDATION 3 cr. (3 and 0)

Psychological aspects of mental retardation; learning, motivation, and personality development.

ED 473, 673 TEACHING THE MENTALLY RETARDED 3 cr. (3 and 0)

Study, selection, and preparation of curricular materials; methods of teaching retarded children within the preadolescent and adolescent range. *Prerequisite:* Ed 472 or equivalent.

ED 474, 674 EDUCATIONAL PROCEDURES FOR CHILDREN WITH EMOTIONAL HANDICAPS 3 cr. (3 and 0)

Major problems of teaching disturbed children: curriculum and instructional modifications, program planning, facility adaptation, behavior controls, articulation with mental health specialists, and procedures to develop readiness for return to regular class. *Prerequisite:* Ed 302 or Psych 201 and Ed 471, or permission of instructor.

ED 475, 675 EDUCATIONAL PROCEDURES FOR CHILDREN WITH LEARNING DISABILITIES 3 cr. (3 and 0)

Special emphasis is given to educational evaluation and remedial procedures designed to improve the individual's learning abilities. A multisensory approach is emphasized geared to individual need. *Prerequisite:* Ed 302, Psych 201 and Ed 471, or permission of instructor.

ED 476, 676 PRACTICUM IN INSTRUCTION FOR EXCEPTIONAL CHILDREN 3 cr. (1 and 4)

Course designed to provide practical experience in teaching children with learning disabilities, mentally retarded, or emotionally handicapped. *Pre-requisite:* Ed 471 and a sequence of either of the following: Ed 472, 473 or 469, 474 or 470, 475.

ED 481 DIRECTED TEACHING IN THE ELEMENTARY SCHOOL 6 cr. (1 and 15)

Supervised observation and teaching experiences in cooperation with selected elementary schools. Enrollment is limited to seniors or graduates who have completed prerequisite courses and who have the accumulated grade-point ratio for graduation.

ED 483 METHODS AND MATERIALS FOR EARLY CHILDHOOD EDUCATION 3 cr. (2 and 3)

Study of methods and materials applicable to nursery schools, kindergarten, and early elementary grades. Includes observation and participation in preschool and/or primary grades.

ED 484 DIRECTED TEACHING IN EARLY CHILDHOOD EDUCATION 6 cr. (1 and 15)

Supervised observation and teaching experiences in cooperation with nursery, kindergartens, and early elementary schools. Enrollment is limited to seniors or graduates who have completed prerequisite courses and who have the accumulated grade-point ratio for graduation.

ED 485 METHODS AND CURRICULUM IN ELEMENTARY MATHEMATICS AND SCIENCE 3 cr. (2 and 3)

Develop understandings, skills, and attitudes in the elementary mathematics and science curricula, with emphasis on strategies, techniques, and materials for teaching elementary mathematics and science. Includes observation and participation in the elementary classroom.

ED 486 METHODS AND CURRICULUM IN ELEMENTARY SOCIAL STUDIES AND LANGUAGE ARTS 3 cr. (2 and 3)

Study of the elementary program with emphasis upon social studies and language arts materials, curriculum, and methodology. Includes observation and participation in the elementary classroom.

ED 494, 694 SCHOOL AND COMMUNITY RELATIONSHIPS 3 cr. (3 and 0)

A study of the interdependence of the school and community, with emphasis on educational implications.

ED 497, 697 AUDIO-VISUAL AIDS IN EDUCATION 3 cr. (3 and 0)

The techniques and uses of audio-visual aids in improving teaching effectiveness.

ED 498, 698 TEACHING SECONDARY SCHOOL READING 3 cr. (1 and 4)

Methods and materials of teaching basic and developmental reading skills; programming special services in reading instruction. Demonstrations of tests and devices. *Prerequisite:* For student teachers or permission of instructor.

- ED 707 READING AND INDEPENDENT STUDY IN EDUCATION 3 cr. (3 and 0)
- ED 720 SCHOOL PERSONNEL ADMINISTRATION 3 cr. (3 and 0)
- ED 721 LEGAL PHASES OF SCHOOL ADMINISTRATION 3 cr. (3 and 0)
- ED 722 FIELD EXPERIENCES IN SCHOOL ADMINISTRATION 3 cr. (2 and 3)
- ED 741 INTRODUCTION TO PUPIL PERSONNEL SERVICES IN HIGHER EDUCATION 3 cr. (3 and 0)
- ED 742 PSYCHOLOGY OF POST SECONDARY SCHOOL YOUTH 3 cr. (3 and 0)
- ED 776 COLLEGE TEACHING 3 cr. (3 and 0)
- ED 801 SEMINAR IN HUMAN GROWTH AND DEVELOPMENT 3 cr. (3 and 0)
- ED 802 HUMAN DEVELOPMENT: PSYCHOLOGY OF LEARNING 3 cr. (3 and 0)
- ED 803 ADVANCED METHODS OF TEACHING IN THE SECONDARY SCHOOL 3 cr. (3 and 0)
- ED 804 ADVANCED METHODS OF TEACHING IN THE ELEMENTARY SCHOOL 3 cr. (3 and 0)

- ED 808 EDUCATIONAL TESTS AND MEASUREMENTS 3 cr. (3 and 0)
- ED 809 ANALYSIS OF THE INDIVIDUAL 3 cr. (3 and 0)
- ED 810 THEORIES AND TECHNIQUES OF COUNSELING 3 cr. (3 and 0)
- ED 811 SCHOOL FINANCE 3 cr. (3 and 0)
- ED 813 EDUCATIONAL AND VOCATIONAL INFORMATIONAL SERVICE AND PLACEMENT 3 cr. (3 and 0)
- ED 814 FIELD EXPERIENCES IN ELEMENTARY SCHOOL GUIDANCE 3 cr. (2 and 3)
- ED 815 FIELD EXPERIENCES IN SECONDARY SCHOOL GUIDANCE 3 cr. (2 and 3)
- ED 816 FIELD EXPERIENCES IN PERSONNEL SERVICES IN HIGHER EDUCATION 3 cr. (2 and 3)
- ED 817 DEVELOPMENT OF COUNSELING SKILLS 3 cr. (3 and 0)
- ED 818 FIELD PROBLEMS IN SCHOOL ADMINISTRATION AND SUPERVISION OF INSTRUCTION 3 cr. (2 and 3)
- ED 819 PSYCHOEDUCATIONAL EVALUATION INTERNSHIP 3 cr. (0 and 6)
- ED 830 TECHNIQUES OF SUPERVISION—THE PUBLIC SCHOOLS 3 cr. (3 and 0)
- ED 831 EVALUATION OF SECONDARY SCHOOL INSTRUCTION 3 cr. (3 and 0)
- ED 832 EVALUATION OF ELEMENTARY SCHOOL INSTRUCTION 3 cr. (3 and 0)
- ED 851 ORGANIZATION AND ADMINISTRATION OF THE ELEMENTARY SCHOOL 3 cr. (3 and 0)
- ED 852 ORGANIZATION AND ADMINISTRATION OF THE SECONDARY SCHOOL 3 cr. (3 and 0)
- ED 853 ADMINISTRATION AND SUPERVISION OF SPECIAL EDUCATION 3 cr. (3 and 0)
- ED 861 ORGANIZATION AND SUPERVISION OF READING PROGRAMS 3 cr. (3 and 0)
- ED 862 CLINICAL RESEARCH IN READING 3 cr. (3 and 0)
- ED 863 PRACTICUM IN READING 3 cr. (2 and 2)
- ED 871 INTERPERSONAL AND GROUP RELATIONSHIPS 3 cr. (3 and 0)
- ED 881 INDIVIDUAL TESTING 3 cr. (3 and 0)

Electrical and Computer Engineering

Professors: T. L. Drake, A. L. Duke, Head; D. J. Dumin, R. W. Gilchrist, B. E. Gilliland, J. W. Lathrop, J. T. Long, J. C. Martin, J. N. Thurston, L. C. Wilcox, M. L. Wolla

Associate Professors: W. J. Barnett, J. E. Bennett, J. K. Bryan, L. T. Fitch, C. P. Goodin, J. N. Gowdy, J. J. Komo, H. V. Poe, J. L. Prince III, F. R. Sias, Jr., R. W. Snelsire

Assistant Professors: B. P. Keane, C. W. Malstrom, E. W. Page III

Instructor: S. D. Gilbert

Visiting Instructors: V. N. Gupta, E. M. O'Brien

E&CE 200 INTRODUCTION TO ELECTRONICS INDUSTRY 3 cr. (1 and 4)

Introduction to the electrical manufacturing industry through participation in an electrical engineering oriented project. A study of the design procedures in electrical circuits and an introduction to construction and testing of prototypes with application of elementary economical evaluation of a manufacturing process. *Prerequisite:* Engr 180. *Corequisite:* Math 106.

E&CE 201 LOGIC AND COMPUTING DEVICES 3 cr. (3 and 0)

A study of logic with an introduction to Boolean algebra. Number systems and representation of information. The use of integrated circuits to implement combinational and sequential logic functions and computing elements. The organization and structure of computing systems.

E&CE 202, H202 ELECTRIC CIRCUITS I 3 cr. (2 and 2)

DC resistive circuits, Kirchhoff's laws, nodal and mesh emphasis, independent sources, Thevenin's and Norton's theorems, RC, RL, RCL circuit solutions with initial condition using homogenous or nonhomogenous ordinary differential equations having constant coefficients. Develop sinusoidal steady state solution. *Corequisite:* Math 208. *Prerequisite:* Phys 221.

E&CE 250 PRINCIPLES OF DIGITAL COMPUTER SYSTEMS 3 cr. (3 and 0)

Introduction to minicomputers and microcomputers. Topics include machine organization and operation, information flow within a machine, data types and structures, data transfers and communication with external devices, computer response time, interrelation between software and hardware, memory types, specifying cost-effective small computer systems, application examples, introductory assembly language programming. *Prerequisite:* E&CE 201.

E&CE 299 DIGITAL COMPUTATION 2 cr. (1 and 2)

A programming course designed to prepare students for the efficient use of digital computers. FORTRAN language is used. A course for those desiring a short but comprehensive introduction to computing. Students are required to write several FORTRAN programs progressing through the elementary programming procedures.

E&CE 301, H301 ELECTRIC CIRCUITS II 3 cr. (2 and 2)

A continuation of the study of electric circuits, including single- and threephase circuits with sinusoidal excitation, rms and average values, power and reactive power, complex frequency, resonance, coupled circuits, circuit equations in state variable form. *Prerequisite:* E&CE 202.

E&CE 302 LINEAR CONTROL SYSTEMS 3 cr. (3 and 0)

An introduction to linear control systems. Topics include plant representation, applications of state variables, time and frequency response, stability, system specification, and system design. *Prerequisite:* E&CE 301, 330, and EM 202 or 211.

E&CE 307 BASIC ELECTRICAL ENGINEERING 3 cr. (2 and 2)

A first course in electrical engineering to provide non-Electrical Engineering majors with a knowledge of electric circuit theory, both dc and ac. The last five weeks of the semester are devoted to an introduction to digital systems. The two-hour sessions are devoted to calculation periods and laboratory work. *Prerequisite:* Math 206, Phys 221.

E&CE 308 ELECTRONICS AND ELECTROMECHANICS 3 cr. (2 and 2)

A continuation of E&CE 307. Energy conversion systems are considered, as well as basic electronics, plus instrumentation with emphasis on digital methods. *Prerequisite:* E&CE 307.

E&CE 317 ELECTRICAL SYSTEMS ANALYSIS 3 cr. (3 and 0)

Introduction to engineering problems of a probabilistic nature. Problems will be solved which utilize the concepts of probability space and functions of random variables. *Prerequisite:* E&CE 330.

E&CE 320 ELECTRONICS I 3 cr. (2 and 2)

Introduction to p-n junction theory and the concepts of solid-state devices. Development of the electrical characteristics of diodes and transistors. Operational characteristics of simple digital circuits and monolithic integrated circuits. The performance of actual devices is studied in the laboratory. *Prerequisite:* E&CE 202, Math 208, Phys 221.

E&CE 321, H321 ELECTRONICS II 3 cr. (2 and 2)

Operation of bipolar and field effect amplifying circuits at both high and low frequencies. Characteristics of different amplifier configurations are studied in the laboratory and compared with theory. *Prerequisite:* E&CE 320.

E&CE 330, H330 ELECTRICAL SYSTEMS ANALYSIS 3 cr. (3 and 0) F, S

Nonsinusoidal periodic waves. Circuit analysis using trigonometric and exponential forms of Fourier. Extension to nonperiodic waves. Frequency spectra. Laplace transformation and the complex-frequency variable. Analysis using Laplace transforms. Pole-zero techniques. Introduction to Z-transforms, flow graph, Bode plots and state variables. *Prerequisite:* E&CE 202.

E&CE 340 ELECTRIC AND MAGNETIC FIELDS I 2 cr. (2 and 0) F, S

An introduction to classical electromagnetics. Topics include vector analysis, Coulomb's law, electric field intensity, Gauss's law, potential theory, solution of Laplace's equation, and dc magnetic fields. *Prerequisite:* Math 208, Phys 221.

E&CE 341, H341 ELECTRIC AND MAGNETIC FIELDS II 2 cr. (2 and 0) F, S

Continuation of E&CE 340 to include magnetic circuits and devices and forces in magnetic fields, time-varying fields, Maxwell's equations, and transmission lines. *Prerequisite:* E&CE 340.

E&CE 351 REAL-TIME APPLICATION OF DIGITAL COMPUTERS 3 cr. (2 and 2) S

Application and operation of digital computers in a real-time or time-critical environment. Topics include interrupt facilities, analog-to-digital and digitalto-analog signal conversion, digital computer interfaces, on-line acquisition and reduction of data. Software concepts include multitask real-time executives, schedulers, and dynamic resource allocation systems. *Prerequisite:* E&CE 250 or permission of instructor.

E&CE 352 MACHINES, LANGUAGES, AND ALGORITHMS 3 cr. (3 and 0) S

Topics fall into three major areas: discrete structures, formal languages, and finite state models. Emphasis is placed on relating formalisms to practical considerations such as logical design of digital machines and the limitations of machine computation. *Prerequisite:* Junior standing in engineering or the physical sciences, or permission of instructor.

E&CE 353 PRINCIPLES OF SOFTWARE ENGINEERING 2 cr. (2 and 0) An indepth study of software design and implementation as applicable to

mini- and micro-computers. Topics include assembly language programming; use of editors, loaders, monitors, etc.; data structure fundamentals and software design methodologies. *Prerequisite:* E&CE 250.

E&CE 403, 603 ENERGY CONVERSION 3 cr. (3 and 0) F

Various methods of energy conversion with emphasis on solar energy which includes conversion techniques, storage, applications, systems, and future trends. Other energy conversion methods including fuel cells, magnetohydrodynamics, and nuclear are covered. *Prerequisite:* Math 208, Phys 222.

E&CE 404 SEMICONDUCTOR DEVICES 2 cr. (2 and 0) S

Consideration of the principles of operation, the external characteristics, and the applications of some of the more important semiconductor devices presently available. *Prerequisite:* Introductory electronics course.

E&CE 405, H405 SPECIAL PROBLEMS 1-3 cr. F, S

Electrical engineering problems assigned to the student according to his needs and capabilities. The purpose is to give students a chance to do projects, either theoretical or experimental, on subjects not covered in other courses. May be repeated for a maximum of six credits. *Prerequisite:* Permission of problem supervisor.

E&CE 406, 606 INTRODUCTION TO INTEGRATED CIRCUITS 3 cr. (3 and 0) F

Integrated circuit technology, devices and applications. Discussion of fabrication methods, survey of standard circuit characteristics, design and layout principles, linear and digital circuit applications. *Prerequisite:* E&CE 320.

E&CE 410, H410, 610 DISCRETE SYSTEM DESIGN 3 cr. (3 and 0)

Introductory course in digital control theory with microprocessors and minicomputer applications: z-transforms, flow graphs, state variables, stability, system compensation using state variables, Root Locus, Nyquist's, and Routh's criterion, optimal design. Introduction to minicomputer and microcomputer implementation of control algorithms. Computer 1/0 techniques for control applications, time-response limitations of transfer functions. *Prerequisite:* E&CE 302. *Corequisite:* E&CE 451.

E&CE 411, 611 ELECTRICAL SYSTEMS 2 cr. (0 and 4)

Experimental investigations in the areas of mathematical modeling, transient and steady-state responses of second and higher order systems, Bode plots, Nyquist's plots, modulation, system identification, and Pade's rational function approximations. *Corequisite:* E&CE 302, 422.

E&CE 412, 612 DIGITAL CONTROL SYSTEMS 3 cr. (3 and 0) S

Several minicomputer and microcomputer system topics are studied for the application of these systems in industrial digital control systems. Topic areas include logic circuits and devices, computer representation of data and text, computer operation and organization, programming systems, analysis and design of computer interfaces, data communication, and industrial applications. *Prerequisite:* Permission of instructor.

E&CE 414 ELECTROMECHANICS 3 cr. (2 and 2)

The principles of energy conversion are introduced with emphasis on electromagnetic and electromechanical devices. From these the mathematical and equivalent circuit models are developed, considering nonlinear magnetic characteristics and linear approximation. Inlaboratory studies are made on transformers and ac and dc motors and generators. *Prerequisite:* E&CE 301, 341.

E&CE 415 INFORMATION THEORY 3 cr. (3 and 0) S

A course designed for those interested in developing a precise definition of information, and then applying this definition to the study of communication. Coding and the effect of noise on the system will be discussed. In the last part of the course upper bounds on the rate at which a process can transmit information will be obtained. *Prerequisite:* E&CE 317.

E&CE 416, 616 INTRODUCTION TO MODERN CONTROL SYSTEMS 3 cr. (3 and 0)

Introduction to modern control systems utilizing state space techniques: state space, state vector differential equation, fundamental matrix, stability, analysis of discrete-time and nonlinear systems, design and synthesis, optimum control systems including adaptive and learning control systems. *Prerequisite:* E&CE 302.

E&CE 420, H420, 620 POWER SYSTEMS ANALYSIS I 3 cr. (3 and 0)

A study of electric power system terminology, components, and operation. Subjects covered include power, reactive power, and power factor; three-phase systems; transmission lines; per unit representation; transformers; synchronous machines; introduction to load flow; economic dispatch, fault analysis, and stability. *Prerequisite:* E&CE 301, 340.

E&CE 421, 621 ELECTRICAL MACHINERY 3 cr. (2 and 2)

Characteristics of dc and ac machines are studied with emphasis on steady state and nonlinear operation. The two-hour workshop offers exercises in instrumentation, operation, and control. *Prerequisite:* E&CE 301, 341.

E&CE 422, H422, 622 ELECTRONICS III 3 cr. (2 and 2)

Characteristics of oscillators and operational amplifiers. The use of electronic circuits as building blocks in analog and digital systems. Characteristics of semiconductor power devices and power circuits. *Prerequisite:* E&CE 301, 321.

E&CE 423, 623 DESIGN FOR LARGE-SCALE INTEGRATION FUNCTIONS 3 cr. (3 and 0)

Introduction to design principles and techniques for devices and functional elements used in large-scale integrated circuits. Emphasis on MOS digital circuits and new types of high-packing density bipolar circuits. Survey of current LSI applications. Impact of manufacturing technology on performance, cost, and reliability included. *Prerequisite:* E&CE 321.

E&CE 424, 624 POWER SYSTEMS ANALYSIS II 3 cr. (3 and 0)

A continuation of E&CE 420. Topics introduced in E&CE 420 are covered in more detail and depth. Subjects covered are load and flow studies, optimum operating strategies, fault analysis, transient stability, and the control problem. System modeling and computer solution of power system problems are included. *Prerequisite:* E&CE 420.

E&CE 425, 625 MICROPROCESSORS 3 cr. (2 and 2)

Survey of currently available microprocessors, indepth study of the architecture of more prominent microprocessors, hardware and software design, use of microcomputer-development system, design projects. *Prerequisite:* E&CE 201 and 412 or 250.

E&CE 426, 626 DIGITAL COMPUTER DESIGN 3 cr. (3 and 0) S

Design of the basic arithmetic and logical units of a digital computer. Study of timing and control problems. Design of a small computing system. *Prerequisite:* E&CE 201, 250.

E&CE 427, 627 OPERATIONAL AMPLIFIERS 2 cr. (2 and 0) S

The fundamentals, design, and applications of the operational amplifier. *Prerequisite:* E&CE 321 or equivalent.

E&CE 428, 628 COMMUNICATIONS THEORY I 3 cr. (3 and 0) F

A course in modern communications theory. Topics covered are Fourier transforms, power spectra, correlation, signals in linear networks, amplitude modulation, frequency modulation, sampling and pulse modulation. *Prerequisite:* E&CE 317.

E&CE 429, 629 COMPUTER ORGANIZATION 3 cr. (3 and 0) F

A computer system is organized as a collection of subsystems. Topics include bus structures, functional specifications of selected computer systems, memory organization and heirarchy, memory protection, memory relocation and allocation techniques, interrupt structures, arithmetic units, input-output structures, state generation, central processor organization, control function implementation, and data communication. *Prerequisite:* E&CE 250, 351, or permission of instructor.

E&CE 430, 630 COMMUNICATIONS THEORY II 3 cr. (3 and 0) S

A continuation of E&CE 428 with emphasis on the statistical properties of signals. Topics covered are random signals and noise, signal space and continuous channels, digital data systems, optimum detection theory. *Prerequisite:* E&CE 317, 428.

E&CE 431, 631 DIGITAL ELECTRONICS 3 cr. (2 and 2)

Electronic devices and circuits of importance to digital computer operation and to other areas of electrical engineering are considered. Active and passive waveshaping, waveform generation, memory elements, switching, and logic circuits are some of the topics. Experimentation with various types of circuits is provided by laboratory projects. *Prerequisite:* E&CE 321.

E&CE 432, 632 INSTRUMENTATION 3 cr. (3 and 0) F

Theory and analysis of transducers and related circuits and instrumentation. Generalized configurations and performance characteristics of instruments will be considered. Transducer devices for measuring physical parameters such as motion, force, torque, pressure, flow, and temperature will be discussed. *Prerequisite:* E&CE 321 or permission of department head.

E&CE 434, 634 POWER ELECTRONICS 3 cr. (3 and 0) F

A study of electronic devices and systems which are designed to control or regulate large amounts of power. Included are SCR applications to inverters, motor controls, high-current power supplies, frequency converters, etc. Also, high-current switching systems, voltage stabilizers, and other power applications of electronics are considered. *Prerequisite:* E&CE 321.

E&CE 435, 635 COMMUNICATIONS CIRCUITS 3 cr. (3 and 0) S

Communication circuits used in amplification, modulation, detection and other signal processing in modern communication systems. Recent developments in electronic devices, such as integrated circuits, will be considered as circuit components along with other solid state and vacuum electronic devices. *Prerequisite:* E&CE 321.

E&CE 436, 636 RADIATION AND WAVE PROPAGATION 3 cr. (3 and 0) F

A study of the theoretical and practical aspects of transmission lines, waveguides, plane electromagnetic waves, and antennas. Smith chart applications and impedance matching considerations are included. *Prerequisite:* E&CE 341.

E&CE 437, 637 LASER TECHNOLOGY AND APPLICATIONS 3 cr. (3 and 0) S

Design and operating principles of gas and solid-state lasers in engineering terms. Applications of lasers to computers, communications, holography, measurements and bioengineering are presented. Demonstrations and special projects are used to supplement the theoretical presentations.

E&CE 450 COMPUTER SYSTEM DESIGN PROJECT 2 cr. (0 and 4)

A project-oriented course which brings together computer engineering students into teams or project groups. Assignments are made to each group which are designed to help develop an appreciation for individual and creative thinking as well as team effort. *Prerequisite:* E&CE 425, 426, or permission of instructor.

E&CE 451, 651 SYSTEM DESIGN PROJECT 2 cr. (0 and 4) F, S

A project-oriented course which brings together electrical engineering students of dissimilar training into teams or project groups. Assignments are made to each group which are designed to help develop an appreciation for individual and creative thinking as well as team effort. *Corequisite:* E&CE 410.

E&CE 452, 652 PROGRAMMING SYSTEMS 3 cr. (3 and 0) S

A second course in programming languages and systems. Topics include assemblers, compilers and syntactical methods; string manipulation and list processing; concepts of executive programs and operating systems; introduction to time-sharing systems. *Prerequisite:* E&CE 250; 352 is recommended. E&CE 460, 660 COMPUTER-AIDED ANALYSIS AND DESIGN 3 cr. (3 and 0) F

Principles and methods suited to the solution of engineering problems on the digital computer. Topics include widely used methods for the solution of the systems of algebraic and/or differential equations which arise in the modeling of engineering systems, data approximation and curve fitting, continuous system simulation languages, and design-oriented programming systems. *Prerequisite:* E&CE 301 or permission of department head.

E&CE 461, 661 ANALOG/HYBRID COMPUTATION AND SIMULATION 3 cr. (2 and 2) F

Topics include nonlinear modeling, function generation, signal processing, and an introduction to hybrid computing. *Prerequisite:* E&CE 301, 330, or permission of department head.

E&CE 467, 667 INTRODUCTION TO DIGITAL SIGNAL PROCESSING 3 cr. (3 and 0)

Discrete time signals and systems, z-transforms, digital filter design techniques, properties and computation techniques of the discrete Fourier transform. *Prerequisite:* E&CE 302.

E&CE 470, 670 COMPUTER APPLICATIONS FOR NONENGINEERS 3 cr. (3 and 0)

Introduction to computers for nonengineering majors. History of Computers; algorithms; introduction to programming in BASIC; hardware components; simulation; applications in urban and government systems, humanities, education, behavioral sciences, arts, and other areas; impact of computers on society; computers and the future. Not open to engineering majors. *Prerequisite:* Senior standing.

E&CE 471, 671 MICROCOMPUTER APPLICATIONS IN MEDICAL INSTRUMENTATION 3 cr. (3 and 0)

A study of state-of-the-art techniques of analysis and monitoring in clinical and research environments. Electrocardiographic (ECG) and electroencephalographic (EGG) analysis and monitoring will be discussed in detail. Automation of other clinical facilities such as intensive care and the catheterization laboratory will be considered. Microcomputer design considerations will be emphasized. *Prerequisite:* E&CE 425 or equivalent microcomputer experience.

E&CE 491, 691 SELECTED TOPICS 1-3 cr. (1-3 and 0)

Study of current and new technical developments in electrical engineering. *Prerequisite:* Permission of the department head.

E&CE 701 SPECIAL PROBLEMS 1-3 cr.

E&CE 801 ANALYSIS OF LINEAR SYSTEMS 3 cr. (3 and 0)

E&CE 807 POWER SYSTEM ANALYSIS TECHNIQUES 3 cr. (3 and 0)

E&CE 812 SAMPLED DATA SYSTEMS 3 cr. (3 and 0)

E&CE 819 DETECTION AND ESTIMATION THEORY 3 cr. (3 and 0)

E&CE 820 THEORY OF COMMUNICATIONS I 3 cr. (3 and 0)

E&CE 821 THEORY OF COMMUNICATIONS II 3 cr. (3 and 0)

E&CE 822 INFORMATION THEORY 3 cr. (3 and 0)

- E&CE 823 INTEGRATED CIRCUIT TECHNOLOGY 3 cr. (3 and 0)
- E&CE 825 SOLID-STATE ELECTRONICS 3 cr. (3 and 0)
- E&CE 830 ELECTROMAGNETICS 3 cr. (3 and 0)
- E&CE 844 DIGITAL SIGNAL PROCESSING 3 cr. (3 and 0)
- E&CE 850 COMPUTATION AND SIMULATION 3 cr. (3 and 0)
- E&CE 851 THEORY AND DESIGN OF DIGITAL-ANALOG MACHINES 3 cr. (3 and 0)
- E&CE 852 DIGITAL COMPUTERS AND INFORMATION PROCESSING 3 cr. (3 and 0)
- E&CE 853 COMPUTER DATA DISPLAYS 3 cr. (3 and 0)
- E&CE 855 ARTIFICIAL INTELLIGENCE 3 cr. (3 and 0)
- E&CE 856 PATTERN RECOGNITION 3 cr. (3 and 0)
- E&CE 857 CODING THEORY 3 cr. (3 and 0)
- E&CE 858 AUTOMATA THEORY 3 cr. (3 and 0)
- E&CE 870 BIOSYSTEMS ANALYSIS 3 cr. (3 and 0)
- E&CE 890 SELECTED TOPICS IN ELECTRICAL ENGINEERING 1-3 cr. (1-3 and 0)
- E&CE 891 MASTER'S RESEARCH. Credit to be arranged.
- E&CE 991 DOCTORAL RESEARCH. Credit to be arranged.

Engineering

ENGR 110 ENGINEERING PROBLEMS WORKSHOP 1 cr. (0 and 2) A workshop devoted to the analysis and solution of engineering-oriented problems. Representative problems taken from the different fields of engineering will be used to illustrate such analytical and problem-solving techniques as estimation and approximation, numerical aids to computation, and solutions by graphical methods.

ENGR 180 ENGINEERING CONCEPTS 3 cr. (2 and 2)

An introduction to the profession of engineering. The engineering process, from problem formulation to the evolution of creative design, is demonstrated through the practical application of engineering problems. The utility and significance of computing devices in engineering practice is emphasized. Computer programming is introduced.

ENGR 220 TECHNOLOGY IN THE MODERN WORLD 3 cr. (3 and 0) A course designed to give the nontechnical student a better appreciation of the effect of technical forces on world events. Topics will include systems analysis, energy sources and systems, automation, the computer and the interaction of technology and the social system. Not open to engineering majors. *Prerequisite:* Sophomore standing or permission of instructor.

ENGR 250 SYSTEMS INTERNATIONALE—THE MODERN METRIC SYSTEM 1 cr. (1 and 0)

Public Law 94-168 proclaims that the United States is converting to the modern metric system. This course, taught for all University students, will present the fundamentals of SI metric and will discuss the impact of converting to SI on business, industry, education, and the consumer.

ENGR 330 ENGINEERING ASPECTS OF ENERGY SYSTEMS 3 cr. (3 and 0)

Design of the total energy system—generation, transmission, and consumption as influenced by the increasing demand for energy, the political and cultural impact of energy systems, and the limitations to energy source siting caused by increasing capital and fuel costs plus tightening environmental constraints. Not open to engineering majors. *Prerequisite:* Engr 220, one year of physical science, or permission of instructor.

ENGR 455 THE ROLE OF ENGINEERING IN TECHNOLOGY ASSESSMENT 3 cr. (3 and 0)

Introduces the mechanisms engineers use in assessing the technologicalsocietal impact resulting from technological change. The projected interactions of new technology with economic, environmental, political, and social factors are discussed. The development of technology assessment rationale and costbenefit results are presented. Case studies are used to present various aspects of technology assessment. The possible paths, both good and bad, resulting from decisions to implement a technological change are examined. *Prerequisite:* Senior standing.

ENGR 491 SEMINAR 1-3 cr. (1-3 and 0)

A study of the dynamic role of engineering in relationship to man and his environment. Topics not covered in formal courses will be presented to keep students abreast of today's rapidly changing technology. *Prerequisite:* Permission of instructor.

Engineering Graphics

Associate Professors: L. H. Jameson, C. M. McHugh, D. L. Ryan Visiting Assistant Professor: C. W. Norton, Jr.

EG 101 FREEHAND SKETCHING 1 cr. (0 and 3)

Principles of technical sketching, including the development of skills in technical lettering and freehand orthographic and pictorial drawing.

EG 105 ENGINEERING GRAPHICS 2 cr. (0 and 6)

A course in graphical communication. Freehand sketching, orthographic and auxiliary projection, sectional views, and conventional practices, dimensioning, reading drawings.

EG 109 ENGINEERING GRAPHICAL COMMUNICATION 2 cr. (0 and 6)

Graphical methods of communicating ideas and information in engineering. Development of the student's ability to visualize and conceptualize threedimensional forms and spatial relationships through the study of creative freehand sketching and basic fundamentals of engineering representation. Use of drafting aids, introduction to computer graphics, curve plotting, reproduction methods.

EG 110 ENGINEERING GRAPHICS 2 cr. (0 and 6)

A continuation of EG 109 with emphasis in depth on graphical communications. Working drawings to include detail and assembly drawings with emphasis on draftsmanship standard practices and procedures, and dimensioning for interchangeability for quantity production. Spatial relationships, architectural drawing, intersections and developments. *Prerequisite:* EG 109 or equivalent.

EG 310 COMPUTER AIDED GRAPHICS 3 cr. (3 and 0)

The use of automated graphic devices and systems are presented through a computer format for successful operation, digitizing, plotting, and display of engineering drawings. Upon completion, the student should be proficient in preparing and storing software such as that used in conjunction with the IBM 370 and CALCOMP digital plotter. *Prerequisite:* E&CE 299 or equivalent and either ME 201 or EG 109 or equivalent.

EG 410 COMPUTER AIDED DESIGN GRAPHICS 3 cr. (3 and 0)

Continuation of EG 310 with special emphasis on sculptured surfaces. The process involves translation from a designer's sketch, to an engineering drawing, to a model, and finally to a three-dimensional computer display. The student will learn how to apply the theory of computer-aided design (CAD) graphics to the solution of product design problems. *Prerequisite:* EG 310.

Engineering Management

Professors: E. A. LaRoche, H. H. Macaulay, Jr., V. W. W. Menke, C. R. Smith, B. J. Todd, G. C. Uselton, C. H. Whitehurst, Jr.

Associate Professors: E. E. Burch, Jr., D. M. Swanson, G. L. Waddle, G. H. Worm, T. W. Zimmerer

Assistant Professors: J. K. Butler, Jr., C. W. Gooding, J. M. McDonald

EMGT 910 SEMINAR IN OPERATIONS MANAGEMENT 1-3 cr. (1-3 and 0)

EMGT 911 SEMINAR IN DECISION THEORY 1-3 cr. (1-3 and 0)

EMGT 912 SEMINAR IN FINANCIAL ANALYSIS 3 cr. (3 and 0)

EMGT 913 MANAGEMENT SYSTEMS ANALYSIS 3 cr. (3 and 0)

EMGT 991 DOCTORAL RESEARCH. Credit to be arranged.

Engineering Mechanics

Professors: N. R. Bauld, Jr., W. E. Castro, J. G. Goree, M. K. Richardson

Associate Professors: R. H. Brown, R. E. Elling, E. H. Law,* R. F. Nowack, P. B. Zielinski

Assistant Professor: B. L. Sill

EM 201, H201 ENGINEERING MECHANICS (STATICS) 3 cr. (3 and 0)

Forces and force systems and their external effect on bodies, principally the condition of equilibrium. The techniques of vector mathematics are employed, and the rigor of physical analysis is emphasized. *Prerequisite:* Phys 122, concurrent registration in Math 206.

°On leave.

EM 202, H202 ENGINEERING MECHANICS (DYNAMICS) 3 cr. (3 and 0)

A continuation of EM 201. The principal topics are kinematics and kinetics of particles and rigid bodies of finite size. Techniques of vector mathematics are employed. *Prerequisite:* EM 201, Math 206.

EM 211 PARTICLE MECHANICS: STATICS AND DYNAMICS 3 cr. (3 and 0)

Force and force systems and their effect on particles; the conditions of equilibrium and the kinematics and kinetics of particle motion. The techniques of vector mathematics are employed, and the rigor of physical analysis is emphasized. *Prerequisite:* Phys 122, Math 206.

EM 304, H304 MECHANICS OF MATERIALS 3 cr. (3 and 0)

The relationships between external loads on solid bodies or members and the resulting internal effects and dimension changes, including the derivation of rational formulas for stresses and deformations and the identification and use of important mechanical properties of engineering materials. *Prerequisite:* EM 201, Math 206.

EM 305 MECHANICS OF MATERIALS LABORATORY 1 cr. (0 and 3)

Theoretical relationships considered in EM 304 are verified. Students observe the behavior under load and the failure of engineering materials; identify and evaluate mechanical properties of materials important to design and manufacturing processes; and are acquainted with various testing methods, testing machines, and instruments. *Prerequisite:* Must be accompanied or preceded by EM 304.

EM 320, H320 FLUID MECHANICS 3 cr. (3 and 0)

The behavior of fluids at rest or in motion, including the study of fluid properties. Emphasis is placed upon a rational, analytical approach from which are developed basic principles of broad applicability to all fields of engineering. *Prerequisite:* EM 202 or 211.

EM 322 FLUID MECHANICS LABORATORY 1 cr. (0 and 3)

The principles developed in EM 320 are verified and demonstrated. Familiarization with orderly techniques in organizing and reporting results of experimental investigations and with the use of instruments and equipment is afforded. *Prerequisite:* Must be accompanied or preceded by EM 320.

EM 421, 621 HYDROLOGY AND HYDRAULICS 2 cr. (2 and 0)

Elements of surface water and groundwater hydrology are introduced and applied to engineering problems. Special topics of open channel hydraulics and water distribution systems are developed from the fundamentals of fluid mechanics. *Prerequisite:* EM 320.

EM 425, 625 ADVANCED STRENGTH OF MATERIALS 3 cr. (3 and 0)

Topics in strength of materials not covered in EM 304. Three-dimensional stress and strain transformations, theories of failure, shear center, unsymmetrical bending, curved beams, and energy methods. Other topics such as stress concentrations and fatigue concepts are treated as time permits. *Prerequisite:* EM 304.

EM 450, 650 MECHANICAL VIBRATIONS 3 cr. (3 and 0)

Mathematical analysis of physical problems in the vibration of mechanical systems. Topics include: linear-free vibrations, forced vibrations, and damping in single degree of freedom systems, transient vibrations, critical speeds and whirling of rotating shafts, dynamic balancing, and multidegree of freedom systems with lumped parameters. *Prerequisite:* EM 202, 304, Math 208.

EM 470, 670 EXPERIMENTAL STRESS ANALYSIS 3 cr. (2 and 3)

Experimental analysis of static and dynamic stress fields. Emphasis is on the techniques required to obtain data and the theoretical analysis required for proper interpretation. Methods and instrumentation associated with strain gages (including transducer applications), Moiré grids, brittle coatings, photoelasticity, and photoelastic coatings are studied. *Prerequisite:* EM 304 and permission of instructor.

EM 829 ENERGY METHODS AND VARIATIONAL PRINCIPLES 3 cr. (3 and 0)

EM 831 THEORY OF ELASTICITY I 3 cr. (3 and 0)

EM 832 THEORY OF ELASTICITY II 3 cr. (3 and 0)

EM 834 PRINCIPLES OF STRUCTURAL STABILITY 3 cr. (3 and 0)

EM 845 INTERMEDIATE DYNAMICS 3 cr. (3 and 0)

EM 891 MASTER'S RESEARCH. Credit to be arranged.

EM 981 SPECIAL TOPICS IN MECHANICS 3 cr. (3 and 0)

EM 991 DOCTORAL RESEARCH. Credit to be arranged.

Engineering Technology

Professors: J. A. Chisman, Director; C. C. Fain, R. W. Gilchrist, J. T. Long, J. N. Thurston, S. M. Watson, Jr., J. S. Wolf

Associate Professors: J. H. Couch, L. T. Fitch, C. O. Huey, Jr., C. R. Lindenmeyer, R. L. Perry, H. V. Poe, R. W. Snelsire

Assistant Professor: R. J. Kopczyk

ET 211 ELECTRICAL CIRCUITS I 4 cr. (3 and 2)

A study of direct and alternating current circuits. Circuit theorems are introduced in the direct current coverage and are reinforced during the study of alternating currents. Emphasis is placed on steady-state conditions and power relationships in circuits with sinusoidal excitations. *Corequisite:* ET 295.

ET 212 ELECTRICAL CIRCUITS II 4 cr. (3 and 2)

Continuation of ET 211. A thorough coverage of polyphase circuits is included. *Prerequisite:* ET 211.

ET 241 APPLIED MECHANICS 4 cr. (4 and 0)

A study of statics including force systems and friction, dynamics of particles and rigid bodies; and kinetics including forces, mass and acceleration, work and energy, impulse and momentum. *Prerequisite:* ET 295, Phys 207.

ET 242 APPLIED STRENGTH OF MATERIALS 3 cr. (2 and 2)

Mechanical properties of solids; stress analysis in solids, beams, columns, and cylinders. *Prerequisite:* ET 241 or equivalent.

ET 245 KINEMATICS OF MACHINES 3 cr. (2 and 3)

A study of displacements, velocities, and accelerations encountered in the design of machines using the graphical approach to the solution of problems. The use of these principles applied to the study of cams, gears, and miscellaneous mechanisms. *Prerequisite:* EG 109, ET 295, Phys 207.

ET 295 PROBLEMS IN TECHNOLOGY 4 cr. (3 and 3)

The application of basic college mathematics, including differential and integral calculus, to problems found in a broad range of categories corresponding to the Engineering Technology curriculum requirements. Major categories covered include electrical, mechanical, heat power, and processes considerations. *Prerequisite:* Math 106 or equivalent.

ET 315 MINICOMPUTERS AND MICROCOMPUTERS 4 cr. (3 and 3) An introductory course in mini- and microcomputers, switching algebra, logic design, number systems, computer organization, assembly language programming, microprocessors, mini- and microcomputer system components and interfacing concepts. *Prerequisite:* ET 321.

ET 321 ELEMENTS OF ELECTRONICS 4 cr. (3 and 2)

Theory and operation of electronic circuits and control with emphasis on equipment for industrial application. *Prerequisite:* ET 211.

ET 322 ELECTRONIC CIRCUITS 4 cr. (3 and 2)

A study of the application of semiconductor diodes, transistors, integrated circuits and other devices in circuits used in industrial equipment and consumer products. Content includes power supplies, regulators, large and small signal amplifiers, oscillators, and operational amplifiers. *Corequisite:* ET 212. *Prerequisite:* ET 321.

ET 325 ELECTRONIC COMMUNICATIONS 4 cr. (3 and 3)

A study of communications circuits, receivers, and transmitters. Content includes AM and FM modulation, amplifiers, networks and filters, antennas and transmission lines. *Prerequisite:* ET 322.

ET 331 ELECTRICAL MACHINERY 4 cr. (3 and 2)

Coverage includes the theory of operation and application of dc and ac machines and transformers. External characteristics are depicted from the machine equivalent circuit. *Prerequisite:* ET 212.

ET 343 APPLIED FLUID MECHANICS 3 cr. (2 and 3)

Principles of fluid properties, fluid statics, fluid flow, dimensional analysis, ideal flow, compressible flow, measurements and equipment. *Prerequisite:* ET 241 or equivalent.

ET 351 APPLIED THERMODYNAMICS I 3 cr. (3 and 0)

First and second laws of thermodynamics, thermodynamic properties, gas mixtures and thermodynamic processes. *Prerequisite:* ET 295, Phys 208.

ET 352 APPLIED THERMODYNAMICS II 4 cr. (3 and 3)

Internal combustion engines, gas turbines, air compressors, flow in nozzles, refrigeration and steam power plant cycles, and heat transfer. *Prerequisite:* ET 351.

ET 375 MATERIALS OF INDUSTRY 3 cr. (3 and 0)

The technological applications of ceramic, metallic, polymeric, and composite materials to a variety of industrial environments. Guidelines are given for the selection of materials based upon material properties, economic considerations, and typical applications as related by case histories.

ET 431 ELECTRICAL ENGINEERING TECHNOLOGY LABORATORY 1 cr. (0 and 3)

The course is intended to illustrate theory covered in previous electrical engineering technology courses; to develop experimental techniques; to interpret data and results; and to develop basic skills in technical report writing. *Prerequisite:* Senior standing.

ET 435 ELECTRICAL POWER SYSTEMS 3 cr. (2 and 2)

A study of the generation, transmission, and distribution of electrical energy. Includes economic consideration of power plant operation, protective relaying, transformers, per unit system, and symmetrical components. *Prerequisite:* ET 331.

ET 451 MECHANICAL ENGINEERING TECHNOLOGY LABORATORY 1 cr. (0 and 3)

The course is intended to illustrate theory covered in previous mechanical engineering technology courses; to develop experimental technique; to interpret data and results; and to develop basic skills in technical report writing. *Pre-requisite:* Senior standing.

ET 452 POWER PRODUCTION AND UTILIZATION 3 cr. (3 and 0)

A course designed to apply the student's background developed in the study of thermodynamics and mechanics to the solution of problems encountered in thermal and hydraulic power systems and their industrial applications. Topics covered are energy processing, steam, internal combustion, hydropower sources, and economics of energy application. *Prerequisite:* ET 241, 351, or equivalents.

ET 455 HEATING AND AIR-CONDITIONING 4 cr. (3 and 2)

Psychrometric properties and processes; heating and cooling load calculations; selection and layout of major equipment for heating systems and airconditioning systems, refrigeration, and automatic controls. *Prerequisite:* ET 351.

ET 461 MACHINE AND COMPONENT DESIGN 4 cr. (3 and 3)

Basic instruction in the design and analysis of machine and machine components with emphasis on realistic and functional application. Kinematic and dynamic characteristics of the mechanical system together with wear, fatigue, structural soundness, safety, and others will be a major consideration of the analysis. *Prerequisite:* EG 110, ET 242, 245.

ET 465 INSTRUMENTATION FOR PROCESS MEASUREMENT AND CONTROL 3 cr. (2 and 3)

An applied approach to industrial control theory. Electronic, pneumatic, mechanical, and hydraulic measurement and control devices are studied. Techniques are discussed for analyzing process control problems and selecting proper measuring and controlling equipment in control system design. *Prerequisite:* ET 321 or equivalent.

ET 490 SELECTED TOPICS IN ENGINEERING TECHNOLOGY 1-3 cr. (1-3 and 0)

A comprehensive study of any timely or special topic in engineering technology not covered in other courses. May be repeated for a maximum of six credits. *Prerequisite:* Permission of instructor.

ET 492 TECHNICAL DESIGN PROJECT 1 cr. (0 and 3)

A senior technical design project performed in consultation with one or more faculty advisers. Collaboration with representatives of industry, government agencies, or community institutions is encouraged. A final written technical report, with evidence of extensive development and/or laboratory performance and tests, is required. *Prerequisite:* Permission of instructor.

English

Professors: R. J. Calhoun, H. M. Cox, C. B. Green, H. R. Holman, J. H. Mandel,^o R. W. Moran, *Head*; R. B. Rollin, M. S. Steadman, Jr.

Associate Professors: R. E. Barfield, Jr., H. B. Bryant, C. O. Caskey, F. L. Day, T. E. Douglass, L. L. Henry, R. W. Hill, A. H. Holt, J. L. Idol, Jr., C. M. McGee, Jr., J. J. McLaughlin, V. A. Rudowski, C. H. Sawyer, R. A. Underwood, M. O. Usrey, E. P. Willey

Assistant Professors: J. Bobbitt, D. G. Bzdyl, H. E. Curtis, Jr., C. S. M. Egan, S. K. Eisminger, B. M. Firestone, D. N. Griffin, D. E. Hickman, G. W. Koon, R. F. Lunsford, C. L. Montgomery, Jr., R. C. Sawyer, F. W Shilstone, J. B. Simms, B. N. Skardon, D. C. Tillinghast, C. H. Woodell

Instructors: J. K. Curtis, L. D. Egan, M. S. Linderman, J. H. McManus, S. S. Titus, M. S. Van Hoy

Lecturers: R. R. Cooke, S. J. Crowson, J. E. Pilkington, L. S. Suits Visiting Assistant Professor: M. K. Nellis

ENGL 100 ENGLISH FUNDAMENTALS 3 cr. (3 and 0)

Drill in basic writing skills: mechanics, spelling, syntax, usage, dialect, sentence clusters, and paragraphing. Required of all freshmen who do not make a satisfactory score on the SAT verbal.

ENGL 101, H101 ENGLISH COMPOSITION 3 cr. (3 and 0)

Training in correct and effective expression, in brief expository essays; review of the fundamentals of grammar and punctuation; instruction in common expository methods.

ENGL 102, H102 ENGLISH COMPOSITION 3 cr. (3 and 0)

Continued emphasis on correct and effective expression; training in the organization and writing of the research report. *Prerequisite:* Engl 101.

ENGL 105 FUNDAMENTALS OF ORAL COMMUNICATION 3 cr. (3 and 0)

Introduction to the problems of oral communication in the following areas: oral reading, listening, discussion, speaking, with emphasis on individual needs; oral exercises.

ENGL 111 ENGLISH FOR FOREIGN STUDENTS 3 cr. (3 and 2)

A special course for students learning English as a second language. Intensive study and drill in American English pronunciation and listening comprehension. Required of all foreign students who do not make a satisfactory grade on screening examinations in oral English.

• On leave.

ENGL H200 LITERATURE AND THE RELATED DISCIPLINES 3 cr. (3 and 0)

Studies in the relation of literature to such disciplines as art, medicine, science, or the military. Topics vary from semester-to-semester. Proficiency in composition must be demonstrated. The course may be repeated once for credit. *Prerequisite:* Engl 101, 102, and approval of the Honors Council.

ENGL 202 THE MAJOR FORMS OF LITERATURE 3 cr. (3 and 0)

A study of the basic structures and elements of fiction, poetry, and drama, including literary and critical theory, with readings in American, British, and world literature. Proficiency in composition must be demonstrated. *Pre-requisite:* Engl 101, 102.

ENGL 203, H203 SURVEY OF ENGLISH LITERATURE I 3 cr. (3 and 0)

Chief British authors and works from Beowulf to the Romantic period. Proficiency in composition must be demonstrated. *Prerequisite:* Engl 101, 102.

ENGL 204, H204 SURVEY OF ENGLISH LITERATURE II 3 cr. (3 and 0)

Chief British authors and works from Romantic period to the present. Proficiency in composition must be demonstrated. *Prerequisite:* Engl 101, 102.

ENGL 205, H205 SURVEY OF AMERICAN LITERATURE I 3 cr. (3 and 0)

American literature to the Civil War, with emphasis on major writers. Proficiency in composition must be demonstrated. *Prerequisite:* Engl 101, 102.

ENGL 206, H206 SURVEY OF AMERICAN LITERATURE II 3 cr. (3 and 0)

American literature from the Civil War to the present, with emphasis on major writers. Proficiency in composition must be demonstrated. *Prerequisite:* Engl 101, 102.

ENGL 207 SURVEY OF WORLD LITERATURE I 3 cr. (3 and 0)

Translations of continental European literature from Homer to the Renaissance (together with some Asian classics), with emphasis on major authors. Proficiency in composition must be demonstrated. *Prerequisite:* Engl 101, 102.

ENGL 208 SURVEY OF WORLD LITERATURE II 3 cr. (3 and 0)

Translations of continental European literature from the seventeenth century to the present (together with some Asian classics), with emphasis on major writers. Proficiency in composition must be demonstrated. *Prerequisite:* Engl 101, 102.

ENGL 209 CONTEMPORARY AMERICAN AND BRITISH LITERATURE 3 cr. (3 and 0)

A study of selected writers of American and British literature since 1945. Proficiency in composition must be demonstrated. *Prerequisite:* Engl 101, 102.

ENGL 217 VOCABULARY BUILDING 3 cr. (3 and 0)

Development of a useful discriminating vocabulary for writing, speaking, and reading. Student notebooks and proficiency quizzes. *Prerequisite:* Engl 101, 102.

ENGL 231 INTRODUCTION TO JOURNALISM 3 cr. (3 and 0)

Instruction and practice in writing for mass media; editorial responsibilities. *Prerequisite:* Engl 102.

ENGL 232 INTRODUCTION TO BROADCASTING 3 cr. (3 and 0) The history and scope of radio and television broadcasting in America.

ENGL 300 JOURNALISM WORKSHOP 1 cr. (1 and 0)

Responsibilities and duties of students editing uncensored publications; criticism of student publications. Open only to members of publication staffs. *Prerequisite:* Engl 102.

ENGL 301 PUBLIC SPEAKING 3 cr. (3 and 0)

Practical training in public speaking; an introduction to parliamentary procedure; practice in preparing, delivering, and evaluating short speeches. *Prerequisite:* Sophomore standing.

ENGL 302 PERSUASION 3 cr. (3 and 0)

The theories and art of ethical oral persuasion. The composition and delivery of speeches of a persuasive nature to convince, to stimulate, and to actuate. *Prerequisite:* Sophomore standing.

ENGL 303 VOICE AND DICTION 3 cr. (3 and 0)

Practical training in speech, with emphasis on clarity, vocal variety, and tone quality. *Prerequisite:* Sophomore standing.

ENGL 304 ADVANCED COMPOSITION 3 cr. (3 and 0)

Supervised writing for students of advanced standing, each student undertaking projects according to his interest; some attention to reports, business letters, research methods and materials. Weekly papers and some larger exercises. Limited enrollment. *Prerequisite:* Sophomore English.

ENGL 305 ORAL INTERPRETATION OF LITERATURE 3 cr. (3 and 0)

Analysis and oral interpretation of selected poetry and prose; training in development of effective tone production. *Prerequisite:* Sophomore standing.

ENGL 306 FORENSIC LABORATORY 1 cr. (0 and 3)

Organized preparation for participation in college speech activities. Intercollegiate, campus, and community programs.

ENGL 307 ARGUMENTATION AND DEBATE 3 cr. (3 and 0)

The basic principles of argumentation with emphasis on developing practical skills in argumentative speech. The role of the advocate in contemporary society and an analysis of selected significant debates in U.S. history. *Prerequisite:* Sophomore standing.

ENGL 308 PRINCIPLES OF ACTING 3 cr. (3 and 0)

Acting for the stage, basic techniques of characterization, audition procedures, exercises in emotional recall and pantomime, experience in supervised performance. *Prerequisite:* Sophomore standing.

ENGL 309 STAGE DIRECTION 3 cr. (3 and 0)

A laboratory class designed to prepare students to direct plays and supervise other theatre activities for educational institutions or civic organizations. *Prerequisite:* Sophomore standing. ENGL 310 INTRODUCTION TO THE THEATRE 3 cr. (3 and 0)

The history of play production from the Greeks to modern times. The role of lighting, costuming, set design and other elements in play production. *Prerequisite:* Sophomore standing.

ENGL 311 THEATRE LABORATORY 1 cr. (0 and 3)

Participation in theatre production including stage management, direction, costume, makeup, lighting, sound, scenery, and business management. No formal class meetings. One credit. May be repeated for a total of three credits.

ENGL 313 DISCUSSION AND GROUP LEADERSHIP 3 cr. (3 and 0)

Techniques of small group communication; the role of leadership in parliamentary and other deliberative bodies. *Prerequisite:* Sophomore standing.

ENGL 314 COMMUNICATION SKILLS FOR ENGINEERS 3 cr. (3 and 0)

Intensive training in the fundamentals of engineering expository and persuasive writing: reports, letters, and memoranda. *Prerequisite:* Sophomore English.

ENGL 322 MYTHOLOGY 3 cr. (3 and 0)

A study of the great myths of the world with an emphasis on their applications to literature. *Prerequisite:* Sophomore standing.

ENGL 323 FOLKLORE 3 cr. (3 and 0)

A study of folklore with an emphasis on such considerations as the folktale, folk songs and ballads, folk heroes, and folk superstitions and remedies. *Prerequisite:* Sophomore standing.

ENGL 333 THE STRUCTURE OF FICTION 3 cr. (3 and 0)

An introduction to the creative writing and critical study of prose fiction. *Prerequisite:* Sophomore standing.

ENGL 334 THE STRUCTURE OF POETRY 3 cr. (3 and 0)

An introduction to the creative writing and critical study of poetry. *Pre-requisite:* Sophomore standing.

ENGL 338 INTRODUCTION TO POPULAR CULTURE 3 cr. (3 and 0)

An examination of the nature, functions, history, and impact upon American society of best sellers, popular magazines, television, movies, and other like phenomena. *Prerequisite:* Sophomore standing.

ENGL 339 SCIENCE FICTION 3 cr. (3 and 0)

Readings in science fiction from the seventeenth century to the present, with special emphasis on writers since Verne and Wells. *Prerequisite:* Sophomore standing.

ENGL 340 BLACK AMERICAN LITERATURE 3 cr. (3 and 0)

Black American literature from its beginning to the present. A critical examination of essays, short stories, novels, drama, and poetry produced by the Black American. *Prerequisite:* Sophomore standing.

ENGL 351 CHILDREN'S LITERATURE 3 cr. (3 and 0)

Wide reading in prose and verse suitable for children in elementary grades. *Prerequisite:* Sophomore standing.

ENGL 352 ADOLESCENT LITERATURE 3 cr. (3 and 0)

Wide reading in prose and verse suitable for children in secondary schools. *Prerequisite:* Sophomore standing.

ENGL 362 SPEECH IN THE ELEMENTARY CLASSROOM 3 cr. (3 and 0)

The development of oral communication skills in children and the use of speech improvement activities to motivate spontaneous, accurate self-expression. *Prerequisite:* Sophomore standing.

ENGL 363 SPEECH FOR TEACHERS 3 cr. (3 and 0)

A performance course in the communication needs of the professional educator: listening, group discussion, speech and drama activities, conferences, using the media, and micro-teaching. *Prerequisite:* Sophomore standing.

ENGL 402, 602 THE ENGLISH LANGUAGE 3 cr. (3 and 0)

Studies in English usage and the historical development of the language. *Prerequisite:* Sophomore English.

ENGL 403, 603 COMPOSITION FOR TEACHERS 3 cr. (3 and 0)

Practical training in teaching composition: finding workable topics, organizing and developing observations and ideas, evaluating themes, and creative writing. *Prerequisite:* Sophomore English.

ENGL 404, 604 THE STRUCTURE OF MODERN ENGLISH 3 cr. (3 and 0)

Structural linguistic analysis; principles of phonology, morphology, and syntax as related to traditional, structural, and transformational grammars. Recommended for English teachers. *Prerequisite:* Sophomore English.

ENGL 405, 605 SHAKESPEARE 3 cr. (3 and 0)

A study of selected tragedies, comedies, and history plays of Shakespeare. Required of all English majors. *Prerequisite:* Sophomore English.

ENGL 406, 606 STUDIES IN SHAKESPEARE. 3 cr. (3 and 0)

Special topics in Shakespeare as selected by instructors. *Prerequisite:* Sophomore English.

ENGL 409, 609 CHAUCER 3 cr. (3 and 0)

Chaucer as an artist; the "Prologue" for historical and linguistic orientation; "The Canterbury Tales," "House of Fame," "Parliament of Fowls," and "Troilus and Criseyde" as art forms. *Prerequisite:* Sophomore English.

ENGL 410, 610 MEDIEVAL ENGLISH LITERATURE 3 cr. (3 and 0)

Selected works of Old and Middle English literature, exclusive of Chaucer and the medieval drama. *Prerequisite:* Sophomore English.

ENGL 411, 611 THE CLASSICS IN TRANSLATION 3 cr. (3 and 0)

An examination of the whole of the *The Iliad*, *The Odyssey*, Hesiod's *Theogony*, *The Aeneid*, *The Metamorphoses*, Apuleius's *The Golden Asse*. *Prerequisite:* Sophomore English.

ENGL 413, 613 CLASSICAL DRAMA 3 cr. (3 and 0)

Selected readings in the dramatic literature of classical Greece and Rome. *Prerequisite:* Sophomore English.

ENGL 416, 616 MODERN DRAMA 3 cr. (3 and 0)

Principles and progress of drama from Ibsen to the present; analysis of representative plays; critical reports; discussion of trends in contemporary drama. *Prerequisite*; Sophomore English.

ENGL 422, 622 AMERICAN LITERATURE I 3 cr. (3 and 0)

Major American authors and movements from the Colonial period to the Civil War. *Prerequisite:* Sophomore English.

ENGL 423, 623 AMERICAN LITERATURE II 3 cr. (3 and 0)

Major American authors and movements from the Civil War to the early twentieth century. *Prerequisite:* Sophomore English.

ENGL 424, 624 AMERICAN LITERATURE III 3 cr. (3 and 0)

Major American authors and movements of the twentieth century. *Prerequisite:* Sophomore English.

ENGL 425, 625 THE ROMANTIC PERIOD 3 cr. (3 and 0)

Readings from the poetry and critical prose of Blake, Wordsworth, Coleridge, Byron, Shelley, Keats, and other representative figures. *Prerequisite:* Sophomore English.

ENGL 427, 627 THE VICTORIAN PERIOD 3 cr. (3 and 0)

Readings from the poetry and nonfiction prose of selected Victorian authors, including works of Carlyle, Tennyson, Browning, Arnold, and other representative figures. *Prerequisite:* Sophomore English.

ENGL 431, 631 THE RESTORATION AND EIGHTEENTH CENTURY 3 cr. (3 and 0)

Readings in Dryden, Swift, Pope, and Dr. Johnson. Prerequisite: Sophomore English.

ENGL 435, 635 SOUTHERN LITERATURE 3 cr. (3 and 0)

The intellectual and literary achievement of the South from 1607 to the present, with emphasis upon the writers of the nineteenth century. *Prerequisite:* Sophomore English.

ENGL 436, 636 MILTON AND HIS AGE 3 cr. (3 and 0)

The development of Milton's thought and art in relation to his times and to the writings of his contemporaries. *Prerequisite:* Sophomore English.

ENGL 437, 637 THE ENGLISH NOVEL 3 cr. (3 and 0)

A study of the English novel from its eighteenth century beginnings through the Victorian period. *Prerequisite:* Sophomore English.

ENGL 438, 638 TWENTIETH CENTURY POETRY 3 cr. (3 and 0)

The modern tradition in English and American poetry from Yeats to the present; relevant critical essays. *Prerequisite:* Sophomore English.

ENGL 439, 639 TWENTIETH CENTURY FICTION 3 cr. (3 and 0)

American and British novelists of the twentieth century. *Prerequisite:* Sophomore English.

ENGL 440, 640 APPLIED LITERARY CRITICISM 3 cr. (3 and 0) Major critical approaches to literature. *Prerequisite:* Sophomore English. ENGL 441, 641 CONTINENTAL FICTION IN TRANSLATION 3 cr. (3 and 0)

Master European fiction writers of the twentieth century, considered in terms of both ideas and literary technique. *Prerequisite:* Sophomore English.

ENGL 443, 643 SEVENTEENTH CENTURY POETRY AND PROSE 3 cr. (3 and 0)

A survey of British authors of the seventeenth century other than Shakespear and Milton. *Prerequisite:* Sophomore English.

ENGL 445, 645 RENAISSANCE NONDRAMATIC LITERATURE 3 cr. (3 and 0)

Tudor and Elizabethan poetry, prose fiction, translations, essays, and criticism. *Prerequisite:* Sophomore English.

ENGL 446, 646 TUDOR-STUART DRAMA 3 cr. (3 and 0)

Selected readings in non-Shakespearean dramatic literature of the sixteenth and seventeenth centuries. *Prerequisite:* Sophomore English.

ENGL 447, 647 THE AMERICAN NOVEL 3 cr. (3 and 0)

A survey of the most significant forms and themes of the American novel from its beginnings to 1900. *Prerequisite:* Sophomore English.

ENGL 448, 648 AMERICAN HUMOR 3 cr. (3 and 0)

Native American humor of the nineteenth and twentieth centuries. *Prerequisite:* Sophomore English.

ENGL 450 FICTION WORKSHOP 3 cr. (3 and 0)

A workshop in the creative writing of prose fiction. *Prerequisite:* Engl 333 or permission of instructor.

ENGL 451 POETRY WORKSHOP 3 cr. (3 and 0)

A workshop in the creative writing of poetry. *Prerequisite:* Engl 334 or permission of instructor.

ENGL 452, 652 CREATIVE WRITING FOR TEACHERS 3 cr. (3 and 0)

A structured approach to the study of fiction and poetry from the writer's perspective, this course is designed for those who plan to teach creative writing. Students will write both fiction and poetry as well as critical papers. *Prerequisite:* Engl 333, 334, or permission of instructor.

ENGL 461, 661 STUDIES IN ENGLISH LITERATURE TO 1700 3 cr. (3 and 0)

Selected readings in English literature from the beginnings to 1700, with emphasis on social and intellectual backgrounds. *Prerequisite:* Sophomore English.

ENGL 462, 662 STUDIES IN ENGLISH LITERATURE SINCE 1700 3 cr. (3 and 0)

Selected readings in English literature from 1700 to the present, with emphasis on social and intellectual backgrounds. *Prerequisite:* Sophomore English.

ENGL H470 SENIOR DIVISION HONORS ENGLISH 3 cr. (3 and 0)

An intensive study of a period, topic, genre, or figure. Papers, reports, reading list, examination. May be repeated by arrangement with the department. *Prerequisite:* Sophomore English and approval of the Honors Council.

ENGL 481 DIRECTED READING 1-3 cr. (1-3 and 0)

Class and tutorial work for students with special interests or projects in American, British, or European literature outside the scope of existing courses. May be repeated by arrangement with the department. *Prerequisite:* Junior standing, or Engl H203, H204, and invitation of the department.

ENGL 482 SPECIAL TOPICS IN LITERATURE 3 cr. (3 and 0)

A study of special topics in English not covered in other courses. Specific title will be announced when offered. *Prerequisite:* Sophomore English.

- ENGL 751 CHILDREN'S LITERATURE FOR TEACHERS 3 cr. (3 and 0)
- ENGL 761 ENGLISH LITERATURE FOR TEACHERS 3 cr. (3 and 0)

ENGL 801 STUDIES IN THE TEACHING OF ENGLISH: MODERN GRAMMAR AND RHETORIC 3 cr. (3 and 0)

- ENGL 802 STUDIES IN MIDDLE ENGLISH LITERATURE 3 cr. (3 and 0)
- ENGL 803 STUDIES IN RENAISSANCE ENGLISH LITERATURE 3 cr. (3 and 0)
- ENGL 804 STUDIES IN NEOCLASSIC AND ROMANTIC LITERATURE 3 cr. (3 and 0)
- ENGL 805 STUDIES IN VICTORIAN AND MODERN ENGLISH LITERATURE 3 cr. (3 and 0)
- ENGL 810 STUDIES IN COLONIAL AND REVOLUTIONARY AMERICAN LITERATURE 3 cr. (3 and 0)
- ENGL 811 STUDIES IN ROMANTIC AND REALISTIC AMERICAN LITERATURE 3 cr. (3 and 0)
- ENGL 812 STUDIES IN MODERN AMERICAN LITERATURE 3 cr. (3 and 0)
- ENGL 820 STUDIES IN THEORETICAL AND APPLIED LITERARY CRITICISM 3 cr. (3 and 0)
- ENGL 825 STUDIES IN LITERARY GENRES 3 cr. (3 and 0)
- ENGL 830 STUDIES IN LINGUISTICS 3 cr. (3 and 0)
- ENGL 840 STUDIES IN WORLD LITERATURE 3 cr. (3 and 0)
- ENGL 881 DIRECTED READING 3 cr. (3 and 0)
- ENGL 890 INTRODUCTION TO RESEARCH 1 cr. (1 and 0)
- ENGL 891 MASTER'S RESEARCH. Credit to be arranged.

Entomology

Professors: T. R. Adkins, Jr., R. C. Fox, S. B. Hays, Head; E. W. King, T. E. Skelton

Associate Professors: G. R. Carner, R. Noblet, B. M. Shepard

Assistant Professors: R. L. Holloway, J. C. Morse

Lecturer: J. A. Jordan

ENT 200 INSECTS 2 cr. (2 and 0)

An introduction to insects; their various relationships with man, other animals and plants. The general nature of this course makes it beneficial to all students regardless of specialty.

ENT 301 GENERAL ENTOMOLOGY 3 cr. (2 and 3)

A general introduction to entomology with emphasis on anatomy, metamorphosis, and description of the most common insect species. Methods of control are introduced and current control practices are explained for some of the most important species.

ENT 307 FOREST ENTOMOLOGY 3 cr. (2 and 3) F

Insects of economic importance to forests, forest products and shade trees, and their role in the practice of good forest management as well as their significance in the natural environment.

ENT 308 APICULTURE 3 cr. (2 and 3)

A detailed study of the honey bee and its economic importance in pollination and honey production. Attention will be given to bee behavior, colony management, equipment, honey plant identification, and honey production and processing. *Prerequisite:* Biol 104, 106, and permission of instructor.

ENT 401, H401, 601 INSECT PESTS OF ORNAMENTAL PLANTS AND SHADE TREES 3 cr. (2 and 3)

Recognition, biology, damage, and control of insect pests of woody and other ornamental plants and shade trees. *Prerequisite:* Ent 301.

ENT 402, H402, 602 FRUIT, NUT, AND VEGETABLE INSECTS 3 cr. (2 and 3)

Common insect pests of the following are studied: peaches, apples, grapes, pecans, sweet corn, cole crops, cucurbits, potatoes, sweet potatoes, peas, and beans. Primary emphasis is placed on life histories, identification of destructive forms, recognition of damage, and current control measures. *Prerequisite:* Ent 301.

ENT 403, H403, 603 FIELD CROP INSECTS 3 cr. (2 and 3)

Insect pests of the more important field crops are studied. Primary emphasis is placed on life histories, identification of destructive stages, recognition of damage, and current control measures. *Prerequisite:* Ent 301.

ENT 404, H404, 604 STRUCTURAL, INDUSTRIAL AND HOUSEHOLD INSECTS 3 cr. (2 and 3)

Recognition, biology, damage, and control of food, stored products, household, structural, and industrial pests. *Prerequisite:* Ent 301.

ENT 405, H405, 605 INSECT MORPHOLOGY 4 cr. (3 and 3) F

A study of insect structure in relation to function and of the variation of form in insects. *Prerequisite:* Ent 301.

ENT 410, 610 INSECT TAXONOMY 3 cr. (1 and 6)

The identification of the principal families of the major orders of adult insects. Laboratory work consists of intensive practice of such identification; lecture material deals with necessary theoretical discussion of taxonomic features observed in the laboratory. *Prerequisite:* Ent 405 or permission of instructor.

ENT 412, 612 FIELD AND MUSEUM ENTOMOLOGY 3 cr. (0 and 9)

Practical aspects of gathering, sorting, and curating insects. Students participate in an intensive insect-collecting expedition for two weeks in the Southeastern States. Students will become acquainted with insect habitats and collecting methods. The remainder of the summer session will be devoted to curatorial preparation of collected material. Limited enrollment. *Prerequisite:* Ent 410 and permission of instructor.

ENT 420, 620 TOXICOLOGY OF INSECTICIDES 3 cr. (2 and 3)

Concepts of insecticide toxicology: principles of insecticide action; toxicological and pharmacological effects in insects and higher animals, safety, current regulations governing the use of insecticides. *Prerequisite:* Ent 301.

ENT 455, H455, 655 MEDICAL AND VETERINARY ENTOMOLOGY 3 cr. (2 and 3) S

Insects and their arthropod relatives which are of economic importance in their effect on man and animals. *Prerequisite:* Ent 301 or permission of instructor.

ENT 461 SPECIAL PROBLEMS IN ENTOMOLOGY AND ECONOMIC ZOOLOGY 1-3 cr.

Research problems in selected entomological and economic zoology areas to provide the student with experiences in research planning, techniques of development and presentation of research results. *Prerequisite:* Consultation with and permission of the appropriate staff member.

ENT 462 SEMINAR 1 cr. (1 and 0) F, S

Literary search and oral presentation of current entomological topics.

ENT 468, 668 INTRODUCTION TO RESEARCH 2 cr. (1 and 3) S

Principles, developments and changes in research methods related to certain fields of biological and agricultural research. The students obtain practice in experimental techniques, scientific writing and the use and maintenance of various research instruments and equipment.

ENT 469, H469, 669 AQUATIC INSECTS 3 cr. (1 and 6)

Identification, life history, habitats, and interrelationships of aquatic insects; techniques of qualitative field collecting; important literature and research workers. *Prerequisite*: Ent 301 or permission of instructor.

ENT 470, H470, 670 INSECT PHYSIOLOGY 3 cr. (2 and 3)

An introduction to the physiological systems of insects including structure as related to function. Emphasis will be on digestion, nutrition, reproduction, respiration, excretion, and nervous and hormonal systems as they affect growth and development in insects. *Prerequisite:* Ent 301 or permission of instructor.

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ENT 480, H480, 680 INSECT PATHOLOGY 3 cr. (2 and 3)

The study of insect diseases including those caused by viruses, rickettsiae, bacteria, fungi, protozoa, and nematodes will be covered in this course. The effects of diseases on insect populations and the use of pathogens in insect control will also be considered in detail. *Prerequisite:* Ent 301 or permission of instructor.

- ENT 808 TAXONOMY OF IMMATURE INSECTS 3 cr. (1 and 6)
- ENT 809 RECENT ADVANCES IN ENTOMOLOGY 1 cr. (1 and 0)
- ENT 812 ENTOMOLOGICAL HISTORY AND LITERATURE 1 cr. (1 and 0)
- ENT 840 INSECT ECOLOGY 3 cr. (2 and 3)
- ENT 853 PRINCIPLES OF CLASSIFICATION 3 cr. (2 and 3)
- ENT 856 MEDICAL ENTOMOLOGY 3 cr. (2 and 3)
- ENT 860 INSECT PEST MANAGEMENT 3 cr. (3 and 0)
- ENT 861 INSECT TOXICOLOGY 3 cr. (2 and 3)
- ENT 863 SPECIAL PROBLEMS IN ENTOMOLOGY 3-6 cr.
- ENT 870 ADVANCED INSECT PHYSIOLOGY 3 cr. (2 and 3)
- ENT 891 MASTER'S RESEARCH. Credit to be arranged.
- ENT 991 DOCTORAL RESEARCH. Credit to be arranged.

Environmental Science

Professors: A. R. Abernathy, R. F. Borgman, W. P. Williams, Jr. Associate Professors: R. O. Hegg, M. G. Johnson

EN SC 431, 631 PUBLIC HEALTH ADMINISTRATION 3 cr. (3 and 0) A course designed to prepare one for a career in the environmental sciences, with positions in public health and pollution control. Topics included are public health organizations and regulations, public relations, psychology of public health administration, and the use of the communications media in educating the public on health problems.

EN SC 432 INSPECTION METHODS IN WATER AND SOLID WASTE 3 cr. (2 and 3)

Methods of disposal of liquid and solid wastes will be emphasized in regard to environmental quality control. Treatment plant methods will be discussed. Inspection techniques for adequate treatment is a basic approach.

EN SC 471, 671 MAN AND HIS ENVIRONMENT 2 cr. (2 and 0)

The interaction of man with his environment will be surveyed. Factors such as urbanization, population growth, pathogens, disease vectors, ionizing radiation, sewage disposal, and noise control will be considered. The effects of environmental contacts with air, water, food, and solid and liquid wastes will be emphasized. *Prerequisite:* Permission of instructor. EN SC 472, 672 ENVIRONMENTAL PLANNING AND CONTROL 2 cr. (2 and 0)

Application of planning and control to effective environmental quality improvement. Water supply and treatment, wastewater treatment and disposal, solid waste disposal, air pollution abatement, and land use and zoning will be considered from the standpoint of control. Not intended for graduate students in engineering. *Prerequisite:* Permission of instructor.

Environmental Systems Engineering

Professors: A. R. Abernathy, B. C. Dysart III, T. M. Keinath, Acting Head; L. G. Rich

Assistant Professors: T. J. Overcamp, T. E. Pollock

ESE 401, 601 ENVIRONMENTAL ENGINEERING 3 cr. (3 and 0)

An introduction to the field of environmental engineering. Topics include environmental phenomena, impact of pollutants in the aquatic environment, solid-waste management, air-pollution control, radiological health, and simple water-treatment systems. *Prerequisite:* Junior standing in engineering or permission of instructor.

ESE 402, 602 WATER AND WASTE-TREATMENT SYSTEMS 3 cr. (3 and 0)

A study of the fundamental principles, rational design considerations, and operational procedures of the unit operations and processes employed in water and waste treatment. Both physiochemical and biological treatment techniques will be discussed. An introduction to the integration of unit operations and processes into water and waste treatment systems. *Prerequisite:* EM 320 or permission of instructor.

ESE 430, 630 AIR POLLUTION ENGINEERING 3 cr. (3 and 0)

An introductory course in air pollution and its control. Topics include air pollutants and effects, sources, dispersion models, engineering controls, and air quality legislation. *Prerequisite:* Senior standing in engineering or physical sciences.

ESE 443, 643 ENVIRONMENTAL ENGINEERING CHEMISTRY I 3 cr. (3 and 0)

A study of those fundamental principles of physical and analytical chemistry as applied to the treatment of waters and wastewaters. Chemical thermodynamics, chemical kinetics, acid-base equilibria, solubility equilibria, complex equilibria, and electrochemistry are several topics that are examined with emphasis on graphical techniques. *Prerequisite:* One year of General Chemistry.

ESE 444, 644 ENVIRONMENTAL ENGINEERING CHEMISTRY LABORATORY I 1 cr. (0 and 3)

Demonstration of the principles discussed in ESE 443 and laboratory exercises in those analytical methods used in water-quality control. EPA prescribed wet-chemical analytical techniques are demonstrated using samples of water or wastewater. These include residue analysis, phosphorus, chemical oxygen demand, nitrogen forms, alkalinity, acidity, pH, hardness, dissolved oxygen, and biochemical oxygen demand. *Prerequisite:* One year of General Chemistry. ESE 491 SELECTED TOPICS IN ENVIRONMENTAL ENGINEERING 1-3 cr.

A study of the dynamic role of environmental engineering in maintaining environmental quality. A comprehensive study of any phase of environmental engineering. *Prerequisite:* Permission of department head.

- ESE 701 SPECIAL PROBLEMS 1-4 cr. (1-4 and 0)
- ESE 802 PRINCIPLES OF WATER-TREATMENT SYSTEMS 4 cr. (4 and 0)
- ESE 803 LABORATORY IN PRINCIPLES OF WATER-TREATMENT SYSTEMS 1 cr. (0 and 3)
- ESE 804 DESIGN AND OPERATION OF WATER-TREATMENT SYSTEMS 4 cr. (4 and 0)
- ESE 805 LABORATORY IN DESIGN AND OPERATION OF WATER-TREATMENT SYSTEMS 1 cr. (0 and 3)
- ESE 806 INTEGRATED PROBLEMS IN WATER-TREATMENT SYSTEMS 2 cr. (2 and 0)
- ESE 831 AIR QUALITY MONITORING 3 cr. (2 and 3)
- ESE 832 AIR POLLUTION METEOROLOGY 3 cr. (3 and 0)
- ESE 846 POLLUTION OF THE AQUATIC ENVIRONMENT 3 cr. (3 and 0)
- ESE 847 POLLUTION OF THE AQUATIC ENVIRONMENT LABORATORY 1 cr. (0 and 3)
- ESE 848 ENVIRONMENTAL ENGINEERING CHEMISTRY II 2 cr. (2 and 0)
- ESE 849 ENVIRONMENTAL ENGINEERING CHEMISTRY LABORATORY II 2 cr. (1 and 3)
- ESE 860 ECOLOGICAL MODELS 3 cr. (2 and 3)
- ESE 861 ENVIRONMENTAL SYSTEMS ENGINEERING SEMINAR 0-1 cr. (1 and 0)
- ESE 862 ENVIRONMENTAL QUALITY CASE STUDY 1 cr. (0 and 3)
- ESE 881 SPECIAL PROBLEMS 1-4 cr.
- ESE 883 SELECTED TOPICS IN ENVIRONMENTAL ENGINEERING 1-4 cr.
- ESE 884 SELECTED TOPICS IN ENVIRONMENTAL ENGINEERING 1-4 cr.
- ESE 891 MASTER'S RESEARCH. Credit to be arranged.
- ESE 991 DOCTORAL RESEARCH. Credit to be arranged.

Experimental Statistics

Professors: W. P. Byrd, W. E. Johnston Associate Professors: P. M. Burrows, J. S. Lytle Assistant Professor: H. S. Hill, Jr. Instructor: J. M. Currin

EX ST 301 INTRODUCTORY STATISTICS 3 cr. (2 and 2) F, S, SS Basic concepts and methods of statistical inference; organization and presentation of data, elementary probability, measures of central tendency and variation, tests of significance, sampling, simple linear regression and correlation. The role of statistics in interpreting research, and the general application of the methods are stressed.

EX ST 462, 662 STATISTICS APPLIED TO ECONOMICS 3 cr. (3 and 0) S

A continuation of Ex St 301 with emphasis on statistical methods used in the collection, analysis, presentation and interpretation of economic data. Special attention is given to time series analysis, the construction of index numbers and the designing of samples for surveys in the social science fields. *Prerequisite:* Ex St 301.

EX ST 801 STATISTICAL METHODS 4 cr. (3 and 3)

EX ST 803 REGRESSION AND LEAST SQUARES ANALYSIS 3 cr. (3 and 0)

EX ST 804 SAMPLING 3 cr. (3 and 0)

EX ST 805 DESIGN AND ANALYSIS OF EXPERIMENTS 3 cr. (3 and 0)

Finance

Professors: C. C. Davis, *Head*; J. A. Turner, Jr., J. M. Wannamaker Associate Professors: F. R. Gray, J. D. Sheriff, A. M. Sibley Assistant Professors: G. S. Carew, H. A. Hobson, C. D. Wiggins

FIN 306 CORPORATION FINANCE 3 cr. (3 and 0)

The organization and operation of corporations with emphasis on the nature and influences of the various sources of funds. *Prerequisite:* Acct 201 or equivalent with permission of instructor.

FIN 308 FINANCIAL INSTITUTIONS AND MARKETS 3 cr. (3 and 0)

A study of financial institutions and markets with emphasis upon the role of financing American industry. *Prerequisite:* Econ 302, Fin 306.

FIN 310 PROBLEMS IN FINANCIAL MANAGEMENT 3 cr. (3 and 0)

A thorough investigation of the problems and problem-solving techniques often encountered by financial managers. Extensive use is made of the case method of instruction. *Prerequisite:* Acct 302, Fin 306.

FIN 402, 602 CAPITAL BUDGETING 3 cr. (3 and 0)

A study of the cost of capital and the planning of capital expenditures with emphasis on selecting the appropriate investments from the standpoint of the firm. *Prerequisite:* Fin 306 or permission of instructor. 260 Description of Courses

FIN 404 SEMINAR IN FINANCE 3 cr. (3 and 0)

An examination of current issues and controversies in financial management. Lectures, student reports, selected readings, and visiting speakers. *Prerequisite:* Fin 308, 310.

Fluid Mechanics

The courses listed are offered by the faculties of the departments of Chemical Engineering and Mechanical Engineering for students majoring in those departments who desire an area of concentration in fluid mechanics. This integrated sequence provides the opportunity for indepth penetration of this study area as well as breadth of application to such diverse fields of technology as propulsion systems, water distribution systems, chemical systems, biological systems, and air and water pollution.

The 800-series courses will be offered on *fixed schedule*, odd number offered in fall and even number in spring. The 900 series are offered as needed.

FM 801 FOUNDATION OF FLUID MECHANICS 3 cr. (3 and 0)

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FM 811 EXPERIMENTAL FLUID MECHANICS 3 cr. (2 and 3)
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FM 812 THEORY OF INCOMPRESSIBLE IDEAL FLOW 3 cr. (3 and 0)
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FM 814 TURBULENT BOUNDARY LAYER 3 cr. (3 and 0)

FM 816 FLOW IN OPEN CHANNELS 3 cr. (3 and 0)

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FM 817 NON-NEWTONIAN FLOW 3 cr. (3 and 0)
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Food Science

Professors: J. J. Janzen, J. T. Lazar, Jr., W. P. Williams, Jr., Head Associate Professors: J. C. Acton, J. J. Jen, M. G. Johnson Assistant Professor: S. S. H. Rizvi

FD SC 101 EPOCHS IN MAN'S STRUGGLE FOR FOOD 1 cr. (1 and 0) A study of significant developments in food preservation methods and the impact each had on man's struggle for food.

FD SC 201 MAN AND HIS FOOD 2 cr. (2 and 0)

A study of food and food products with emphasis on nutrients, nutrient needs, and the relationship between nutrient intake and health. Also discussed are food additives, nutritional awareness (to include nutrition labeling), product development, food protection, food resources, and the influence of processing on nutritional quality of food.

FD SC 202 INTRODUCTION TO PACKAGING 2 cr. (2 and 0)

An introduction to the technological concepts involved in creating a package and its basic functions. Closure and sealing materials and methods, packaging and labeling laws, ecological impacts, and future of packaging are identified.

FD SC 212 MAN'S FOOD RESOURCES 2 cr. (2 and 0)

Food material resources with reference to quality preservation, processing, and nutritional requirements. The role of science and technology in the modern food industry is emphasized. The need for food standards and grades is explained, and the functions of regulatory agencies are discussed.

FD SC 305, H305 DAIRY AND FOOD ENGINEERING 3 cr. (2 and 3)

A study of the basic engineering principles and their application to the dairy and food processing operations. The relationship between engineering principles and fundamentals of food processing is emphasized. Topics include material and energy balance, electricity, steam, refrigeration, heat transfer, fluid mechanics, evaporation, water and waste treatment.

FD SC 401, H401, 601 FOOD CHEMISTRY I 4 cr. (3 and 3)

The basic composition, structure, and properties of food and the chemistry of changes occurring during processing utilization. *Prerequisite:* Bioch 210 or permission of instructor.

FD SC 402, H402, 602 FOOD CHEMISTRY II 4 cr. (3 and 3)

Application of theory and procedures for quantitative and qualitative analysis of food ingredients and food products. Methods for protein, moisture, lipid, carbohydrate, ash, fiber, rancidity, color and vitamin analyses and tests for functional properties of ingredients are examined. *Prerequisite:* Bioch 210 or permission of instructor.

FD SC 403, 603 FOOD PRESERVATION AND PROCESSING I 3 cr. (3 and 0)

Food preservation and processing by refrigerated and frozen storage, thermal processing and pasteurization, dehydration and concentration, fermentation, radiation, microwave heating and chemical preservatives. *Prerequisite:* Physics and organic chemistry or biochemistry.

FD SC 404, 604 FOOD PRESERVATION AND PROCESSING II 3 cr. (3 and 0)

Principles of food preservation applied to flow processes, ingredient functions, and the importance of composition and physical characteristics of foods related to their processing. Product recalls and product development concepts. *Prerequisite:* Physics and organic chemistry or biochemistry.

FD SC 405, 605 FOOD PRESERVATION AND PROCESSING LABORATORY I 1 cr. (0 and 3)

Laboratory exercises on preservation methods, equipment utilized, and processes followed in food manufacture. *Prerequisite:* Concurrent registration in Fd Sc 403.

FD SC 406, 606 FOOD PRESERVATION AND PROCESSING LABORATORY II 1 cr. (0 and 3)

A continuation of Fd Sc 405 with greater emphasis on processes followed in food manufacture. *Prerequisite:* Concurrent registration in Fd Sc 404.

FD SC 417 SEMINAR 1 cr. (1 and 0)

Literature research and oral presentation of current food science topics.

FD SC 418 SEMINAR 1 cr. (1 and 0)

Literature research and oral presentation of current food science topics.

FD SC 420, H420 SPECIAL TOPICS IN FOOD SCIENCE 1-3 cr. (1-3 and 0)

A comprehensive study of special topics in food science not covered in other courses. Special emphasis will be placed on independent investigations of contemporary developments. *Prerequisite:* Permission of instructor.

FD SC 422, 622 QUALITY ASSURANCE AND SENSORY EVALUATION 2 cr. (2 and 0)

Principles of food quality assurance programs with emphasis on the elements of sensory evaluation testing, sampling, inspections, federal and trade standards/grades, records and EVOP procedures.

FD SC 424, 624 QUALITY ASSURANCE AND SENSORY EVALUATION LABORATORY 1 cr. (0 and 3)

A continuation of Fd Sc 422. The mechanics of quality assurance laboratory methods with emphasis on sensory evaluation panel testing, scoring, kinesthetic properties, and grade-quality measurements.

FD SC 462, 662 FOOD PACKAGING SYSTEMS 4 cr. (3 and 3)

Characteristics and application of various materials and systems used in the packaging of foods. Engineering properties of the materials and the methods used to measure such properties are emphasized. Consideration is given to packaging systems for specific food applications. *Prerequisite:* Fd Sc 403.

FD SC 801 TOPICAL PROBLEMS IN FOOD SCIENCE 1-3 cr. (1-3 and 0)

FD SC 802 FOOD ENZYMOLOGY 2 cr. (2 and 0)

FD SC 891 MASTER'S RESEARCH. Credit to be arranged.

Forestry

Professors: R. M. Allen, Head; B. M. Cool, D. D. Hook, C. L. Lane, W. H. D. McGregor, R. E. Schoenike, D. H. Van Lear, J. R. Warner, T. E. Wooten

Associate Professors: B. A. Dunn, G. D. Kessler, P. Labosky, L. E. Nix, L. D. Reamer, W. A. Shain, G. W. Wood

Assistant Professors: C. W. Brewer, C. A. Gresham, D. L. Ham, A. P. Marsinko, A. E. Miller, P. J. Przestrzelski, G. E. Sabin, T. M. Williams

Instructors: J. R. Scholtens, A. T. Shearin, J. G. Williams, Jr.

FOR 101 INTRODUCTION TO FORESTRY 1 cr. (1 and 0) F

An informative sketch of forestry, forests, and forestry tasks of the nation; education and career opportunities for foresters.

FOR 102 INTRODUCTION TO FORESTRY 1 cr. (1 and 0) S A continuation of For 101.

FOR 205 DENDROLOGY 4 cr. (3 and 3) F

Classification and identification of the principal forest trees of the United States, their geographical distribution, ecological requirements, and economic importance. Field identification of native trees, shrubs, woody vines, and of commonly planted exotics in the Piedmont and surrounding areas. *Prerequisite:* Biol 103, 105 or permission of instructor.

FOR 206 SILVICS 4 cr. (3 and 3) S

A study of the nature of forests and forest trees, how they grow, reproduce, and their relationships to the physical and biological environment. *Prerequisite:* Agron 202, Biol 103 and 105, For 205, or permission of instructor. FOR 251 FOREST PLANTS 2 cr. (Summer Camp) SS

Identification of principal native forest understory plants by vegetative and floral characteristics; their site requirements and forest-type associations with emphasis on successional patterns; and their value for man and wildlife. The preparation of a field herbarium is required of all students. *Prerequisite*: Biol 103 and 105, For 205, or permission of instructor.

FOR 252 FOREST ENGINEERING 2 cr. (Summer Camp) SS

Field and drafting practice in mapping, traversing boundaries, and road location; use of surveying equipment and techniques. *Prerequisite:* EG 105, CE 201, or permission of instructor.

FOR 253 FOREST MENSURATION 4 cr. (Summer Camp) SS

Practical application of field techniques including timber cruising, measuring tree heights and volumes, constructing volume tables and boundary line surveys. *Prerequisite:* CE 201, EG 105, For 205, or permission of instructor.

FOR 254 FOREST PRODUCTS 1 cr. (Summer Camp) SS

A tour of the forest products industry of South Carolina with an emphasis on those products and processes of some distinction or special interest.

FOR 302, 602 FOREST MENSURATION 3 cr. (2 and 3) S

A practical application of statistical and mensurational techniques in forest management. *Prerequisite:* Ex St 301, For 253, or permission of instructor.

FOR 304, 604 FOREST ECONOMICS 3 cr. (3 and 0) S

Economic problems and principles involved in the utilization of forest land and timber and in the distribution of forest products; cost analysis of integrated forest operations. *Prerequisite:* Econ 201 or permission of instructor.

FOR 305 ELEMENTS OF FORESTRY 2 cr. (2 and 0) F, S

A compendium of forestry subjects providing a broad view of the forest environment as it relates to ecology, management and utilization of forests, especially those of South Carolina. Not open to Forest Management majors. *Prerequisite:* Biol 103 and 105 or permission of instructor.

FOR 306, 606 WOOD AND WOOD FIBER IDENTIFICATION 2 cr. (1 and 3) S

Macroscopic and microscopic identification, properties, and uses of selected economically significant timbers. *Prerequisite:* Biol 103 and 105, Ch 102, or permission of instructor.

FOR 307 ELEMENTS OF FORESTRY LABORATORY 1 cr. (0 and 3) F, S

Field and laboratory exercises in the fundamentals of forest land management considered in For 305. *Prerequisite:* Registration in For 305.

FOR 308, 608 AERIAL PHOTOGRAPHS IN FORESTRY 3 cr. (2 and 3) F

An introduction to photographic measurements, aerial photo-interpretations, mapping, and timber estimating. *Prerequisite:* CE 201, Forestry Summer Camp, or permission of instructor.

FOR 310, 610 SILVICULTURE 4 cr. (3 and 3) S

Theory and practice of establishing, maintaining, and harvesting forest stands in accordance with ecological and economic principles. *Prerequisite:* For 206, Forestry Summer Camp, or permission of instructor.

FOR 315 FOREST ECOLOGY 2 cr. (2 and 0) S

A study of the forest ecosystem stressing the interrelationships between the living and nonliving components of the forest environment. Energy flow, nutrient and hydrologic cycles, meteorological and soil factors will also be considered. Not open to Forestry majors.

FOR 401, 601 LOGGING AND MILLING 3 cr. (2 and 3) S

Logging and milling methods and costs with major emphasis on survey of methods and equipment. *Prerequisite:* Senior standing or permission of instructor.

FOR 403, 603 FOREST SOILS SEMINAR 1 cr. (1 and 0) S

A study of forest soil characteristics with respect to site evaluation, forest fertilization, planting problems, watershed management, tree-soil-microorganism interactions, and trafficability. *Prerequisite:* Junior standing or permission of instructor.

FOR 409, 609 MULTIPLE-USE FORESTRY 3 cr. (3 and 0) F

A study of the demands placed on forests for a variety of products and uses, and how these can and must be reconciled in planning the management of each forest. *Prerequisite:* Senior standing or permission of instructor.

FOR 411, 611 HARVESTING FOREST PRODUCTS 3 cr. (2 and 3) S

An application of engineering and cost analysis techniques to the evaluation of the forest transport system and various harvesting situations. *Prerequisite:* For 401 or permission of instructor.

FOR 412, 612 FOREST PROTECTION 2 cr. (2 and 0) S

Prevention and suppression of forest fires; their effect upon the environment and people; factors affecting fire behavior; and use of fire in resource management. *Prerequisite:* Senior standing or permission of instructor.

FOR 414, 614 MANAGEMENT PLANS 1 cr. (0 and 3) S

Analysis of factors entering into forest working plans of several forestry organizations; preparation of a preliminary management plan of a sample area. *Prerequisite:* For 417.

FOR 416, 616 FOREST POLICY AND ADMINISTRATION 2 cr. (2 and 0) S

Development of public and private forest policy in the United States; administrative and executive tasks in forestry; principles of organization, personnel management, budgeting, and decision making. *Prerequisite:* For 304 or permission of instructor.

FOR 417, 617 FOREST MANAGEMENT AND REGULATION 4 cr. (3 and 3) F

Correlation of production factors and yields of forests; regulation of cuts and growing stock in sustained yield management. *Prerequisite:* Forestry Summer Camp, For 304, 310, or permission of instructor.

FOR 418, 618 FOREST VALUATION 3 cr. (3 and 0) S

Capital investments in forestry and the returns derivable from them; valuation of land, timber, and other resources associated with forestry; appraisal of damage and stumpage values. *Prerequisite:* For 304 or permission of instructor.

FOR 419 SENIOR PROBLEMS 3 cr. (1-3 and 0)

Problems chosen with faculty approval in selected areas of forestry. Prerequisite: Senior standing.

FOR 420, 620 FOREST PRODUCTS 2 cr. (2 and 0) F

Primary forest products other than lumber; i.e., poles and piles, railroad ties, veneers and plywoods, wood furniture, shingles, containers, secondary wood products; chemically derived products from wood including pulp and paper, distillation products, wood hydrolysis; miscellaneous and minor forest products. *Prerequisite:* For 205, Phys 207, Forestry Summer Camp; Senior standing or permission of instructor.

FOR 421, 621 WOOD PROPERTIES I 3 cr. (2 and 3) F

The formation of wood in forest trees, gross and minute characteristics of wood; defects in wood; variability in wood. *Prerequisite:* Biol 103 and 105, For 306, or permission of instructor.

FOR 422, 622 WOOD PROPERTIES II 3 cr. (2 and 3) S

Wood in relation to moisture, heat, sound, light, and electricity; mechanical properties of wood; standard testing procedures for wood. *Prerequisite:* For 306 or permission of instructor.

FOR 424, 624 FOREST GENETICS AND TREE BREEDING 3 cr.

(3 and 0) S, Even-numbered years.

History of genetics and breeding in forestry and its relation to silviculture; natural variation, hybridization and inheritance in forest trees; tree breeding objectives and methods. *Prerequisite:* Gen 302 or equivalent, or permission of instructor.

FOR 425 WOOD CHEMISTRY 3 cr. (2 and 3) F

The chemistry of the major components of wood; distribution of the cellwall components in wood; chemical processing of wood and cellulose-derived products. *Prerequisite:* Ch 102 or permission of instructor.

FOR 427 WOOD PROCESSING I 3 cr. (2 and 3) F

Wood seasoning principles and practices; seasoning defects; wood preservation principles and practices; fire-retardant treatments. *Prerequisite:* For 421, 422, or permission of instructor.

FOR 428 WOOD PROCESSING II 3 cr. (2 and 3) S

Machining and preparation of wood for processing; wood adhesives; wood finishes. *Prerequisite:* For 427 or permission of instructor.

FOR 429, 629 WOOD DESIGN 3 cr. (2 and 3) F

The technical mechanical properties of wood; load analysis and design criteria; design of structural elements in wood. *Prerequisite:* For 427, 428, or permission of instructor.

FOR 431, 631 RECREATION RESOURCE PLANNING IN FOREST MANAGEMENT 3 cr. (3 and 0) F

Forest recreation is analyzed from two aspects: its effects on the physical and biological forest environment and on human participation and preferences. Various physiographic factors composing the forest site and techniques of properly managing these factors will be examined. Man's perspective and participation in forest recreation activities and his influence and impacts will be surveyed. *Prerequisite:* Senior standing or permission of instructor. FOR 432, 632 FOREST SITE CAPABILITY 2 cr. (2 and 0) S

Analysis of use pressures on the forest land base and their effects on the capability of the forest to satisfy resource demands. Productivity and sensitivity of sites will be discussed. *Prerequisite:* Senior standing in Forestry or permission of instructor.

FOR 440, 640 FOREST WETLAND ECOLOGY 5 cr. (3 and 6) SS

Coastal wetland forest types and sites are analyzed by physiographic types, soils, groundwater hydrology, flooding and species adaptability characteristics. The impact of silvicultural treatments on forest productivity, site, and water quality are evaluated for major forest types and sites. Course offered only at the Belle W. Baruch Forest Science Institute at Georgetown, S. C. *Prerequisite:* Senior standing or permission of instructor.

FOR 801 DATA PROCESSING IN FORESTRY PROBLEMS 3 cr. (2 and 3) F

FOR 802 ADVANCED MENSURATION 3 cr. (2 and 3) S, Even-numbered years.

FOR 803 PHOTO INTERPRETATION 3 cr. (2 and 3) S, Odd-numbered years.

FOR 804 ADVANCED FOREST ECONOMICS 3 cr. (2 and 3) S, Odd-numbered years.

FOR 807 SPECIAL PROBLEMS IN FORESTRY. Credit to be arranged. F, S, SS

FOR 808 SEMINAR 1 cr. (1 and 0) F, S

FOR 891 MASTER'S RESEARCH. Credit to be arranged.

French

Professor: H. E. Stewart, Head
Associate Professor: R. R. McGregor, Jr.
Assistant Professors: D. Y. Brannock, Jr., J. A. McNatt, J. B. Macy
Instructors: D. J. Calvez, R. Willingham
Visiting Assistant Professor: R. H. Robe
Visiting Instructor: J. C. Rouse

FR 101, H101 ELEMENTARY FRENCH 4 cr. (3 and 1)

A course for beginners in which, through conversation, composition, and dictation, the fundamentals of the language are taught and a foundation is provided for further study and the eventual ability to read and speak the language. Three hours a week of classroom instruction and one hour a week in the language laboratory.

FR 102, H102 ELEMENTARY FRENCH 4 cr. (3 and 1)

A continuation of Fr 101; three hours a week of classroom instruction and one hour a week in the language laboratory.

FR 151 FRENCH FOR GRADUATE STUDENTS 3 cr. (3 and 0)

An intensive program for graduate students preparing to take the reading examination in French. Some previous study of the language is helpful but not essential. FR 201, H201 INTERMEDIATE FRENCH 3 cr. (3 and 0)

Attention to grammar, with conversation, composition and dictation continued from Fr 102, and the beginning of more serious reading of French prose in short stories or novels.

FR 202, H202 INTERMEDIATE FRENCH 3 cr. (3 and 0)

While attention is paid to writing and speaking French, more stress is laid on the rapid reading of more difficult French prose than in the earlier courses. *Prerequisite:* Fr 201.

FR 205 ELEMENTARY FRENCH CONVERSATION AND COMPOSITION 3 cr. (3 and 0)

Intensive oral and written training in French through conversation groups, speeches, written composition, and controlled vocabulary acquisition. Required of all French majors and minors. May be taken concurrently with Fr 202 or 301. *Prerequisite:* Fr 201.

FR 299 FOREIGN LANGUAGE DRAMA LABORATORY 1 cr. (0 and 3) Participation in foreign language drama productions. No formal class meetings, but an average of three hours per week in a foreign language drama workshop for production. May be repeated for a total of three credit hours. *Prerequisite:* Permission of instructor directing the play.

FR 301 SURVEY OF FRENCH LITERATURE I 3 cr. (3 and 0)

French literary movements and authors of the 19th and 20th centuries. Prerequisite: Fr 202.

FR 302 SURVEY OF FRENCH LITERATURE II 3 cr. (3 and 0)

French literary movements and authors of the 17th and 18th centuries. *Prerequisite:* Fr 202.

FR 303 SURVEY OF FRENCH LITERATURE III 3 cr. (3 and 0)

French literary movements and authors of the Medieval period and the 16th century. *Prerequisite:* Fr 202.

FR 305 INTERMEDIATE FRENCH CONVERSATION AND COMPOSITION I 3 cr. (3 and 0)

Practice in the spoken language, with stress on vocabulary building, pronunciation, intonation, and comprehension; written work to increase accuracy. Assignments in the language laboratory. *Prerequisite:* Fr 205.

FR 306 INTERMEDIATE FRENCH CONVERSATION AND COMPOSITION II 3 cr. (3 and 0)

A continuation of Fr 305, with additional emphasis on written composition. *Prerequisite:* Fr 305 or permission of department head.

FR 307 FRENCH CIVILIZATION 3 cr. (3 and 0)

A study of the significant aspects of the culture of France from its origins to the present. *Prerequisite:* Fr 202 and 205 or permission of department head.

FR 308 CONTEMPORARY FRENCH CULTURE 3 cr. (3 and 0)

A study of contemporary ideas, opinions and events through magazines, newspapers, scholarly journals of individual interest and essays of national and international import. Class discussions; oral and written reports. *Prerequisite:* Fr 202 and 205 or permission of department head.

FR 309 INTRODUCTION TO FRENCH PHONETICS 3 cr. (3 and 0) A study of the fundamental principles of the pronunciation of French through the use of the International Phonetic Alphabet and recordings. *Prerequisite:* Fr 201 or equivalent.

FR 403 TWENTIETH CENTURY PROSE 3 cr. (3 and 0)

The outstanding authors of the 20th century: Proust, Gide, Mauriac, Saint-Exupéry, Sartre, Camus, and others. Reading of selected works, discussions, and reports. *Prerequisite:* Fr 301, 302, or 303.

FR 404 TWENTIETH CENTURY DRAMA 3 cr. (3 and 0)

The French theater since 1900, with emphasis on the period after 1930. Readings, discussions, and reports. *Prerequisite:* Fr 301, 302, or 303.

FR 405 NINETEENTH CENTURY FRENCH ROMANTICISM 3 cr. (3 and 0)

The Romantic movement as expressed in the works of Chateaubriand, Hugo, Mérimée, Vigny, Stendhal, Sand, and others. Readings, discussions, and reports. *Prerequisite:* Fr 301, 302, or 303.

FR 406 NINETEENTH CENTURY FRENCH REALISM 3 cr. (3 and 0)

Realism as expressed in the works of Balzac, Flaubert, Daudet, Maupassant, Zola, and others. Selected works, discussions, and reports. *Prerequisite:* Fr 301, 302, or 303.

FR 407 EIGHTEENTH CENTURY FRENCH LITERATURE 3 cr. (3 and 0)

The principal literary figures of the 18th century, with particular emphasis on Voltaire and Rousseau. Selected works, discussions, and reports. *Prerequisite:* Fr 301, 302, or 303.

FR 408 SEVENTEENTH CENTURY FRENCH DRAMA 3 cr. (3 and 0) The French classical drama, with emphasis on Corneille, Racine, and Molière. Selected works, discussions, and reports. *Prerequisite:* Fr 301, 302, or 303.

FR 409 ADVANCED GRAMMAR AND CONVERSATION 3 cr. (3 and 0) An intensive study of syntax and stylistics through composition and translations. *Prerequisite:* Senior standing or permission of department head.

FR 498 INDEPENDENT STUDY 1-3 cr. (1-3 and 0)

Independent indepth study of selected topics in French literature. May be repeated for a maximum of six credits. *Prerequisite:* Permission of department head.

Genetics

Professors: G. R. Craddock, Head; W. D. Graham, Jr., C. M. Jones

Associate Professors: P. M. Burrows, E. F. McClain, J. D. Maxwell, J. S. Rice, E. A. Rupert

Lecturer: P. B. Gibson

CEN 301 GENETICS 3 cr. (3 and 0) S

Basic genetic principles stressing their relationship to human affairs. Control of human heredity and its social implications will be covered. Course is designed as an elective to meet the needs of undergraduates in nonbiological science majors. Will not substitute for Gen 302.

GEN 302, H302, 602 GENETICS 4 cr. (3 and 3) F, S, SS

A basic course dealing with the fundamental principles of inheritance in prokaryotes and eurkaryotes. Emphasis is given to mendelian genetics, physical and chemical bases of heredity, inherited human abnormalities, population genetics and other facets of heredity. *Prerequisite:* Biol 103, 104, 105, 106, or permission of instructor.

GEN 451, 651 GENETICS 3 cr. (3 and 0) S

Advanced study of the principles of general genetics. Topics emphasized are variations in chromosome number and structure, natural and induced mutations, extranuclear inheritance, recombination, control of gene activity, genes and development, genetics of behavior patterns, population genetics, systems of mating, genetics and man. *Prerequisite:* Gen 302 or equivalent.

GEN 461, 661 BIOMETRICAL GENETICS 3 cr. (3 and 0)

Statistical methodology in the study of population genetics. Probability as applied to genetic systems, gene and zygotic frequencies, derivation of genetic expectations, forces which change gene frequency, inbreeding, estimation and testing of genetic parameters, partitioning of variance, responses to selection, and other statistical aspects of continuous variation. *Prerequisite:* Ex St 301, Gen 302, or equivalent.

GEN 701 MODERN DEVELOPMENTS IN GENETICS 3 cr. (3 and 0)

GEN 801 CYTOGENETICS 3 cr. (2 and 3) S, Even-numbered years.

GEN 806 SPECIAL PROBLEMS IN GENETICS 1-3 cr. (0 and 3-9)

Geography

Associate Professor: J. L. Arbena

GEOG 101 INTRODUCTION TO GEOGRAPHY 3 cr. (3 and 0)

An introduction to the tools, language, methodologies, and basic concepts of geography as a social science.

GEOG 301 POLITICAL GEOGRAPHY 3 cr. (3 and 0)

The geographic basis for and the geographic problems of the modern state; the relevance of geographical patterns to international affairs. *Prerequisite:* Geog 101.

GEOG 302 ECONOMIC GEOGRAPHY 3 cr. (3 and 0)

The geographic conditions fundamental to the world's resources (agricultural, mineral, commercial, and industrial), and the conditions which affect the utilization, marketing, consumption, and strategic significance of those resources. *Prerequisite:* Geog 101.

Geology

Professors: P. K. Birkhead, V. S. Griffin, Jr., R. D. Hatcher, Jr. Associate Professors: G. M. Haselton, D. S. Snipes Visiting Instructor: J. R. Wagner

GEOL 101 PHYSICAL GEOLOGY 4 cr. (3 and 2)

A study of the minerals and rock which compose the earth's crust, their origins and transformations. Emphasis is placed upon geological processes, both internal and external, by which changes are produced on or in the earth. Laboratory instruction is provided in the interpretation of geologic processes through study of topographic maps. Field trips provide direct observation of processes and results.

GEOL 102 HISTORICAL GEOLOGY 4 cr. (3 and 3)

Evolution, both organic and inorganic, is traced from the beginning of the record through the present. Laboratory instruction and field trips provide practice in the identification and study of plants and animals which have left their record as fossils in the rocks of the earth's crust. *Prerequisite:* Geol 101.

GEOL 219 GEOLOGY FOR FORESTERS 3 cr. (3 and 0)

A study of materials of the earth's crust, processes of their origin and change; landforms, processes of their formation and destruction. Demonstration of materials is fully incorporated into lectures. Limited to students majoring in Forest Management or permission of instructor.

GEOL 306, 606 MINERALOGY 3 cr. (2 and 3)

The student gains a working knowledge of crystallography and a comprehensive knowledge of determinative mineralogy. Identification of the minerals is based on their physical and chemical properties. *Prerequisite:* Geol 101.

GEOL 309, H309, 609 PETROLOGY 3 cr. (2 and 3)

The genesis, evolution, and classification of rocks through lectures, laboratory exercises, and field trips. The occurrences, chemical relationships, and distribution of rock types are emphasized. *Prerequisite:* Geol 306.

GEOL 310, H310, 610 OPTICAL MINERALOGY 3 cr. (1 and 4)

The purpose of this course is to enable the student to identify minerals under the microscope on the basis of their optical properties. *Prerequisite:* Geol 306.

GEOL 313, 613 STRATIGRAPHY AND SEDIMENTATION 3 cr. (3 and 0)

The process by which sediments are eroded, transported, and deposited (sedimentation), with major emphasis on relationships of the area and time distribution of stratified rocks and their historical significances (stratigraphy). *Prerequisite:* Geol 101.

GEOL 400, 600 ENVIRONMENTAL GEOLOGY 3 cr. (3 and 0)

A discussion-oriented introductory study of the relationships of man to his physical surroundings and the problems resulting from upsetting the established equilibria of geologic systems; man's role as a geologic agent, environmental conservation and management.

GEOL 402, H402, 602 STRUCTURAL GEOLOGY 3 cr. (2 and 2)

The diverse geological structures of the earth, their description, origin, and field recognition. Practical problems in interpreting geologic structures are utilized, in addition to theoretical considerations of the mechanics and causes of tectonism. *Prerequisite:* Geol 101.

GEOL 403, H403, 603 INVERTEBRATE PALEONTOLOGY 3 cr. (2 and 3)

A study of life of past geologic ages, as shown by fossilized remains of ancient animals, with emphasis on the invertebrates. *Prerequisite:* Geol 101 or permission of instructor.

GEOL 404, H404 ECONOMIC GEOLOGY 3 cr. (3 and 0)

This course concerns the description and classification of ore deposits and commercial nonmetallic mineral deposits. The origin of mineral deposits and their occurrence is emphasized. Problem studies and field trips to nearby mines and quarries. *Prerequisite:* Geol 306.

GEOL 405, 605 GEOMORPHOLOGY 4 cr. (3 and 3)

A study of the surface features of the earth—their form, nature, origin, development, and the change they are undergoing. *Prerequisite:* Geol 101, 102, or permission of instructor.

GEOL 407, 607 QUATERNARY GEOLOGY 3 cr. (2 and 2)

Early concepts about glaciation. Types and distribution of glaciers today and during their maximum extent. Glacial erosion, transportation and icesculptured terrain features. Study of quaternary sediments and their chronology. Drainage changes, sea level fluctuations and crustal deformation. Detailed study of specific areas as time permits. Field trips.

GEOL 408, 608 GEOHYDROLOGY 3 cr. (3 and 0)

Study of the hydrologic cycle, aquifer characteristics, theory of groundwater movement, mechanics of well flow, experimental methods, and subsurface mapping. *Prerequisite:* Geol 101, 102.

GEOL 411 RESEARCH PROBLEMS 1-3 cr. (0 and 3-9)

A field, laboratory, or library study of an approved topic in geology. The topic would be one not normally covered in formal course offering, but may be an extension of a course. *Prerequisite:* Senior standing in geology or approval of the department head.

GEOL 412 RESEARCH PROBLEMS 3 cr. (0 and 9)

A continuation of Geol 411.

GEOL 415, 615 GEOLOGY PRACTICED IN INDUSTRY AND GOVERNMENT 3 cr. (3 and 0)

Geology's practical role, with a basic geology introduction for mathematics, economics, management, agronomy, and engineering students. Multidisciplinary, geologic-based problems are treated to enable students to apply themselves more effectively in geology-related positions in their disciplines. *Prerequisite:* Senior or graduate standing, permission of instructor. GEOL 450 SEMINAR IN GEOLOGY 1 cr. (1 and 0) F

A survey of the current literature and ideas of geology through library research and preparation of a seminar lecture on a topic by each individual student. *Prerequisite:* Junior standing.

GEOL 451 SEMINAR IN GEOLOGY 1 cr. (1 and 0) S

A survey of the current literature and ideas of geology through library research and preparation of a seminar lecture on a topic by each individual student. *Prerequisite:* Junior standing.

GEOL 700 EARTH SCIENCE I 3 cr. (2 and 3)

GEOL 750 EARTH SCIENCE II 3 cr. (2 and 3)

German

Associate Professor: P. W. Wannamaker Assistant Professors: J. M: Melton, M. M. Sinka[°] Instructor: E. P. Arnold

GER 101, H101 ELEMENTARY GERMAN 4 cr. (3 and 1)

A course for beginners in which, through conversation, composition and dictation, the fundamentals of the language are taught and a foundation is provided for further study and the eventual ability to read and speak the language. Three hours a week of classroom instruction and one hour a week in the language laboratory.

GER 102, H102 ELEMENTARY GERMAN 4 cr. (3 and 1)

A continuation of Ger 101; three hours a week of classroom instruction and one hour a week in the language laboratory.

GER 151 GERMAN FOR GRADUATE STUDENTS 3 cr. (3 and 0)

An intensive program for graduate students preparing to take the reading examination in German.

GER 201, H201 INTERMEDIATE GERMAN 3 cr. (3 and 0)

Some short review of grammar, with conversation and composition continued from Ger 102, and the beginning of more serious reading of German prose in short stories or novels. *Prerequisite:* Ger 102.

GER 202, H202 INTERMEDIATE GERMAN 3 cr. (3 and 0)

While attention is paid to writing and speaking German, more stress is laid on the rapid reading of more difficult German prose than in the earlier courses. *Prerequisite:* Ger 201.

GER 205 ELEMENTARY GERMAN CONVERSATION AND COMPOSITION 3 cr. (3 and 0)

Intensive oral and written training in German through conversation groups, speeches, written compositions, and controlled vocabulary acquisition. Recommended for all German majors. May be taken concurrently with Ger 202, 301, or 302. *Prerequisite:* Ger 201.

* On leave.

GER 251 SCIENTIFIC GERMAN 3 cr. (3 and 0)

An alternate course to Ger 202; readings in general science and some review of grammar and syntax. *Prerequisite:* Ger 201.

GER 299 FOREIGN LANGUAGE DRAMA LABORATORY 1 cr. (0 and 3)

Participation in foreign language drama productions. No formal class meetings, but an average of three hours per week in a foreign language drama workshop for production. May be repeated for a total of three credit hours. *Prerequisite:* Permission of instructor directing the play.

GER 301 TWENTIETH CENTURY GERMAN DRAMA 3 cr. (3 and 0)

Selected works from major German-speaking dramatists of the 20th century, including Hauptmann, Brecht, Dürrenmatt, and Frisch. Required of all German majors. *Prerequisite:* Ger 202.

GER 302 TWENTIETH CENTURY GERMAN PROSE AND POETRY 3 cr. (3 and 0)

Selected prose and poetry from major 20th century German-speaking authors, including Kafka, Hesse, Rilke, Böll, and Grass. Required of all German majors. *Prerequisite:* Ger 202.

GER 305 INTERMEDIATE GERMAN CONVERSATION AND COMPOSITION 3 cr. (3 and 0)

Practice in the spoken language, with emphasis on vocabulary, pronunciation, and comprehension; written exercises for accuracy. Required of German majors. *Prerequisite:* Ger 202 or 205.

GER 307 GERMAN CIVILIZATION 3 cr. (3 and 0)

A study of significant aspects of the contemporary culture of the Germanspeaking peoples from their origins to the present. *Prerequisite:* Ger 202 or 251 or approval of department head.

GER 308 CONTEMPORARY GERMAN CULTURE 3 cr. (3 and 0)

A study of important developments and trends of the contemporary culture of the four major German-speaking countries: the Federal Republic of Germany, the German Democratic Republic, Switzerland, and Austria. *Prerequisite:* Ger 202 or 251 or approval of department head.

GER 405 ADVANCED GERMAN CONVERSATION AND COMPOSITION 3 cr. (3 and 0)

Training in the spoken and written language with emphasis on vocabulary, syntax, and stylistics. *Prerequisite:* Ger 305 or permission of department head.

GER 407 EARLY GERMAN LITERATURE 3 cr. (3 and 0)

The period from 800 to 1750 with particular emphasis on Hartmann, Wolfram, Gottfried, and Walther. *Prerequisite:* Ger 301 or 302.

GER 408 GERMAN CLASSICISM 3 cr. (3 and 0)

A study of the great German classical period from 1749 to 1832 with major emphasis on Goethe and Schiller. *Prerequisite:* Ger 301 or 302.

GER 409 THE GERMAN NOVELLE 3 cr. (3 and 0)

The development of the German Novelle at the hands of German, Austrian, and Swiss authors from Tieck to Thomas Mann. *Prerequisite:* Ger 301 or 302.

GER 410 GERMAN ROMANTICISM AND REALISM 3 cr. (3 and 0)

A study of the two major contrasting movements of German literature in the 19th century. Readings will include works from Novalis, Tieck, Heine, Hebbel, and Grillparzer. *Prerequisite:* Ger 301 or 302.

GER 498 INDEPENDENT STUDY 1-3 cr. (1-3 and 0)

Supervised study of selected topics in German literature, language, and culture. *Prerequisite:* Permission of the Head of the Department of Languages.

Graduate Studies

GS 799 COMPREHENSIVE STUDIES 1-15 cr.

History

Professors: R. S. Lambert, E. M. Lander, Jr., J. V. Reel, Jr., A. Schaffer, Head

- Associate Professors: J. L. Arbena, P. K. Hill, R. L. Saunders, Jr., W. F. Steirer, Jr.
- Assistant Professors: H. D. Adams, J. W. Barnhill, E. D. Carney, R. S. Davis, R. M. Golden, L. J. Greenspoon, C. A. Grubb, J. W. Johnson, J. Y. Le-Bourgeois, R. P. Leemhuis, C. H. Lippy, R. R. Owens, J. Rogainis, N. T. Wolfe

Visiting Instructor: T. K. Andrews

HIST 101, H101 HISTORY OF THE UNITED STATES 3 cr. (3 and 0)

The political, economic, and social development of the American people from the period of discovery to the end of Reconstruction.

HIST 102, H102 HISTORY OF THE UNITED STATES 3 cr. (3 and 0)

The political, economic, and social development of the American people from the end of Reconstruction to the present.

HIST 172, H172 WESTERN CIVILIZATION 3 cr. (3 and 0)

The political, economic, and social movements of Western civilization from ancient times to the seventeenth century.

HIST 173, H173 WESTERN CIVILIZATION 3 cr. (3 and 0)

The political, economic, and social movements of Western civilization from the seventeenth century to the present.

HIST 198 CURRENT HISTORY 1 cr. (1 and 0)

An examination of the major events and problem areas in the news with emphasis on their historical context and possible long-range significance. May be taken a total of three times for credit. Does not count toward the requirements of the major or minor in History.

HIST 300 HISTORY OF COLONIAL AMERICA 3 cr. (3 and 0)

The development of American institutions and customs in the period before 1776. Considerable emphasis is placed on the imperial relations between Great Britain and her colonies and upon the movement towards and the philosophy of the American revolution.

• On leave.

HIST 301 AMERICAN REVOLUTION AND THE NEW NATION 3 cr. (3 and 0)

A study of the various historical explanations leading to an understanding of the American Revolution, the establishment of the Nation under the Constitution, and the first decade of the new nation. Special emphasis will be placed upon developing an understanding of individual motivation and ideological development present during the last four decades of the eighteenth century.

HIST 302 AGE OF JEFFERSON AND JACKSON 3 cr. (3 and 0)

The formation and growing pains of the new nation through the Federal and Middle periods of its history, with emphasis on economic and political development, the westward movement, and the conflicting forces of nationalism and sectionalism.

HIST 303 CIVIL WAR AND RECONSTRUCTION 3 cr. (3 and 0)

A study of the political, military, and social aspects of the sectional conflict and of the era of Reconstruction. Some emphasis will be placed on the historical controversies which the period has inspired.

HIST 304 INDUSTRIALISM AND THE PROGRESSIVE ERA 3 cr. (3 and 0)

A study of American society in the period between 1880 and the 1930s, this course emphasizes the effects of industrialization and urbanization on the American people.

HIST 305 UNITED STATES SINCE 1933 3 cr. (3 and 0)

Particular emphasis will be given to the Great Depression, World War II, the Cold War, and domestic developments in the 1950s and 1960s.

HIST 306 AMERICAN ECONOMIC DEVELOPMENT 3 cr. (3 and 0)

The economic development of the United States from Colonial to recent times, emphasizing the institutional development of agriculture, banking, business and labor, and government regulation and policy.

HIST 307 RECENT UNITED STATES DIPLOMATIC HISTORY 3 cr. (3 and 0)

The history of American foreign policy from the late nineteenth century to the present, showing the rise of America's world interests and gradual involvement in global affairs. Emphasis is placed on the role of public opinion in foreign policy.

HIST 308 AMERICAN LEGAL HISTORY 3 cr. (3 and 0)

A survey of the American legal system in its historical perspective, from colonial times to the present. Emphasis will be placed on the relationship between law and society: the way in which the practice of law changes American society and the way in which social development affected both the theory and practice of the law.

HIST 313 HISTORY OF SOUTH CAROLINA 3 cr. (3 and 0)

The political, economic, and social development of South Carolina from 1670 to the present.

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HIST 314 HISTORY OF THE SOUTH 3 cr. (3 and 0)

Origins and development of political, economic, and cultural institutions of the South from the Colonial period to the present, and the role of the South in the nation's development.

HIST 315 BLACK HISTORY IN AMERICA 3 cr. (3 and 0)

A study of the Afro-American experience in the United States, from the African past, through slavery times, to the present.

HIST 331 PRE-MODERN HISTORY OF EAST ASIA 3 cr. (3 and 0)

A survey of the history of China and Japan from earliest times to the arrival of Europeans in the sixteenth century.

HIST 332 MODERNIZATION OF EAST ASIA 3 cr. (3 and 0)

A survey of the history of China and Japan from the sixteenth century to the present, with emphasis on the impact of Western culture.

HIST 340 ANCIENT AMERICANS 3 cr. (3 and 0)

An introduction to the geography of the Western Hemisphere; origin of human life in the Americas; structure and accomplishments of the major pre-Columbian societies, with an emphasis on the rise and decline of the Classic civilizations; the impact of the European conquest; the formation of a new Ibero-American culture.

HIST 341 MEXICO AND MIDDLE AMERICA SINCE 1800 3 cr. (3 and 0)

An introduction to the geography of the region, origins and progress of the Independence movements and political, economic and social developments after 1825; current domestic and international problems.

HIST 342 SOUTH AMERICA SINCE 1800 3 cr. (3 and 0)

An introduction to the geography of the region; origins and progress of the Independence movements; political, economic and social developments after 1825; current domestic and international problems. *Prerequisite:* 6 hours of history or permission of instructor.

HIST 351 ANCIENT NEAR EAST 3 cr. (3 and 0)

A history of the peoples and civilizations of the Near East from the Sumerians to the establishment of Roman power in this region. Geography, mythology, religious and economic currents, as well as the methods and discoveries of archaeology will be included.

HIST 354 THE GREEK WORLD 3 cr. (3 and 0)

A study of Greek civilization from its beginnings until the time of the Roman conquest, concentrating on the social institutions of the Greek city-states.

HIST 355 THE ROMAN WORLD 3 cr. (3 and 0)

The rise of Rome to world empire and the international civilization it dominated. Concentration on the nature of the political change from Republic to monarchy and particular emphasis on city life and the causes of its decline.

HIST 361 HISTORY OF ENGLAND TO 1603 3 cr. (3 and 0) The history of England to 1603.

HIST 363 HISTORY OF ENGLAND SINCE 1603 3 cr. (3 and 0) A continuation of Hist 361.

HIST 370 MEDIEVAL HISTORY 3 cr. (3 and 0)

A survey of the period from the eclipse of Rome to the advent of the Renaissance, emphasizing human migrations, feudalism, rise of towns, and cultural life.

HIST 372 THE RENAISSANCE 3 cr. (3 and 0)

An examination of the transitional period of European civilization (*ca.* 1300-1500), with emphasis on institutional, cultural, and intellectual developments.

HIST 373 AGE OF THE PROTESTANT REFORMATION 3 cr. (3 and 0)

The evolution of Modern Europe (ca. 1500-1660), as affected by the Reformation, wars of religion, and growth of nation-states. The study will include intellectual advances and the beginnings of European expansion overseas.

HIST 374 EUROPE IN THE AGE OF REASON 3 cr. (3 and 0)

A study of the quest for order and the consolidation of the European state system between 1660 and 1789 with emphasis on the idea of absolutism, the question of French hegemony, and the synthesis of the eighteenth century Enlightenment.

HIST 375 REVOLUTIONARY EUROPE 3 cr. (3 and 0)

A history of Europe from the outbreak of the French Revolution through the Revolutions of 1848, with emphasis on the conflict between the forces of change and those of conservatism within the states and in Europe in general.

HIST 376 THE AGE OF EUROPEAN DOMINANCE 3 cr. (3 and 0)

A history of Europe from the midnineteenth century to the outbreak of the First World War, with emphasis on the social, economic, and political development of the European states and the forces of nationalism, imperialism, and liberalism.

HIST 377 EUROPE IN CRISIS, 1914 TO THE PRESENT 3 cr. (3 and 0)

A study of the political, economic, and social institutions of the European peoples from 1914 to the present. Attention will be given to the world wars and to the collapse of the European state-system.

HIST 385 HISTORY OF RUSSIA TO 1905 3 cr. (3 and 0)

A survey of Russian history from earliest times to 1905, emphasizing Kievan and Appanage Russia, the rise of the Moscow state, and Imperial Russia.

HIST 386 HISTORY OF RUSSIA SINCE 1905 3 cr. (3 and 0) Continuation of Hist 385.

With departmental permission any 400-level course in history may be repeated one time for credit.

HIST 400, 600 STUDIES IN UNITED STATES HISTORY 3 cr. (3 and 0)

Topics and problems in the history of the United States from the Colonial era to the present.

HIST 440, 640 STUDIES IN LATIN AMERICAN HISTORY 3 cr. (3 and 0)

A consideration of selected and varied topics in Latin American history through readings, class discussions, and individual or group projects. Special attention will be given to the use of an inquiry or problem-solving method of historical analysis and to the cultivation of a comparative perspective.

HIST 450, 650 STUDIES IN ANCIENT HISTORY 3 cr. (3 and 0)

Selected topics in the field of ancient history ranging from pre-Biblical times to the fall of the Roman Empire.

HIST 460, 660 STUDIES IN BRITISH HISTORY 3 cr. (3 and 0)

An examination of selected themes, topics, or periods in British history from Anglo-Saxon times to the present.

HIST 470, 670 STUDIES IN EARLY EUROPEAN HISTORY 3 cr. (3 and 0)

Study of selected topics or themes in European history from the fall of the Roman Empire to the age of industrialization.

HIST 471, 671 STUDIES IN MODERN EUROPEAN HISTORY 3 cr. (3 and 0)

Study of selected topics or problems in European history from the end of the Old Regime to the present.

HIST 492, 692 STUDIES IN DIPLOMATIC HISTORY 3 cr. (3 and 0) Selected topics and problems in international conflict and conflict resolution among nations. Concentration will usually be in twentieth century history.

HIST 493, 693 STUDIES IN SOCIAL HISTORY 3 cr. (3 and 0)

Studies in the ways people have earned their livings and lived their lives, individually and as communities, in the confines of different societies.

HIST 494, 694 STUDIES IN COMPARATIVE HISTORY 3 cr. (3 and 0) Selected topics in comparative history, contrasting and comparing similar historic developments in different nations, geographic areas, or civilizations.

HIST 495, 695 STUDIES IN THE HISTORY OF IDEAS 3 cr. (3 and 0) Selected topics and themes in the development of ideas that have had an impact on the behavior of individuals and civilizations.

HIST 496, 696 STUDIES IN LEGAL HISTORY 3 cr. (3 and 0)

Study of selected problems in the development of law and the system of criminal and civil justice.

HIST 499 INDEPENDENT STUDY 3 cr. (3 and 0)

Study of selected problems in history under the direction of a faculty member chosen by the student. The student and faculty member develop a course of study designed for the individual student and approved by the head of the department prior to registration.

HIST 715 HISTORY OF THE BLACK AMERICAN 3 cr. (3 and 0)

HIST 719 UNITED STATES HISTORY SINCE 1900 3 cr. (3 and 0)

HIST 732 MODERNIZATION OF EAST ASIA 3 cr. (3 and 0)

- HIST 741 COMPARATIVE HISTORY OF THE AMERICAS 3 cr. (3 and 0)
- HIST 811 INTRODUCTION TO HISTORICAL RESEARCH 3 cr. (3 and 0)
- HIST 814 MODERN EUROPEAN HISTORIOGRAPHY 3 cr. (3 and 0)
- HIST 821 STUDIES IN EIGHTEENTH CENTURY UNITED STATES HISTORY 3 cr. (3 and 0)
- HIST 822 STUDIES IN NINETEENTH CENTURY UNITED STATES HISTORY 3 cr. (3 and 0)
- HIST 823 STUDIES IN TWENTIETH CENTURY UNITED STATES HISTORY 3 cr. (3 and 0)
- HIST 824 SEMINAR IN THE AMERICAN SOUTH 3 cr. (3 and 0)
- HIST 861 SEMINAR IN MEDIEVAL ENGLAND 3 cr. (3 and 0)
- HIST 862 SEMINAR IN MEDIEVAL ENGLAND TO 1485 3 cr. (3 and 0)
- HIST 863 SEMINAR IN TUDOR ENGLAND 3 cr. (3 and 0)
- HIST 864 SEMINAR IN STUART ENGLAND 3 cr. (3 and 0)
- HIST 865 SEMINAR IN MODERN ENGLAND SINCE 1715 3 cr. (3 and 0)

HIST 891 MASTER'S RESEARCH. Credit to be arranged.

Horticulture

Professors: J. R. Haun, W. L. Ogle, T. L. Senn, Head; E. T. Sims, Jr., B. J. Skelton, G. E. Stembridge

Associate Professors: J. P. Fulmer, R. G. Halfacre, W. S. Jordan, A. R. Mazur, A. J. Pertuit, Jr., F. W. Thode, D. F. Wagner

Assistant Professors: D. W. Bradshaw, A. R. Kingman, B. J. Parliman

HORT 201 GENERAL HORTICULTURE 3 cr. (2 and 2) F, S

A working knowledge of the fundamental plant processes is developed, showing the influence of light, temperature, water and nutrients upon vegetative growth and reproduction of horticultural plants. Production practices, harvesting, storage and marketing of the principal fruit, vegetable and ornamental crops are discussed with demonstrations and practice in greenhouse and orchard. *Prerequisite:* Biol 103, 105 or Ch 101.

HORT 301 HORTICULTURE AND MAN 2 cr. (2 and 0)

Study of various areas of horticulture as they affect the daily affairs of man. Topics include the horticultural industry, factors influencing plant growth, establishment and maintenance of home grounds, house plants, care of perishable horticultural products, and flower arranging.

HORT 302 PRINCIPLES OF VEGETABLE PRODUCTION 3 cr. (2 and 3) F

The general principles of vegetable growing and handling. Phases receiving special emphasis are economic importance, producing areas, management practices, plant forcing, cultural practices, irrigation, quality factors, harvesting, grading, packing, storage, market inspection, transportation, refrigeration, exhibition and seed production. *Prerequisite:* Hort 201.

HORT 303 PLANT MATERIALS I 3 cr. (2 and 3) F

Woody, ornamental plants and their aesthetic and functional uses in landscape developments. The study covers habit of growth, ultimate size, texture effect, period of bloom, color, and cultural requirements.

HORT 304 PLANT MATERIALS II 3 cr. (2 and 3) S

Herbaceous, ornamental plants which are commonly used as garden flowers. This study covers habit of growth, size, period of bloom, color and cultural requirements.

HORT 305 PLANT PROPAGATION 3 cr. (2 and 3) F

Methods of propagation; time, manner and material for making cuttings; temperature and media for rooting cuttings or ornamental trees, shrubs and flowering plants; propagating structures, soils and fertilizers. Practical instruction given in field and greenhouse. *Prerequisite:* Hort 201.

HORT 308 LANDSCAPE DESIGN 3 cr. (2 and 3) S

Landscape planning of residential and public properties in order to achieve best use and most enjoyment from a given piece of ground. *Prerequisite:* Hort 303.

HORT 310, 610 FLORICULTURE 3 cr. (2 and 3) S

Greenhouse production of commercial flower crops; soils; fertilizers; greenhouse diseases and insects; flower crops to be grown on benches and as pot plants; marketing and costs of production. *Prerequisite:* Hort 201.

HORT 352, 652 COMMERCIAL POMOLOGY 3 cr. (2 and 3) F

Fruit bud formation, rest period and water relations of fruit plants, soils, fruit setting; orchard soil management and responses of various fruits to fertilizers; principles of pruning, effect of climatic differences, freezing of tissues and means of avoiding injury; harvesting, transportation and storage. *Pre-requisite:* Hort 201.

HORT 406, 606 NURSERY TECHNOLOGY 3 cr. (2 and 3) S

Principles and techniques in handling nursery crops. Prerequisite: Hort 303, 305.

HORT 407, 607 LANDSCAPE DESIGN 3 cr. (2 and 3) F

The first half of this course is a study of trees, shrubs, vines and ground covers used in landscape planting. Attention is given to cultural requirements, growth habits, period of bloom, texture, and fall color. The second half of the course is devoted to landscape planning for small residential properties.

HORT 409 SEMINAR 1 cr. (1 and 0) F

Recent research work on various phases of horticulture, methods of conducting investigations, and preparation of report of investigations.

HORT 410 SEMINAR 1 cr. (1 and 0) S A continuation of Hort 409.

HORT 412, 612 TURFGRASS MANAGEMENT 3 cr. (2 and 3) F

Studies of warm and cool season turfgrasses in relation to value, use, regional adaptation, establishment, soils, and cultural practices. The influence of environmental, cultural, and genetic factors on turf quality and serviceability. Identification of grass and weed species and discussion of programs for the management of lawns, parks, roadsides, and golf courses. *Prerequisite:* Biol 103, 105 or equivalent.

HORT 413, 613 ADVANCED TURFGRASS CULTURE 3 cr. (3 and 0)

Studies on the anatomy and morphology of turfgrasses, soil physical properties, soil amending, and turfgrass nutrition. Discussion of integrated turfgrass pest management programs, soil microbiological activities and the turfgrass ecosystem. *Prerequisite:* Hort 412 or equivalent.

HORT 414 RETAIL FLOWER BUSINESS 2 cr. (2 and 0)

Topics covered include financing, types of business ownership, planning the shop, equipment, refrigeration, lighting, care and handling of flowers, personnel, selling, advertising and promotion, pricing the merchandise, flowers by wire, delivery, etc. A term problem is required. *Prerequisite:* Econ 201 or equivalent.

HORT 416 FLORAL DESIGN 2 cr. (1 and 3)

Topics covered include simple arrangements (history, containers, mechanical aids, etc.), arrangements for specific occasions, church arrangements, funeral designs, bride's bouquets, dried arrangements and flower preservation, corsage work, foliage arrangements, bonsai, terrarium, Christmas wreaths, and foliage plant identification. *Prerequisite:* Biol 103, 105 or equivalent.

HORT 454, 654 SUBTROPICAL AND TROPICAL HORTICULTURE 3 cr. (3 and 0)

A survey of the horticultural characteristics, culture, harvesting, and handling of subtropical and tropical fruits, vegetables, and ornamental crops of economic significance. The history, importance, adaptation, and world use of these crops will be studied. *Prerequisite:* Agric 104 or Biol 103, 105 and Hort 201 or 301 or permission of instructor.

HORT 455, 655 SMALL FRUIT AND NUT CROPS 4 cr. (3 and 3)

An indepth survey of taxonomical, morphological, and physiological characteristics of small fruit and nut crops as they relate to the study of horticultural characteristics, culture, production, harvesting, and handling of both commercial and home-grown grapes, blueberries, strawberries, brambles, pecans, and walnuts. *Prerequisite:* Hort 305 or permission of instructor.

HORT 456, 656 VEGETABLE CROPS 3 cr. (3 and 0)

The principles and practices employed in the commercial growing and marketing of vegetable crops. Emphasis is placed on temperature requirements, plant characteristics, varieties, soils, fertilizers, weed control, harvesting and preparation for market. HORT 461, 661 PROBLEMS IN LANDSCAPE DESIGN 3 cr. (2 and 3) F Landscape planning for larger residential properties, schools, industrial plants, real estate developments; detailed finished plans; further study of materials used; original problems; field study. *Prerequisite:* Hort 308 or 407.

HORT 462, 662 LANDSCAPE DESIGN IMPLEMENTATION 3 cr. (2 and 3) S

Implementation of landscape plans, including interpretation of specifications, bidding, planting methods, construction materials and installation methods, irrigation, lighting, and allied landscape specialties. Also studied—maintenance contracts, equipment, methods, materials and labor management. *Prerequisite:* Hort 461.

HORT 464, 664 POSTHARVEST HORTICULTURE 3 cr. (2 and 2) F The handling of fruits, vegetables, and ornamental crops after harvesting. Subjects include spoilage problems, hydrocooling, common and cold storage of crops, packaging and processing procedures.

HORT 470, 670 HORTITHERAPY 2 cr. (2 and 0)

The use of horticultural appeal and methods for improvement of physical and mental well-being will be emphasized. A number of activities will be planned for use in horticultural therapy programs for exceptional individuals in any type of therapeutic situation. *Prerequisite:* Biol 103, 105 and permission of instructor.

HORT 471, 671 INTERNSHIP 1-6 cr. (0 and 2-12)

Internship under competent supervision in an approved agency dealing with horticultural endeavors. Internships will be designed to provide students with on-the-job horticultural experience. The student will submit monthly reports during the internship and will conduct a departmental seminar at its conclusion. *Prerequisite:* Junior standing and permission of instructor.

HORT 473, 673 HORTITHERAPY LABORATORY 1 cr. (0 and 2)

Activities which will be presented will enable students, in turn, to present techniques to exceptional individuals. Emphasis will be placed on performing horticultural skills which are suitable for any therapeutic situation. *Prerequisite:* For non-Horticulture majors registered in Hort 470.

HORT 801 PROBLEMS IN SMALL FRUIT PRODUCTION 3 cr. (3 and 0)

HORT 802 RESEARCH SYSTEMS IN HORTICULTURE 3 cr. (2 and 3)

HORT 803 EXPERIMENTAL OLERICULTURE 3 cr. (3 and 0)

HORT 804 SCIENTIFIC ADVANCES IN ORNAMENTAL HORTICULTURE 3 cr. (3 and 0)

HORT 805 PHYSIOCHEMICAL PROCEDURES FOR DETERMINING QUALITY IN HORTICULTURAL CROPS 3 cr. (2 and 3)

HORT 806 POSTHARVEST PHYSIOLOGY AND HANDLING OF HORTICULTURAL CROPS 3 cr. (3 and 0)

HORT 807 POMOLOGY 3 cr. (3 and 0)

Hospital and Health Services Administration 283

- HORT 808 SPECIAL INVESTIGATIONS IN HORTICULTURE 2 cr. (2 and 0)
- HORT 809 SEMINAR I 1 cr. (1 and 0)
- HORT 810 SEMINAR II 1 cr. (1 and 0)
- HORT 811 QUANTITATIVE EXPOSITION OF PLANT DEVELOPMENT 2 cr. (1 and 3)
- HORT 870 PRACTICUM IN HORTITHERAPY 3 cr. (1 and 4)
- HORT 891 MASTER'S RESEARCH. Credit to be arranged.
- HORT 991 DOCTORAL RESEARCH. Credit to be arranged.

Hospital and Health Services Administration

Assistant Professor: J. M. McDonald Visiting Part-time Lecturer: R. E. Toomey

H ADM 308 HOSPITAL AND HEALTH SERVICES ADMINISTRATION 3 cr. (3 and 0)

An introduction to the organization and operation of modern American hospitals, separate clinics and public health services. Included will be legal status, organizational peculiarities, and specific legislation affecting such agencies. *Prerequisite:* Junior standing.

H ADM 410, 610 HOSPITAL INTERNSHIP 3 cr. (0 and 9)

The student will spend nine hours per week on a specified program of observing, practicing and experiencing the duties of hospital administrators in selected local hospitals. The course will be specifically outlined along with the amount of time the student will spend in each phase or department of the hospital. Student progress will be constantly monitored by University faculty and hospital staff. *Prerequisite:* H Adm 308.

H ADM 800 THE FUNCTION AND ORGANIZATION OF HOSPITALS AND HEALTH SERVICES ADMINISTRATION 3 cr. (3 and 0)

Humanities

Associate Professor: J. J. McLaughlin

HUM 201 INTRODUCTION TO THE HUMANITIES 3 cr. (3 and 0) A general introduction to humanistic studies, stressing the interrelatedness of various humanistic disciplines. Such fields as art, architecture, music, literature, philosophy, and drama will be considered as they interact with, support, and develop each other in various cultural settings. *Prerequisite:* Sophomore standing.

HUM 202 INTRODUCTION TO THE HUMANITIES 3 cr. (3 and 0) A continuation of Hum 201. *Prerequisite:* Sophomore standing or permission of instructor. HUM 301 CREATIVE GENIUS IN WESTERN CULTURE 3 cr. (3 and 0)

An investigation of creativity through a study of great innovators in art, literature, music, and ideas. *Prerequisite:* Junior standing or permission of instructor.

HUM 303 FILM 3 cr. (3 and 0)

An examination of the film medium as an art form: its history, how films are made, why certain types of films (westerns, horror movies, etc.) have become popular, and how critical theories provide standards for judging films. *Prerequisite:* Sophomore standing.

HUM 305 IDEAS OF PROGRESS IN SCIENCE AND THE ARTS 3 cr. (3 and 0)

An investigation of the ideas of progress as they are found in literature, science, the arts, music, and philosophy. *Prerequisite:* Sophomore standing.

Industrial Education

Professors: J. P. Crouch, D. E. Maurer, H. E. Morgan, Jr., A. F. Newton, Head

Associate Professors: F. A. Bosdell, P. C. Caley, D. H. Pate, Jr., W. E. West Assistant Professor: B. V. Burkett, Jr.

Instructor: B. L. Smith

Visiting Assistant Professor: G. G. Lovedahl

IN ED 101 INTRODUCTION TO INDUSTRIAL EDUCATION 2 cr. (1 and 2)

An introduction to the field of industrial education in terms of the underlying philosophies, the aims and goals, and the specific objectives of each of the Industrial Education options. Course activities include research and field experiences in industrial education.

IN ED 102 WOODWORKING I 2 cr. (1 and 3)

A study of wood, its properties and the requisite skills necessary for understanding the use of wood in our technological way of life.

IN ED 103 WOODWORKING II 2 cr. (1 and 3)

A continuation of In Ed 102 in the study of wood, its properties, skills in machine and tool use with wood, project design, project costs and finishing processes necessary for teachers of industrial subjects. *Prerequisite:* In Ed 102.

IN ED 105 MACHINING PRACTICES 3 cr. (1 and 6)

Basic practical shop experiences on the lathe, drill press, milling machine and shaper. Benchwork, measuring tools, theory and demonstrations related to a survey of fundamental machining practices. *Prerequisite:* In Ed 101.

IN ED 203 BASIC METAL PROCESSES 3 cr. (1 and 6)

Material separating, forming and combining practices in the metals industries through the study of basic casting, welding and sheet metal techniques. *Prerequisite:* In Ed 101.

IN ED 204 GRAPHIC ARTS 3 cr. (1 and 6)

Major emphasis is placed on the basic principles underlying the graphic arts. Major areas of study include general photography, graphic layout and design, process photography, offset lithography, screen processing, printing, and bindery. Modern industrial applications are stressed throughout.

IN ED 205 POWER TECHNOLOGY 3 cr. (2 and 2)

A study of power in terms of energy sources, and the generation, transmission and utilization of power. Emphasis is placed on the development of insights and understandings of the scientific and operational principles involved in the production, transmission, and utilization of power. *Prerequisite:* In Ed 101.

IN ED 208 ELECTRICITY 3 cr. (2 and 3)

Theory and application of dc and ac fundamentals, including instrumentation, power sources, circuit analysis, motors, construction wiring, and electronic principles and components. *Prerequisite:* In Ed 101.

IN ED 220 RECREATIONAL AND AVOCATIONAL CRAFTS 3 cr. (2 and 3)

Provides exploratory experiences in the performance of a variety of arts and crafts activities, and encourages the development of an understanding of the purpose of arts and crafts in the comprehensive recreational program.

IN ED 302 DWELLING MATERIALS AND CONSTRUCTION METHODS 2 cr. (1 and 2)

This course is designed as an introduction to the commonly used building materials and the methods of combining them in present day construction. *Prerequisite:* In Ed 102.

IN ED 304 PHOTOGRAPHIC TECHNIQUES 3 cr. (1 and 6)

Emphasis is placed on application of black and white photography as activities for vocation and avocation. Sufficient laboratory experiences are provided to assure confidence in the use of photographic techniques. Problems encountered in action, portrait, still life, and character study photography are considered.

IN ED 310 METHODS OF TRADE TEACHING 3 cr. (3 and 0)

This course is designed to give basic instruction to beginning teachers in tradework. Psychological factors of learning; individual differences; methods of teaching subjects; the special methods used in teaching skills; grading of students and keeping of proper records and reports. Offered in Summer Sessions only.

IN ED 312 METAL PROCESSES 3 cr. (2 and 3)

Exploration of metal removal and shaping processes. Basic and precision measurement, inspection techniques and quality control. Layout procedures, workholding devices, and proper set-up methods. *Prerequisite:* In Ed 101.

IN ED 313 ARTS AND CRAFTS 3 cr. (1 and 6)

A study of the art and craft of designing and making well-designed, useful objects. Emphasis on the development of skill and knowledge in the industrial crafts. Included will be laboratory activity involving work with wood, metal, ceramic, textiles, paper, and leather materials. *Prerequisite:* In Ed 101.

IN ED 316 PLASTICS AND PLASTIC PROCESSES IN THE GENERAL SHOP 3 cr. (3 and 0)

The industrial, commercial and personal uses of plastics are discussed and demonstrated. In addition, the kinds of plastics, their properties, and special uses are studied. Offered in Summer Sessions only.

IN ED 320 MACHINE WOODWORKING 2 cr. (1 and 3)

Basic characteristics of woodcutting, shaping, and finishing operations by use of machinery and auxiliary tools. Includes project work. *Prerequisite:* Junior standing.

IN ED 325 INDUSTRIAL ORGANIZATIONS AND PEOPLE 3 cr. (3 and 0)

A study of the relationship of training and safety personnel to the kinds of tasks they are asked to perform in industrial situations. Emphasis is on safety knowledge development and on techniques which may be used in industrial safety training. *Prerequisite:* In Ed 101 or permission of instructor.

IN ED 350 INDUSTRIAL COOPERATIVE EXPERIENCE 6 cr. (0 and 6)

A full-time work experience program in industry. The course is offered during the summer only. Students are requested to register with the instructor one semester prior to the summer in which they plan to enroll. *Prerequisite:* Junior standing in the Vocational-Technical Education program; permission of instructor.

IN ED 372 ARTS AND CRAFTS FOR THE ELEMENTARY CHILD 3 cr. (2 and 3)

Provides the elementary school teacher with an opportunity to develop skills and knowledge in the use of a variety of media suitable for integrating the study of industry and industrial technology into the usual classroom procedures.

IN ED 402 DIRECTED TEACHING 6 cr. (0 and 18)

Supervised observation and teaching in cooperation with selected public schools in which opportunities are provided for securing experience in teaching industrial subjects. *Prerequisite:* In Ed 416, 425, and grade-point ratio required for graduation.

IN ED 405, 605 COURSE ORGANIZATION AND EVALUATION 3 cr. (3 and 0)

Problems, techniques and procedures in the preparation, selection and organization of subject matter for instructional purposes. Methods, techniques and preparation of materials used in the evaluation of student achievement in industrial education subjects.

IN ED 408, 608 TRAINING PROGRAMS IN INDUSTRY 3 cr. (3 and 0)

Basic concepts of supervision, administration, and management of training programs. Emphasis on determining training requirements, planning, directing, and evaluating training programs.

IN ED 410, 610 SPECIAL INSTITUTE COURSE: TOPICS IN INDUSTRIAL EDUCATION 1-3 cr. (1-3 and 0)

Subject areas organized according to institute needs. Content of the course will be planned cooperatively by the University and the school system or agency requesting the course. *Prerequisite:* Teacher or Graduate standing.

IN ED 414, 614 ELECTRONICS FOR TEACHERS 3 cr. (1 and 6)

Principles of electronics as applied in communications and automatic controls involving vacuum tubes, transistors, integrated circuits, and other electronic devices and materials for the preparation of teachers of industrial arts and vocational-technical electricity and electronics. *Prerequisite:* In Ed 208 or equivalent.

IN ED 415, 615 CONSTRUCTION PRACTICES 3 cr. (2 and 3)

A study of industrial practices affecting man, materials, and equipment employed by the construction industry. Activities are directed to developing a working knowledge of construction technology and a framework for incorporating this industry into the industrial arts curriculum of the secondary school. *Prerequisite:* In Ed 101 or Graduate standing.

IN ED 416 MANAGEMENT AND OPERATION OF INDUSTRIAL EDUCATION LABORATORIES 3 cr. (2 and 2)

Management and operation of unit and multiple-activity laboratories, including laboratory design, selection and procurement of tools and equipment, budgeting management, and coordination of activities in laboratory courses.

IN ED 418, 618 TECHNOLOGICAL CONCEPTS IN MANUFACTURING 3 cr. (2 and 3)

This course is designed to familiarize industrial arts students with the technological concepts of management, production, and personnel practices employed in manufacturing industries. Students also will develop materials and utilize methods which will assist them in teaching concepts about manufacturing at the secondary-school level. *Prerequisite:* In Ed 101 or Graduate standing.

IN ED 421 VOCATIONAL COOPERATIVE PROGRAMS 3 cr. (3 and 0) A study of the developments, objectives and principles of industrial cooperative training programs. Emphasis is on the organization, promotion, and management of programs in this area of vocational education. *Prerequisite:* Permission of instructor.

IN ED 422, 622 HISTORY AND PHILOSOPHY OF INDUSTRIAL AND VOCATIONAL EDUCATION 3 cr. (3 and 0)

A study of industrial and vocational education programs with the intent of developing a sound individual philosophy of industrial and vocational education. General topics covered: history; local, state, and federal legislation; types of vocational-technical programs; professional organizations; manpower utilization, vocational guidance, and training; industry, labor, and school relationships.

IN ED 425, 625 TEACHING INDUSTRIAL SUBJECTS 3 cr. (3 and 0) Effective methods and techniques of teaching industrial subjects. Emphasis is given to class organization, preparation of lesson outlines, and audio-visual aids. *Prerequisite:* Ed 335.

IN ED 432, 632 ADVANCED WOODWORKING 2 cr. (1 and 3)

An advanced consideration of machine methods and developments, materials, quality factors, and evaluation of instructional materials and problems. Inspection trips and reports. *Prerequisite:* In Ed 102.

IN ED 435, 635 ADVANCED INDUSTRIAL METALWORKING PRACTICES 3 cr. (2 and 3)

A continuation of In Ed 203, enabling advanced studies in welding, foundry, and structural metals. A portion of the course will be devoted to studying existing metals manufacturing industries and to developing and using curriculum materials for teaching metalworking concepts. Field trips will be taken. *Prerequisite:* In Ed 203.

IN ED 438, 638 ADVANCED MACHINING 3 cr. (1 and 6)

Advanced experiences in the set-up, operation and maintenance of machine tools and equipment. Project and product design. Study and reports of recent machining technological developments. *Prerequisite:* In Ed 105.

IN ED 440, 640 ADVANCED TECHNIQUES OF THE GRAPHIC ARTS 4 cr. (2 and 4)

Students selecting to pursue the area of graphic arts will gain experience in the development of advanced techniques of layout and design; photographic copy preparation; cold type composition; line, halftone, duotone, and special-effects photography, full color reproduction and advanced platemaking; process stripping, and color offset presswork. *Prerequisite:* In Ed 204.

IN ED 441 COMPREHENSIVE LABORATORY FIELD EXPERIENCE 2 cr. (1 and 3)

Field experiences in comprehensive laboratories including management and planning of multiple-activity programs.

IN ED 442 COMPETENCY TESTING IN VOCATIONAL SUBJECTS 3 cr. (3 and 0)

This course is especially designed for trade teachers who have assisted in making trade tests for S. C. Certification program. Teachers who expect to assist in making trade tests are also urged to enroll in this course. The course is devoted to revising present trade tests and developing tests in new fields. Offered in Summer Sessions only.

IN ED 444, 644 GRAPHIC ARTS PRODUCTION CONTROL 3 cr. (2 and 3)

A study of commercial and industrial printing control. Emphasis is placed upon consideration for decision making in the areas of process and equipment selection and plant layout. Other topics include production flow, cost analysis, and recent developments as they affect production. *Prerequisite:* In Ed 204, 440, or permission of instructor.

IN ED 450 INDUSTRIAL COOPERATIVE EXPERIENCE 6 cr.

Continuation of In Ed 350. Summer only. *Prerequisite:* Senior standing, In Ed 350, and permission of instructor.

IN ED 451 SPECIAL PROJECTS 3 cr. (3 and 0)

The student is assigned a project in accordance with his needs and capabilities. Projects are either experimental, theoretical or developmental and cover subjects not thoroughly covered in other courses.

IN ED 452, 652 ADVANCED PROJECTS 1-6 cr.

The student gains depth in content by completing a project under the supervision of an instructor in one of the following subject areas: (a) Arts and Crafts, (b) Drawing and Design, (c) Electricity and Electronics, (d) Graphic Arts, (e) Metalworking, (f) Occupational Education, (g) Power, and (h) Woodworking.

IN ED 460, 660 CAREER EDUCATION 3 cr. (3 and 0)

An introduction to the concepts and philosophical basis for career education with emphasis on the applications of career education as an integrating force within the total school curriculum. This course is designed for all students preparing to teach or those seeking to improve their teaching competencies. *Prerequisite:* Ag Ed 201, Ed 100, In Ed 101, or Graduate standing.

IN ED 464, 664 STILL PICTURE PRODUCTION 3 cr. (1 and 4)

This course includes media selection, specification of learning outcomes, program planning, storyboarding, art creation and direction, photography, scripting, and audio tape production and synchronization. *Prerequisite:* In Ed 204, 304, or permission of instructor.

IN ED 465, 665 MOTION PICTURE PRODUCTION 3 cr. (1 and 4)

A study of how to produce video tape and motion picture presentations. *Prerequisite:* In Ed 464 or permission of instructor.

IN ED 496, 696 PUBLIC RELATIONS 3 cr. (3 and 0)

This course emphasizes the techniques and methods of effective public and industrial relations which contribute to understanding and cooperation of labor, business, professional, educational, and industrial groups.

IN ED 815 SEMINAR IN INDUSTRIAL EDUCATION 1 cr. (1 and 0)

IN ED 820 RECENT PROCESS DEVELOPMENTS 3 cr. (3 and 0)

IN ED 840 SCHOOL SHOP DESIGN 3 cr. (3 and 0)

IN ED 845 CURRICULUM PLANNING AND DEVELOPMENT IN INDUSTRIAL EDUCATION 3 cr. (3 and 0)

IN ED 860 CURRICULUM MATERIALS DEVELOPMENT IN INDUSTRIAL EDUCATION 3 cr. (3 and 0)

IN ED 861 ADMINISTRATION AND SUPERVISION OF VOCATIONAL EDUCATION 3 cr. (3 and 0)

IN ED 865 AMERICAN INDUSTRIES 3 cr. (3 and 0)

IN ED 894 PROJECT RESEARCH 1-6 cr. (1-6 and 0)

IN ED 895 SPECIAL PROBLEMS I 3 cr. (3 and 0)

IN ED 896 SPECIAL PROBLEMS II 3 cr. (3 and 0)

Industrial Engineering

Professor: J. A. Chisman Associate Professors: J. H. Couch, C. R. Lindenmeyer

IE 207 SURVEY OF INDUSTRIAL ENGINEERING 3 cr. (3 and 0)

An introduction to the industrial engineer's role in modern industrial enterprises. Topics such as industrial organization, production planning and control, personnel management, plant layout, manufacturing systems analysis and work standards are included.

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IE 301 MANUFACTURING PROCESSES I 3 cr. (2 and 3)

Study of methods of conversion of raw materials into finished products. Includes basic terminology, interpretation and use of engineering plans, impact of production volume, and manufacturing control. Various manufacturing processes including material removal, casting, joining and forming of materials, and associated measurement techniques are examined. *Prerequisite:* EG 109 or permission of instructor.

IE 303 JOB EVALUATION AND WAGE INCENTIVES 3 cr. (3 and 0)

Job description, specification, and classification. Systems employed for establishing relative ranks of jobs. Basic wage and salary determination. Wage incentive methods. *Prerequisite:* Permission of instructor.

IE 304 METHODS AND STANDARDS 3 cr. (2 and 3)

Fundamentals relating to work methods design and analysis. Includes study of techniques necessary for determining efficient work methods. Work measurement as a basis for control of costs and scheduling. *Prerequisite:* Junior standing.

IE 306 MANUFACTURING PROCESSES II 3 cr. (2 and 3)

Continuation of IE 301. Exploration of modern material removal and shaping processes. Special laboratory investigations. *Prerequisite:* IE 301 or permission of instructor.

IE 361 INDUSTRIAL APPLICATION OF STATISTICS 3 cr. (3 and 0) Application of statistical principles of analysis and control to production

processes, studies of process capabilities, quality control, work sampling, reliability analysis, and machine interference. *Prerequisite:* Math 106 or equivalent.

IE 403 PROCESS PLANNING 3 cr. (3 and 0)

Study of the techniques of planning and control of industrial operations. Emphasis is placed on consideration for decision-making to the area of process and equipment selection and capital investment. Other topics include production flow, cost analysis, and recent developments as they affect production. Particular attention is paid to surveying current literature. *Prerequisite:* IE 301 or permission of instructor.

IE 404 ADVANCED METHODS ENGINEERING 3 cr. (2 and 3)

Synthesis of effective work methods using a predetermined basic motion time system. Methods-time measurement is covered in detail. Standard data development and administration. Linear and multiple regression analysis for time formula development. *Prerequisite:* IE 304 or IM 408 or permission of instructor.

IE 405 PLANT LAYOUT AND MATERIAL HANDLING 3 cr. (2 and 3)

Fundamentals underlying the planning of factory layout for new products and increases in production volume. Layout by product and process. Scale model, template, and other planning techniques. Materials handling analysis and equipment decisions. *Prerequisite:* IE 301 and IM 408, or permission of instructor.

Industrial Management

Professors: C. V. Aucoin, E. A. LaRoche, H. H. Macaulay, Jr., W. W. Menke, C. R. Smith, B. J. Todd, *Head*; G. C. Uselton, C. H. Whitehurst, Jr., S. M. Willis

Associate Professors: S. H. Brown, E. E. Burch, Jr., J. L. Richardson, C. B. Russell, D. M. Swanson, G. L. Waddle, G. H. Worm, T. W. Zimmerer

Assistant Professors: R. T. Brown, Jr., J. K. Butler, Jr., C. W. Gooding, W. F. Grazer, J. M. McDonald, M. H. Sanders, H. Van Bulck, L. G. White

Instructors: T. B. Maertens, J. L. Woodruff

Visiting Assistant Professors: C. T. Deal, L. D. S. Ramsay

Visiting Instructors: E. S. Hansberger III, H. C. Haynsworth III, P. F. Petersen, J. B. Williamson

Visiting Part-time Lecturers: T. M. Patrick, Jr., R. E. Toomey

IM 201 INTRODUCTION TO INDUSTRIAL MANAGEMENT 3 cr. (3 and 0)

Management's role as a factor of economic production. Functions of management, principles of organization, and behavior in organizations.

IM 299 COMPUTER UTILIZATION I 1 cr. (0 and 3)

Familiarization in the use of modern timesharing computer terminals and minicomputers. *Prerequisite:* Comp Sc 205 or equivalent.

IM 304 STATISTICAL QUALITY CONTROL 3 cr. (3 and 0)

Basic statistical control techniques in all areas of industry. Sampling, statistical control, and inspection problems are studied with special reference to practical applications. Emphasis is placed on the underlying statistical theory and the assumptions associated with the various procedures. *Prerequisite:* Math 203 or 301.

IM 307 PERSONNEL MANAGEMENT 3 cr. (3 and 0)

Principles, concepts, and techniques concerned with effective and efficient utilization of personnel. Emphasis on motivation, leadership, and human behavior as they relate to employer-employee relations. Topics include personnel recruitment, classification, selection, training, development, and performance evaluation. *Prerequisite:* Junior standing.

IM 308 PRINCIPLES OF MARKETING 3 cr. (3 and 0)

Principles and concepts involved in planning, pricing, promotion, and distribution of goods and services.

IM 400 MANAGEMENT OF ORGANIZATIONAL BEHAVIOR 3 cr. (3 and 0)

The purpose of this course is to provide the management student with a framework for understanding how behavior within business organizations is managed. Particular emphasis will be placed on integrating management theory with recent developments in the behavioral sciences with distinct management applications. Theory, research, and business applications will be considered. *Prerequisite:* IM 201, 307, or permission of instructor.

IM 401, 601 QUANTITATIVE MARKETING ANALYSIS 3 cr. (3 and 0) Quantitative techniques applied to the investigation and solution of marketing problems. Emphasis is placed on the use of decision theory, game theory,

• On leave.

Markov chain models, sales forecasting models, sample survey design, mathematical programming, simulation models, and marketing information systems. *Prerequisite:* IM 308, Math 203 or 301.

IM 402, 602 OPERATIONS PLANNING AND CONTROL 3 cr. (3 and 0)

Concepts and models important to management are stressed in this course. Emphasis is placed on elementary deterministic and stochastic inventory models, inventory analysis and control systems, forecasting techniques, elementary queuing models, introduction to simulation, network programs, and production planning and scheduling. *Prerequisite:* Math 203 or 301 and Senior standing.

IM 403 SPECIAL PROBLEMS 1-3 cr. (1-3 and 0)

Planning, developing, and executing a research project related to the field of management or defense studies. *Prerequisite:* Senior standing in Industrial Management or Administrative Management.

IM 404, 604 MANAGERIAL ECONOMICS 3 cr. (3 and 0)

Use of tools of economic analysis in classifying problems, in organizing and evaluating information, and in comparing alternative courses of action. Bridges the gap between economic theory and managerial practices. *Prerequisite:* Mgt Sc 310 or 311, or permission of instructor.

IM 405, 605 ECONOMICS OF TRANSPORTATION 3 cr. (3 and 0)

Topics covered include history and structure of transportation systems in the United States, the nature of transportation costs and rates, transportation systems as factors in industrial location, government policy toward transportation, and transportation and national security. *Prerequisite:* Senior standing and permission of instructor.

IM 406, 606 THEORY OF INDUSTRIAL LOCATION 3 cr. (3 and 0)

A theoretical study of the general factors which determine industrial location in a market place economy. Current literature is surveyed. A comparison of location theory and actual location patterns is stressed. *Prerequisite:* Senior standing and permission of instructor.

IM 407 DIRECTED RESEARCH 1 cr. (1 and 0)

Planning, developing, and executing a research project related to the field of management. *Prerequisite:* Senior standing in Administrative Management or Industrial Management.

IM 408, 608 WORK SIMPLIFICATION AND STANDARDIZATION 3 cr. (3 and 0)

Principles and practices of motion and time as it is applied to industry. Emphasis is given to its application and its influence on methods, material handling, plant layout, and time study procedures.

IM 410 DIRECTED RESEARCH IN MARKETING 1 cr. (1 and 0)

Directed independent research and analysis of contemporary topics in marketing. *Prerequisite:* IM 308.

IM 412, 612 MARKETING MANAGEMENT 3 cr. (3 and 0)

Application of marketing principles in the investigation and solution of marketing problems. Managerial decision areas include products development, pricing, advertising, personal selling, and channels of distribution. *Prerequisite:* IM 308.

IM 413, 613 MARKETING COMMUNICATIONS 3 cr. (3 and 0)

An analysis of mass and interpersonal communications in marketing. Attention is given to communications theory, advertising, sales promotion, and personal selling. Prerequisite: IM 308.

IM 415, 615 BUSINESS POLICY 3 cr. (3 and 0)

This is a capstone course for seniors. The case method is used in solving complex business problems requiring the student to integrate his knowledge of the functional areas of business. Student participation and written and oral communication are stressed. Prerequisite: IM 201 or 307 and Senior standing.

IM 416. 616 MANAGEMENT OF HUMAN RESOURCES 3 cr. (3 and 0)

Recent developments in the management of human resources with emphasis on results of research into the motivation, development of potential, and full utilization of the human resources. Prerequisite: IM 307 or permission of instructor

IM 417, 617 LOGISTICS MANAGEMENT 3 cr. (3 and 0)

Management of physical distribution and supply systems with emphasis on design concepts, cost determinants and control. Prerequisite: Senior standing.

IM 418, 618 MANAGEMENT INFORMATION SYSTEMS 3 cr. (3 and 0)

The use of data processing concepts as an aid in implementing managerial functions. Electronic data processing terminology, software, hardware, computer operations and techniques, systems analysis, and the principles of management information systems design and implementation are emphasized. Prerequisite: Comp Sc 205 or equivalent. Corequisite: IM 499.

IM 419, 619 MARKETING INFORMATION 3 cr. (3 and 0)

The planning, collection, processing, and utilization of information used in marketing decision making. Prerequisite: IM 308.

IM 420, 620 MANAGEMENT OF DEFENSE EXPENDITURES 3 cr. (3 and 0)

Components and budget classification of the Department of Defense. Organization and management systems employed in the Department of Defense. Prerequisite: Econ 419 or permission of instructor.

IM 421, 621 CONSUMER BEHAVIOR 3 cr. (3 and 0)

An examination of selected behavioral science concepts and their application to the understanding of consumer decision making. Text and cases, Prerequisite: IM 308.

IM 499 COMPUTER UTILIZATION II 1 cr. (1 and 0)

Components of computer systems and effective methods of selection and utilization. Topics include review of terminology, methods of communicating with computer personnel, languages, package programs, package systems, and sources of current literature. Prerequisite: Comp Sc 205 or equivalent.

Italian

Instructor: L. T. Perry

ITAL 199 SITUATIONAL ITALIAN 4 cr. (3 and 1)

A course in conversational Italian designed to place greatest emphasis on specific situations the student is likely to encounter in the course of travel or business trips to Italian-speaking areas.

Latin

Associate Professor: R. R. McGregor, Jr.

LAT 101 ELEMENTARY LATIN 3 cr. (3 and 0)

A course for beginners designed principally to teach the reading of the language.

LAT 102 ELEMENTARY LATIN 3 cr. (3 and 0)

A continuation of Lat 101 with the introduction of supplementary readings from Classical and Medieval authors.

LAT 201 INTERMEDIATE LATIN 3 cr. (3 and 0)

A review of the fundamental principles of grammar in conjunction with readings from the Classical period. *Prerequisite:* Lat 102 or equivalent.

LAT 202 INTERMEDIATE LATIN 3 cr. (3 and 0)

A continuation of Lat 201 with the introduction of writings from the late Latin and Medieval periods. *Prerequisite:* Lat 201 or equivalent.

Law

Associate Professor: S. H. Brown Assistant Professors: R. T. Brown, Jr., M. H. Sanders Visiting Assistant Professor: C. T. Deal Visiting Lecturer: T. M. Patrick, Jr.

LAW 312 COMMERCIAL LAW 3 cr. (3 and 0)

An introduction to business law with primary attention given to contracts, agency, negotiable instruments, and sales. *Prerequisite:* Junior standing.

LAW 313 COMMERCIAL LAW 3 cr. (3 and 0)

Continuation of Law 312 with emphasis on business organization, personal and real property, estates and bankruptcy, and security services. *Prerequisite:* Law 312 or permission of instructor.

LAW 322 LEGAL ENVIRONMENT OF BUSINESS 3 cr. (3 and 0)

The development of both state and national regulation of business. Attention is given to the constitutional force and limitations of power, specific areas in which governments have acted, and the regulations that have been imposed in these areas. *Prerequisite:* Junior standing.

LAW 401 LABOR LAW 3 cr. (3 and 0)

Basic labor law in the National Labor Relations Act, the Taft-Hartley and Landrum-Griffin Acts. Legal problems raised by state and federal statutes such as workmen's compensation, unemployment compensation, wage and hour legislation, and equal opportunity laws. *Prerequisite:* Law 322, Junior standing.

Leisure Skills

LS 140 FENCING 1 cr. (0 and 3)

Individual and group instruction for beginners in the basic skills and techniques of foil fencing.

LS 150 BEGINNING SWIMMING 1 cr. (0 and 3)

Fundamentals of swimming and water safety.

LS 151 DIVING 1 cr. (0 and 3)

An introduction to basic springboard diving.

LS 152 SAILING 1 cr. (0 and 3)

Basic instruction in the nomenclature, safety and rescue techniques, and skills required to skipper sailing craft. *Prerequisite:* Basic swimming skills.

LS 153 BEGINNING CANOEING 1 cr. (0 and 3)

Basic instruction in the nomenclature, strokes, and safety techniques in canoeing. *Prerequisite:* Basic swimming skills.

LS 160 BEGINNING TENNIS 1 cr. (0 and 3)

A fundamentals course stressing rules, basic strokes and strategy, with ample opportunity for practice.

LS 162 HANDBALL 1 cr. (0 and 3)

A thorough knowledge and understanding of the rules, strategy, fundamental skills, and techniques of handball for the beginning player.

LS 163 RACQUETBALL 1 cr. (0 and 3)

The basic skills, knowledge of rules, and strategy of racquetball.

LS 170 BEGINNING GOLF 1 cr. (0 and 3)

A fundamentals course stressing rules, strategy, and basic strokes.

LS 180 ADAPTIVE EXERCISE 1 cr. (0 and 3)

Instruction in sports skills and knowledge for students who, due to physical limitations, cannot participate to their full advantage in other activity courses.

LS 190 MODERN DANCE 1 cr. (0 and 3)

An introduction to modern dance techniques with emphasis on developing the style of movement and understanding the dance art form.

LS 252 ADVANCED SAILING 1 cr. (0 and 3)

A course in the fundamentals of sailboat racing. *Prerequisite:* LS 152 or permission of instructor.

LS 254 ADVANCED LIFESAVING 1 cr. (0 and 3)

Course designed to enhance aquatic skills and to develop lifesaving techniques. It teaches progressive techniques and practice of lifesaving and water safety skills. *Prerequisite:* Pass preliminary swim test.

LS 255 WATER SAFETY INSTRUCTION 1 cr. (0 and 3)

Course teaches progressive techniques and practice of teaching swimming and lifesaving. Prerequisite: LS 254.

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LS 260 INTERMEDIATE-ADVANCED TENNIS 1 cr. (0 and 3)
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The opportunity to advance and correct mistakes in basic tennis skills. *Prerequisite:* Basic tennis skills.

Management

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MGT 800 MANAGEMENT GAMING 1 cr. (0 and 3)
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MGT 801 QUANTITATIVE ECONOMIC ANALYSIS 3 cr. (3 and 0)
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MGT 802 FINANCE 3 cr. (3 and 0)
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- MGT 803 OPERATIONS MANAGEMENT 3 cr. (3 and 0)
- MGT 804 MANAGERIAL POLICY 3 cr. (3 and 0)
- MGT 805 ADVANCED QUALITY CONTROL 3 cr. (3 and 0)
- MGT 810 MANAGEMENT AND THE LAW 3 cr. (3 and 0)
- MGT 811 ADVANCED MARKETING ANALYSIS 3 cr. (3 and 0)

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MGT 812 TRANSPORTATION PLANNING AND POLICY 3 cr. (3 and 0)
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MGT 816 MANAGEMENT OF HUMAN RESOURCES 3 cr. (3 and 0)

MGT 891 MASTER'S RESEARCH. Credit to be arranged.

Management Science

Professors: C. V. Aucoin, E. A. LaRoche, W. W. Menke, C. R. Smith, B. J. Todd, G. C. Uselton, C. H. Whitehurst, Jr.

Associate Professors: S. H. Brown, E. E. Burch, Jr., C. B. Russell, D. M. Swanson, G. L. Waddle, G. H. Worm, T. W. Zimmerer

Assistant Professors: J. K. Butler, Jr., C. W. Gooding

MGT SC 310 INTRODUCTION TO MANAGEMENT SCIENCE 3 cr. (3 and 0)

Quantitative methods of the management scientist with applications to economic, business, and industrial problems. Topics include regression analysis, elementary time series analysis, sampling, and decision making under uncertainty, nonparametric methods, and linear programming. *Prerequisite:* Econ 202, Math 203.

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MGT SC 311, 611 INTRODUCTION TO ECONOMETRICS 3 cr. (3 and 0)
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Elements of time series analysis and an introduction to the measurement, specification, estimation, and interpretation of functional relationships through single equation least squares techniques. Problems of multicollinearity, dummy variables, heteroscedasticity, autocorrelation, and lagged variables in simple economic models are introduced. *Prerequisite:* Econ 314, Math 301.

MGT SC 413, 613 MANAGEMENT SCIENCE I 3 cr. (3 and 0)

The role and usage of management science techniques in decision making in business and industry. Static and deterministic models will be emphasized. Topics include classical optimization, probabilistic inventory control, linear programming, queueing, Markov chains, and simulation. *Prerequisite:* Permission of instructor. MGT SC 414, 614 STATISTICAL ANALYSIS 3 cr. (3 and 0)

Application of statistics in management decision making. Emphasis is placed on the proper design, analysis, and interpretation of planned experiments. Topics include single factor through fractional factorial experiments, response surface methodology, analysis of covariance and evolutionary operations. *Prerequisite:* Math 301 or equivalent.

MGT SC 806REGIONAL SCIENCE METHODS 3 cr. (3 and 0)MGT SC 807ECONOMETRIC METHODS I 3 cr. (3 and 0)MGT SC 808ECONOMETRIC METHODS II 3 cr. (3 and 0)MGT SC 812MANAGEMENT SCIENCE II 3 cr. (3 and 0)

Materials Engineering

Professors: D. J. Dumin, C. C. Fain, J. W. Lathrop, G. C. Robinson, J. S. Wolf

Associate Professors: F. W. Cooke, D. D. Moyle, J. L. Prince III, P. F. Rad, H. Scott

Assistant Professors: J. B. Park, W. H. Talbott

MATE 405, 605 PHYSICAL METALLURGY 3 cr. (3 and 0)

A comprehensive treatment of electron theory, lattice defects, diffusion, solutions and phase equilibria, phase transformations, creep and fracture applied to metals and simple alloys, with emphasis on structure-property relationships. *Prerequisite:* CrE 310.

MATE 450, 650 SPECIAL TOPICS IN MATERIALS ENGINEERING 1-4 cr. (0-4 and 12-0)

A comprehensive study of a topic of current interest in the field of materials engineering. May be taken for credit more than one time. *Prerequisite:* Permission of instructor.

MATE 451, 651 CORROSION OF MATERIALS 3 cr. (2 and 3)

An introduction to the aqueous and gaseous corrosion of metals and alloys. Topics included are ion migration in solid and liquid phases, Pourbaix diagrams, theory and application of corrosion rate measurements, and special corrosion processes as they apply to metal degradation and failure. *Prerequisite:* A course in thermodynamics.

MATE 461, 661 ELEMENTS OF METALLURGY 3 cr. (2 and 3)

A survey of industrial metallurgical processes including extraction of metals from their ores, primary fabrication of metals, heat and surface treatments, methods of secondary fabrication, and the mechanical testing of metals. Laboratory sessions emphasize the measurement of properties of metals and alloys as they are influenced by process variables. *Prerequisite:* CrE 310 or equivalent.

MATE 462, 662 HEAT TREATMENT OF STEELS 3 cr. (2 and 3)

Industrial processing of commercially important ferrous material including plain carbon and low alloy steels; precipitation hardenable steels; tool steels and cast irons with special emphasis on response to heat treatment: annealing, hardening, alloying, and atmosphere control. Laboratory determination of bulk and surface effects of treatment on mechanical properties. *Prerequisite:* CrE 310 or equivalent.

MATE 463, 663 METALLURGY OF WELDING AND NONDESTRUCTIVE TESTING 3 cr. (2 and 3)

Survey of welding processes, including resistance, forge, gas, arc, thermite, ultrasonic, electron beam and laser welding with reference to metallurgical effects and materials applicability. Includes nondestructive test methods for industrial weld inspection. Laboratory determination of microstructural and stress effects induced by welding and effects on material serviceability. *Prerequisite:* CrE 310 or equivalent.

MATE 464, 664 INDUSTRIAL CORROSION OF METALS 3 cr. (2 and 3)

Introduction to technical aspects of corrosion as it affects various industrial operations. Classification of types of metallic corrosion. Techniques of industrial corrosion protection with emphasis on materials selection and case histories. Industrial corrosion testing techniques and relation of metallic corrosion to basic electrochemical concepts. *Prerequisite:* CrE 310 or equivalent.

MATE 465, 665 INTRODUCTION TO PLASTICS 3 cr. (3 and 0)

Basic polymer chemistry, structure, properties, and testing; manufacture and application of industrial plastics and elastomers. Crystalline-amorphous systems, fibers, addition and condensation polymers, block- and graft-copolymers, thermoplastics, thermosets, elastomers, catalysis, curing, plasticizers, stablizers, fire retarders, and pigments. *Prerequisite:* Ch 201, CrE 310 or equivalent.

MATE 800 SEMINAR IN MATERIALS RESEARCH 1 cr. (1 and 0)

MATE 891 MASTER'S RESEARCH. Credit to be arranged.

Mathematics

- Professors: K. Alam, C. V. Aucoin, J. V. Brawley, Jr., Acting Head; F. M. Cholewinski, J. D. Fulton, W. R. Hare, Jr., R. E. Haymond, A. T. Hind, Jr., P. T. Holmes, J. W. Kenelly, R. C. Lasker, D. R. LaTorre, R. F. Ling, S. M. Lukawecki, T. G. Proctor, W. H. Ruckle, A. F. Sobczyk, B. J. Todd, K. T. Wallenius
- Associate Professors: W. R. Boland, A. K. Bose, E. E. Burch, Jr., A. S. Cover, P. M. Dearing, Jr., R. E. Fennell, J. L. Flatt, J. C. Harden, Jr., C. E. Kirkwood, Jr., J. K. Luedeman, M. C. Palmer, E. Park, J. C. Peck, J. A. Reneke, L. A. Rife, C. B. Russell, K. Seo, J. R. Sullivan
- Assistant Professors: C. R. Aucoin, J. P. Jarvis, J. G. LaTorre, A. W. Madison, F. W. Morgan, J. H. Nicholson, H. F. Senter, A. J. Turner, Jr., J. M. Westall, Jr.

Instructors: E. V. Bartmess, L. G. Fulmer, I. B. Ibrahim, K. R. Watson

Lecturer: L. M. Lundberg

Visiting Professor: J. R. Reay

Visiting Associate Professors: D. J. Caveny, F. R. McMorris, R. A. Vandervelde Visiting Instructors: A. C. Connor, E. O. Hare, K. P. Layton, P. W. Uselton Visiting Part-time Instructor: K. H. Mertens

Adjunct Associate Professors: J. T. Poole, R. H. Rodine

MATH 100 PREPARATORY MATHEMATICS 2 cr. (5 and 0)

Topics to be covered: Sets and real numbers; algebra of polynomials and fractions; first-degree equations and inequalities in one variable; exponents, radicals, and complex numbers; quadratic equations and inequalities; log-

arithms; functions. *Prerequisite*: Required of freshmen requiring Math 101/ 102 that fail to make a satisfactory score on the Mathematics Test, Level II (Standard).

MATH 101 FINITE PROBABILITY 3 cr. (3 and 0)

Topics include probability, discrete random variables, and probability distribution. *Prerequisite:* A satisfactory score on the Mathematics Test, Level II (Standard) or permission of instructor.

MATH 102 INTRODUCTION TO MATHEMATICAL ANALYSIS 3 cr. (3 and 0)

An intuitive approach to the concepts and applications of calculus. Topics include functions and graphing, differentiation, and integration. Applications from social, biological, and management sciences are presented. Not open to those receiving credit for Math 106. *Prerequisite:* A satisfactory score on the Mathematics Test, Level II (Standard) or permission of instructor.

MATH 104 TRIGONOMETRY 2 cr. (2 and 0)

Topics to be covered are circular functions, graphs of circular functions and their inverses, identities and conditional equations, trigonometric functions and complex numbers.

MATH 105 ALGEBRA AND TRIGONOMETRY 5 cr. (5 and 0)

Freshman mathematics. A unified course in algebra and trigonometry. Properties of real numbers, algebraic expressions, equations and inequalities in one variable, relations and functions, polynomial and rational functions, exponential and logarithmic functions, circular functions, trigonometric functions and conditional equations, matrices and determinants, and complex numbers.

MATH 106, H106 CALCULUS OF ONE VARIABLE I 4 cr. (4 and 0)

Topics include: analytic geometry, introduction to derivatives, computation and application of derivatives, integrals, exponential and logarithm functions. *Prerequisite:* Math 100, or a satisfactory score on the Mathematics Test, Level II (Standard) or permission of instructor.

MATH 108, H108 CALCULUS OF ONE VARIABLE II 4 cr. (4 and 0)

Topics included are infinite series, limits, differentiation and techniques of integration. *Prerequisite:* Math 106.

MATH 115 CONTEMPORARY MATHEMATICS FOR ELEMENTARY SCHOOL TEACHERS I 3 cr. (3 and 0)

Logic, sets, and the properties of the counting numbers, numeration systems. Open only to Elementary Education majors. *Prerequisite:* Permission of instructor.

MATH 116 CONTEMPORARY MATHEMATICS FOR ELEMENTARY SCHOOL TEACHERS II 3 cr. (3 and 0)

A continuation of Math 115. Subtraction, properties of the integers, elementary number theory, rational number system, real number system. Open only to Elementary Education majors. *Prerequisite:* Math 115 or permission of instructor.

MATH 203 ELEMENTARY STATISTICAL INFERENCE 3 cr. (3 and 0)

A survey course in fundamental statistical principles with applications. Topics include estimation, test of hypothesis, regression and correlation, analysis of variance, and nonparametric statistics. *Prerequisite:* Math 101.

MATH 206, H206 CALCULUS OF SEVERAL VARIABLES 4 cr. (4 and 0)

Topics include: real valued functions of several variables, multiple integration, differential calculus of functions of several variables, matrices, vector field theory. *Prerequisite:* Math 108.

MATH 208, H208 ENGINEERING MATHEMAT[†]CS I 4 cr. (4 and 0) This course presents an introduction to the study of differential equations and their application to physical problems. The topics include exact solutions, series solutions, numerical solutions, solutions by means of Laplace transforms, and solutions of systems of differential equations. *Prerequisite:* Math 206.

MATH 210 APPLIED MATRIX ALGEBRA 3 cr. (3 and 0)

An introduction to the basic principles of matrix algebra with applications to the behavioral and managerial sciences. The major areas of application will include linear programming, directed graphs, and game theory. *Prerequisite:* Math 101 and 102 or 106.

MATH 215 ALGEBRA FOR ELEMENTARY SCHOOL TEACHERS 3 cr. (3 and 0)

Linear equations and linear inequalities in one variable, functions and graphs, systems of linear equations and linear inequalities, quadratic equations, complex number system. Finite number systems, algebraic structures. Open only to Elementary Education majors. *Prerequisite:* Math 216.

MATH 216 GEOMETRY FOR ELEMENTARY SCHOOL TEACHERS 3 cr. (3 and 0)

An informal treatment of the basic concepts of geometry. Open only to Elementary Education majors. *Prerequisite:* Math 116 or permission of instructor.

MATH 231 MATHEMATICS OF LIFE INSURANCE 3 cr. (3 and 0)

An introduction to the basic mathematics of finance and life insurance. Topics include compound interest, annuities certain, mortality tables, life annuities, net premiums, net level reserves, modified reserves, nonforfeiture values and dividends.

MATH 232 ACTUARIAL SCIENCE SEMINAR I 1 cr. (1 and 0)

A problem-solving seminar designed to prepare the student for the Society of Actuaries Examination I (General Mathematics). *Prerequisite:* Math 206.

MATH 301, H301, 601 STATISTICAL THEORY AND METHODS I 3 cr. (3 and 0)

Principal topics include: elementary probability theory, discrete and continuous random variables, expected values, normal distribution, chi-square distribution, t-distribution, F-distribution, test of hypothesis, point and interval estimation, curve fitting. *Prerequisite:* Math 106.

MATH 308 COLLEGE GEOMETRY 3 cr. (3 and 0)

Theorems and concepts more advanced than those of high school geometry. A treatment of the various properties of the triangle, including the notable points, lines, and circles associated with it. *Prerequisite:* Math 106.

MATH 309, H309 ENGINEERING MATHEMATICS II 3 cr. (3 and 0) A continuation of Math 208. An introduction to Fourier Series, numerical methods, partial differential equations and certain special functions is given. *Prerequisite:* Math 208.

MATH 350 INTRODUCTION TO MATHEMATICAL MODELS 3 cr. (3 and 0)

A study of the modeling process which will include the translation of practical problems into mathematical models, the solution of the mathematical models, and the interpretation of the solution back into practical problems. Examples will be chosen from the physical, biological, social, and management sciences. *Prerequisite:* Comp Sc 205, Math 208, 301.

MATH 402, H402, 602 THEORY OF PROBABILITY 3 cr. (3 and 0) Principal topics include: combinatorial theory, probability axioms, random variables, expected values; special discrete and continuous distributions, jointly distributed random variables, correlation, conditional expectation, law of large numbers, central limit theorem. *Prerequisite:* Math 301 or permission of instructor.

MATH 403, H403, 603 STATISTICAL INFERENCE 3 cr. (3 and 0)

Principal topics include: sampling distributions, point and interval estimation, maximum likelihood estimators, method of moments, least squares estimators, tests of hypothesis, likelihood ratio methods, regression and correlation analysis, introduction to analysis of variance. *Prerequisite:* Math 402.

MATH 404, 604 INTRODUCTION TO STOCHASTIC PROCESSES 3 cr. (3 and 0)

Principal topics include random variables, Markov processes, limiting distributions. Examples from scientific fields will be used in the construction of stochastic models of physical and behavioral phenomena. Applications to such topics as queuing, inventory, reliability, and decision analysis will be treated. *Prerequisite*: Math 402.

MATH 405, 605 STATISTICAL THEORY AND METHODS II 3 cr. (3 and 0)

Principal topics include simple linear regression, multiple regression and correlation analysis, one-way analysis of variance, multiple comparison, multifactor analysis of variance, experimental design. Computation and interpretation of results are facilitated through use of statistical computer packages. *Prerequisite:* Math 301.

MATH 407, 607 PARTIAL DIFFERENTIAL EQUATIONS 3 cr. (3 and 0)

Partial differentiation and space geometry, origins of partial differential equations, linear and nonlinear equations of the first order, Fourier series, linear equations of the second and higher orders. *Prerequisite:* Math 208.

MATH 408, 608 TOPICS IN GEOMETRY 3 cr. (3 and 0)

An introduction to topics in special geometries which include non-Euclidean space concepts, such as projective geometry, finite geometrics, and intuitive elementary topology. A brief introduction to vector geometry. *Prerequisite:* Math 206. MATH 409, 609 STATISTICAL THEORY AND METHODS III 3 cr. (3 and 0)

Principal topics include the analysis of enumerative data, nonparametric methods, sampling techniques, and time-series analysis. *Prerequisite:* Math 405 or permission of instructor.

MATH 411, H411, 611 LINEAR ALGEBRA 3 cr. (3 and 0)

An introduction to the algebra of matrices, vector spaces, polynomials and linear transformations. *Prerequisite:* Math 206.

MATH 412, H412, 612 INTRODUCTION TO MODERN ALGEBRA 3 cr. (3 and 0)

An introduction to the concepts of algebra. Topics included are the number system and the elementary theory of groups, rings, and fields. *Prerequisite:* Math 411.

MATH 415, H415 INTRODUCTION TO TOPOLOGY 3 cr. (3 and 0)

An introduction to point set topology; Hausdorff, regular and normal spaces; metric, connected and compact spaces; continuous mappings and homeo-morphisms. *Prerequisite:* Math 206.

MATH 419, H419, 619, DISCRETE MATHEMATICAL STRUCTURES I 3 cr. (3 and 0)

This course applies theoretical concepts of sets, functions, binary relations, graphs, Boolean algebras, propositional logic, semigroups, groups, homomorphisms, and permutation groups to computer characterization and design, words over a finite alphabet and concatenation, binary group codes, and other communication or computer problems. *Prerequisite:* Math 411.

MATH 420, 620 DISCRETE MATHEMATICAL STRUCTURES II 3 cr. (3 and 0)

This course applies graph theory, ring and field theory, cardinality of sets, and difference equations to Nim games and other perfect information games, transport networks, shortest route problems, polynomial codes, Bose-Chandhuri-Hoquenghem codes, machine computability, mathematical linguistics, and different codes. *Prerequisite:* Math 412, 419, or permission of instructor.

MATH 428, 628 NUMERICAL LINEAR ALGEBRA 3 cr. (3 and 0)

Numerical solution of linear algebraic systems, matrix inversion, computation of eigenvalues and eigenvectors. *Prerequisite:* Comp Sc 205, Math 411.

MATH 429, 629 NUMERICAL ANALYSIS 3 cr. (3 and 0)

Solution of nonlinear equations and systems, function approximation with polynomials, numerical differentiation and quadrature, numerical solution of ordinary differential equations. *Prerequisite:* Comp Sc 205, Math 453 or 463.

MATH 430, 630 ACTUARIAL FINITE DIFFERENCES 3 cr. (3 and 0)

Topics include finite differences, factorial polynomials, Stirling's numbers, summation, Newton's interpolation formula, operators, collocation polynomials, Lagrange's interpolation formula, divided differences, numerical (including Gaussian) integration, singular integrals, and numerical solution of linear equations. *Prerequisite:* Math 206 or permission of instructor.

MATH 431, 631 THEORY OF INTEREST 3 cr. (3 and 0)

A comprehensive treatment of the theory of interest from a continuous viewpoint. Topics include simple and compound interest, annuities certain, amortization schedules and sinking funds, and application of the theory to bonds and other securities. *Prerequisite:* Math 430 or permission of instructor.

MATH 432 ACTUARIAL SCIENCE SEMINAR II 1 cr. (1 and 0)

A problem-solving seminar designed to prepare the student for the Society of Actuaries Examination 2 (probability and statistics). *Prerequisite:* Math 403 may be taken concurrently or permission of instructor.

MATH 435, H435, 635 COMPLEX VARIABLES 3 cr. (3 and 0)

Elementary functions. Differentiation and integration of analytic functions. Taylor and Laurent series. Contour integration and residue theory. Conformal mapping. Schwartz-Christoffel transformation. *Prerequisite:* Math 206.

MATH 452, H452, 652 LINEAR PROGRAMMING 3 cr. (3 and 0)

An introduction to linear programming, using elementary matrix algebra and the theory of convex polygons. Applications to managerial problems, operations research, economic behavior, the theory of games and military strategy are considered. *Prerequisite:* Math 206 or permission of instructor.

MATH 453, H453, 653 ADVANCED CALCULUS I 3 cr. (3 and 0)

Limits, continuity, and differentiation of functions of one and several variables, the Riemann integral, and vector analysis. *Prerequisite:* Math 206.

MATH 454, H454, 654 ADVANCED CALCULUS II 3 cr. (3 and 0)

A continuation of Math 453. Transformations, multiple integrals, line and surface integrals, infinite sequences and series, and improper integrals.

MATH 457, 657 APPLIED MATHEMATICS I 3 cr. (3 and 0)

Determinants and matrices, review of differential equations, finite differences, Fourier series and integrals, Laplace transformations, a large selection of applications. *Prerequisite:* Math 208.

MATH 458, 658 APPLIED MATHEMATICS II 3 cr. (3 and 0)

A continuation of Math 457. Partial differential equations, Bessel functions and Legendre polynomials, analytic functions of complex variables, infinite series in a complex plane, the theory of residues, conformal mapping. *Prerequisite:* Math 457.

MATH 463, H463, 663 MATHEMATICAL ANALYSIS I 3 cr. (3 and 0)

Basic properties of the real number system, sequences and limits; continuous functions, uniform continuity and convergence. Integration, differentiation, functions of several real variables, implicit function theory. *Prerequisite:* Math 206.

MATH 464, H464, 664 MATHEMATICAL ANALYSIS II 3 cr. (3 and 0) A continuation of Math 463.

MATH 471, 671 APPLIED STATISTICAL DECISION THEORY 3 cr. (3 and 0)

An introduction to statistical decision theory emphasizing the Bayesian approach. Behavioral axioms, characterizing the "Rational decision maker," lead to the laws of probability theory and utility theory. Topics include: axioms of subjective probability and utility, extensive and normal form analysis, likelihood principle, conjugate distributions. *Prerequisite:* Math 402.

MATH 473, 673 INTRODUCTION TO NONLINEAR OPTIMIZATION 3 cr. (3 and 0)

An introduction to the application and theory of nonlinear optimization problems. The primary topics include: classical optimization based on the calculus, approximation techniques, separable programming, quadratic programming, gradient methods, and dynamic programming. *Prerequisite:* Math 452, 453.

MATH 481 SEMINAR IN MATHEMATICS 1-3 cr. (1-3 and 0)

Attention will be focused upon mathematical areas in which nonroutine problems can be posed with comparative ease. Emphasis will be upon independent study and student use of previously acquired mathematical skills. Open to students only by invitation for not more than three hours credit.

MATH 701 MODERN MATHEMATICS FOR ELEMENTARY SCHOOL TEACHERS—NUMBER SYSTEMS I 3 cr. (3 and 0)

MATH 702 MODERN MATHEMATICS FOR ELEMENTARY SCHOOL TEACHERS—NUMBER SYSTEMS II 3 cr. (3 and 0)

MATH 703 MODERN MATHEMATICS FOR ELEMENTARY SCHOOL TEACHERS—GEOMETRY 3 cr. (3 and 0)

MATH 705 MODERN MATHEMATICS FOR ELEMENTARY SCHOOL TEACHERS—ALGEBRA, PROBABILITY AND STATISTICS 3 cr. (3 and 0)

- MATH 710 ELEMENTARY CALCULUS FROM AN ADVANCED VIEWPOINT 3 cr. (3 and 0)
- MATH 712 MODERN ALGEBRAIC CONCEPTS 3 cr. (3 and 0)
- MATH 721 MATRIX ALGEBRA I 3 cr. (3 and 0)
- MATH 722 MATRIX ALGEBRA II 3 cr. (3 and 0)
- MATH 725 COMBINATORIAL MATHEMATICS FOR TEACHERS 3 cr. (3 and 0)
- MATH 730 MODERN GEOMETRY FOR TEACHERS 3 cr. (3 and 0)
- MATH 731 NON-EUCLIDEAN GEOMETRY 3 cr. (3 and 0)
- MATH 732 PROJECTIVE GEOMETRY 3 cr. (3 and 0)
- MATH 741 INTRODUCTION TO LINEAR PROGRAMMING WITH APPLICATIONS 3 cr. (3 and 0)
- MATH 751 FUNDAMENTAL CONCEPTS OF CALCULUS I 3 cr. (3 and 0)
- MATH 752 FUNDAMENTAL CONCEPTS OF CALCULUS II 3 cr. (3 and 0)
- MATH 761 PROBABILITY AND STATISTICS 3 cr. (3 and 0)
- MATH 771 NUMERICAL METHODS IN SECONDARY SCHOOL MATHEMATICS I 3 cr. (3 and 0)
- MATH 772 NUMERICAL METHODS IN SECONDARY SCHOOL MATHEMATICS II 3 cr. (3 and 0)

- MATH 781 HISTORY OF MATHEMATICS 3 cr. (3 and 0)
- MATH 783 THEORY OF NUMBERS 3 cr. (3 and 0)
- MATH 791 MATHEMATICAL PROBLEMS IN THE CURRICULUM 3 cr. (3 and 0)
- MATH 801 GENERAL LINEAR HYPOTHESIS I 3 cr. (3 and 0)
- MATH 802 GENERAL LINEAR HYPOTHESIS II 3 cr. (3 and 0)
- MATH 803 STOCHASTIC PROCESSES I 3 cr. (3 and 0)
- MATH 804 STOCHASTIC PROCESSES II 3 cr. (3 and 0)
- MATH 805 DATA ANALYSIS 3 cr. (3 and 0)
- MATH 806 NONPARAMETRIC STATISTICS 3 cr. (3 and 0)
- MATH 809 TIME-SERIES ANALYSIS, FORECASTING AND CONTROL 3 cr. (3 and 0)
- MATH 811 NONLINEAR PROGRAMMING 3 cr. (3 and 0)
- MATH 812 DYNAMIC PROGRAMMING 3 cr. (3 and 0)
- MATH 813 ADVANCED LINEAR PROGRAMMING 3 cr. (3 and 0)
- MATH 814 NETWORK FLOWS AND INTEGER PROGRAMMING 3 cr. (3 and 0)
- MATH 815 DATA STRUCTURES 3 cr. (3 and 0)
- MATH 817 STOCHASTIC MODELS IN OPERATIONS RESEARCH I 3 cr. (3 and 0)
- MATH 818 STOCHASTIC MODELS IN OPERATIONS RESEARCH II 3 cr. (3 and 0)
- MATH 821 REAL ANALYSIS I 3 cr. (3 and 0)
- MATH 822 REAL ANALYSIS II 3 cr. (3 and 0)
- MATH 823 COMPLEX ANALYSIS I 3 cr. (3 and 0)
- MATH 824 COMPLEX ANALYSIS II 3 cr. (3 and 0)
- MATH 825 ORDINARY DIFFERENTIAL EQUATIONS I 3 cr. (3 and 0)
- MATH 826 ORDINARY DIFFERENTIAL EQUATIONS II 3 cr. (3 and 0)
- MATH 828 THEORY OF PROGRAMMING LANGUAGES 3 cr. (3 and 0)
- MATH 831 FOURIER SERIES 3 cr. (3 and 0)
- MATH 833 OPERATIONAL MATHEMATICS 3 cr. (3 and 0)
- MATH 837 CALCULUS OF VARIATIONS 3 cr. (3 and 0)
- MATH 839 INTEGRAL EQUATIONS 3 cr. (3 and 0)
- MATH 841 APPLIED MATHEMATICS I 3 cr. (3 and 0)

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MATH 842	APPLIED MATHEMATICS II 3 cr. (3 and 0)
MATH 850 STRUCTU	COMPUTATIONAL PROBLEMS IN DISCRETE RES 3 cr. (3 and 0)
MATH 851	ABSTRACT ALGEBRA I 3 cr. (3 and 0)
MATH 852	ABSTRACT ALGEBRA II 3 cr. (3 and 0)
MATH 853	ADVANCED LINEAR ALGEBRA 3 cr. (3 and 0)
MATH 854	THEORY OF GRAPHS 3 cr. (3 and 0)
MATH 855	COMBINATORIAL ANALYSIS 3 cr. (3 and 0)
MATH 861	ADVANCED NUMERICAL ANALYSIS I 3 cr. (3 and 0)
MATH 862	ADVANCED NUMERICAL ANALYSIS II 3 cr. (3 and 0)
MATH 863	DIGITAL MODELS I 3 cr. (3 and 0)
MATH 864	DIGITAL MODELS II 3 cr. (3 and 0)
MATH 867	SYSTEMS AND SOFTWARE 3 cr. (3 and 0)
MATH 868 (3 and 0)	INTRODUCTION TO NUMERICAL PROCESSES 3 cr.
MATH 871	GENERAL TOPOLOGY I 3 cr. (3 and 0)
MATH 872	GENERAL TOPOLOGY II 3 cr. (3 and 0)
MATH 891	MASTER'S RESEARCH. Credit to be arranged.
MATH 907	MULTIVARIATE ANALYSIS 3 cr. (3 and 0)
MATH 920 (3 and 0)	INTRODUCTION TO HARMONIC ANALYSIS 3 cr.
MATH 927	FUNCTIONAL ANALYSIS I 3 cr. (3 and 0)
MATH 928	FUNCTIONAL ANALYSIS II 3 cr. (3 and 0)
MATH 956	FIELD THEORY 3 cr. (3 and 0)
MATH 957	SEMIGROUP THEORY 3 cr. (3 and 0)
MATH 981 1-3 cr. (1-	SPECIAL TOPICS IN MATHEMATICAL STATISTICS 3 and 0)
MATH 982	SPECIAL TOPICS IN ANALYSIS 1-3 cr. (1-3 and 0)
MATH 984 (1-3 and (SPECIAL TOPICS IN APPLIED MATHEMATICS 1-3 cr.
MATH 985	SPECIAL TOPICS IN ALGEBRA 1-3 cr. (1-3 and 0)
MATH 986	SPECIAL TOPICS IN CONVEXITY 1-3 cr. (1-3 and 0)
MATH 987 (1-3 and 0	SPECIAL TOPICS IN NUMERICAL PROCESSES 1-3 cr.

MATH 988 SPECIAL TOPICS IN OPERATIONS RESEARCH 1-3 cr. (1-3 and 0)

MATH 991 DOCTORAL RESEARCH. Credit to be arranged.

Mechanical Engineering

Professors: N. R. Bauld, Jr., E. H. Bishop, Head; D. W. Bradbury, C. A. Brandon,^o W. E. Castro, J. L. Edwards, J. G. Goree, T. C. Hardin, E. Harrison, J. C. Hester, D. W. Lyons, M. K. Richardson, C. S. Rudisill, S. M. Watson, Jr., T. Yang

Associate Professors: M. W. Dixon, A. C. Elrod, J. L. Gaddis, W. G. Hudson, C. O. Huey, Jr., J. K. Johnson, Jr., E. H. Law, R. L. Perry

Assistant Professors: P. J. Bishop, G. F. Robinson

Visiting Associate Professor: A. D. Anderson

Visiting Instructor: V. B. Anand

Adjunct Professor: T. S. Hargest

ME 201 INNOVATIVE DESIGN I 2 cr. (1 and 3)

Creative design; the design process; design planning; design analysis; design documentation; engineering professional ethics; engineering graphics as a means of conceptualization, problem solving, and communication. *Pre-requisite:* Sophomore standing.

ME 202 INNOVATIVE DESIGN II 3 cr. (2 and 3)

Decision making in the selection of materials and processes for manufacturing products. Experience in the solution of authentic design problems. Product design. *Prerequisite:* CrE 310, ME 201, Phys 221.

ME 301 ENGINEERING SYSTEMS ANALYSIS 3 cr. (3 and 0)

Application of undergraduate mathematics, numerical methods, and basic engineering principles in the solution of engineering problems. Problems will be drawn from dynamics, vibrations, kinematics, thermodynamics, heat transfer, fluid mechanics, electrical circuits, and other engineering fields. *Prerequisite:* Math 208, Junior standing in engineering.

ME 302 AUTOMATIC CONTROLS 3 cr. (3 and 0)

Principles of dynamic system response and control are introduced and applied to electromechanical, mechanical, fluid, and thermal systems. Process (or plant) and controller models are developed and analyzed using Laplace transforms, time- and frequency-domain techniques, and computer methods. Both classical and modern control theory are applied. *Prerequisite:* EM 202, Math 208, ME 301, Phys 221.

ME 304 HEAT TRANSFER 3 cr. (3 and 0)

Heat conduction in the steady and transient states; free and forced convection; radiation; combined modes; boiling and condensation. Analytical and numerical solutions to engineering heat transfer problems are emphasized. *Prerequisite:* Junior standing, Math 208, ME 311.

ME 305 ENCINEERING EXPERIMENTATION 1 cr. (0 and 3)

Introductory course to engineering experimentation. Theory and application of elementary instruments for static measurements of pressure, temperature, etc. Planning, conducting, and reporting results of the experiment. Develop-

°On leave.

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ment of experimental skills by performing experiments in the laboratory. *Prerequisite:* Junior standing.

ME 311, H311 ENGINEERING THERMODYNAMICS I 3 cr. (3 and 0) First and second laws of thermodynamics applied to engineering systems. Properties of the ideal and real gases and vapors. Processes and introduction to power and refrigeration cycles. *Prerequisite:* Math 208, Phys 221, Junior standing.

ME 312 ENGINEERING THERMODYNAMICS II 3 cr. (3 and 0)

Continuation of ME 311. Availability, power and refrigeration cycles, mixtures of gases and vapors, thermodynamic relations, compressibility factors and charts. Introduction to compressible flow, chemical reactions and combustion. *Prerequisite:* EM 320, ME 311.

ME 313 INSTRUMENTATION AND MEASUREMENTS 3 cr. (2 and 3)

Principles of measurements, instrument accuracy and performance characteristics. Modern instrumentation for measuring both static and dynamic pressure, temperature, fluid, flow, speed, power, force, acceleration, etc. Uncertainty analysis, curve fitting, and technical report writing. Analog and digital computer methods for engineering experimentation. *Prerequisite:* E&CE 307, ME 305, 311.

ME 401, 601 DESIGN OF MECHANICAL SYSTEM COMPONENTS 3 cr. (3 and 0)

Principles of the analysis and synthesis of machines. The application of engineering principles and state-of-the-art of experimental knowledge to the selection of machine elements. *Prerequisite:* EM 304.

ME 402, 602 INNOVATIVE DESIGN III 3 cr. (2 and 3)

The student is given the opportunity to apply creatively his general knowledge and his knowledge of engineering in the analysis and design of one or more engineering systems, machines, or devices. A substantial portion of the design problem will involve the theory and applications of engineering economics. *Corequisite:* ME 401, 412.

ME 403 FLUID DYNAMICS 3 cr. (3 and 0)

The theory of fluids in motion. Topics include review of concepts of thermodynamics as applied to fluids in motion, wave propagation in a fluid, isentropic flow with variable area, Fanno line, Rayleigh line, normal and oblique shocks, flow with friction and heat transfer, viscous flow theory, potential flow theory, applications. *Prerequisite:* EM 320, ME 311, and permission of instructor.

ME 404, 604 CONTROL SYSTEM COMPONENTS 3 cr. (2 and 2)

A study of control system components from the standpoint of model derivation, performance specifications, and system interaction. Laboratory evaluation of components and systems are made through transient and frequency response tests. *Prerequisite:* ME 302 or equivalent.

ME 405 KINEMATICS AND DYNAMICS OF MACHINERY 3 cr. (3 and 0)

Graphical, analytical, and numerical techniques are used in the dynamic analysis and synthesis of machines. Emphasis on the application of the analysis techniques to linkages, cams, gears, and other mechanisms. *Prerequisite:* EM 202 and Senior standing.

ME 407, 607 APPLIED HEAT TRANSFER 3 cr. (3 and 0)

An application oriented extension of ME 304, considering topics in transient conduction, flow of fluids, energy exchange by radiation, and mass transfer. Applications in heat-exchanger design with emphasis on economics and variation of operating conditions from the design point. *Prerequisite:* ME 304 and permission of instructor.

ME 408, 608 NUMERICAL METHODS IN ENGINEERING ANALYSIS 3 cr. (3 and 0)

Techniques for solving engineering problems utilizing numerical techniques and the digital computer. Polynomial interpolation formulas, numerical integration, roots of nonlinear algebraic equations, simultaneous linear equations, ordinary and partial differential equations. Simpson's rule, Gauss-Jordan, Gauss-Siedel, Newton-Raphson, Runge-Kutta, Milne, Hamming, and Crank-Nicholson methods. *Prerequisite:* Senior standing.

ME 409 DESIGN OF MACHINE ELEMENTS 3 cr. (3 and 0)

An analytical treatment of machine elements. A rational approach to optimal design of shafting, springs, fasteners, clutches, brakes, gears, and other machine elements. *Prerequisite:* ME 401.

ME 410 MECHANICAL PROCESSING OF MATERIALS 3 cr. (3 and 0)

Qualitative and quantitative descriptions of mechanical processing of materials are presented. The mechanical and metallurgical analysis of forging, rolling, extrusion, cutting, metal finishing and other processes are presented. *Prerequisite:* CrE 310. *Corequisite:* ME 401.

ME 411, 611 GAS POWER SYSTEMS 3 cr. (3 and 0)

A study of the effects of variation in specific heat, some fundamentals of compressible flow, the combustion process, and chemical dissociation. The theoretical and actual processes associated with the gas turbine, the thermal jet, the thermal rocket, and the spark ignition and compression ignition engines are analyzed. *Prerequisite:* ME 312.

ME 412 DESIGN OF THERMAL SYSTEM COMPONENTS 3 cr. (3 and 0)

Models of components and mathematical representation of thermal systems. System characterization, economic incentives, and optimization. Problems in air conditioning, thermal power systems, and other thermal systems areas. *Pre-requisite:* EM 320, ME 304, 312.

ME 413 THERMAL SYSTEMS LABORATORY 1 cr. (0 and 3)

Experimental investigations in such areas as internal combustion engines, air-conditioning, refrigeration, steam turbines, steam condensers, etc. *Pre-requisite:* ME 304, 312, 313.

ME 414 MECHANICAL SYSTEMS LABORATORY 1 cr. (0 and 3)

Investigations of natural phenomena arising within the areas of dynamics, vibrations, and elasticity. Experiments include friction, photoelasticity, critical speed of shafts, frequency response, and others. *Prerequisite:* EM 304. *Corequisite:* ME 405.

ME 415, H415 UNDERGRADUATE RESEARCH 1-3 cr.

Individual research projects to be conducted under the direct supervision and guidance of a faculty member. *Prerequisite:* Permission of instructor.

ME 416 UNDERGRADUATE RESEARCH 1-3 cr.

Individual research projects to be conducted under the direct supervision and guidance of a faculty member. *Prerequisite:* Permission of instructor.

ME 419, 619 CENTRAL-STATION ELECTRIC POWER GENERATION 3 cr. (3 and 0)

A survey of present-day techniques for generating electricity in fossil- and nuclear-fueled power plants. This includes discussion of the arrangement, function, and design of basic plant components. Methods of performing analytical design computations are developed and applied to typical design problems. *Prerequisite:* ME 304, 312.

ME 422, 622 PRINCIPLES OF TURBOMACHINERY 3 cr. (3 and 0)

The guiding principles underlying all forms of turbomachinery. A unified treatment of turbomachinery to include pumps, fans, compressors and turbines. Dimensional analysis as applied to turbomachinery. Euler's equation, concepts of specific speed, thermodynamics of turbomachinery processes, the matching of the flow characteristics of duct systems with those of turbomachines, and related topics are covered. *Prerequisite:* EM 320, Senior standing.

ME 425, 625 KINEMATICS: KINEMATIC DESIGN OF MACHINES 3 cr. (3 and 0)

Graphical, analytical, and numerical synthesis techniques are applied to the design of mechanisms to meet the specified kinematic objectives of function generation, path generation, and coupler motion. Spatial mechanisms are discussed, but emphasis is on planar motion. *Prerequisite:* EM 202 and permission of instructor.

ME 429 CRYOGENICS, REFRIGERATION AND AIR-CONDITIONING 3 cr. (3 and 0)

Mechanical vapor compression refrigeration cycles, refrigerants, thermoelectric cooling systems, cryogenics, thermodynamic properties of air, psychrometric charts, heating and cooling coils, solar radiation, heating and cooling loads, insulation systems. *Prerequisite:* ME 312.

ME 452, 652 SAFETY ENGINEERING 3 cr. (2 and 3)

Basic principles of industrial safety, inspections for safety compliance, design codes, design of machines and industrial equipment to meet safety standard, fire protection and control, safety laws and regulations, protective equipment. *Prerequisite:* Senior standing.

- ME 807 MECHANICAL SYSTEMS I 3 cr. (3 and 0)
- ME 808 MECHANICAL SYSTEMS II 3 cr. (3 and 0)
- ME 809 THERMAL SYSTEMS 3 cr. (3 and 0)
- ME 810 MACROSCOPIC THERMODYNAMICS 3 cr. (3 and 0)
- ME 811 GAS DYNAMICS 3 cr. (3 and 0)
- ME 816 ENERGY CONVERSION 3 cr. (3 and 0)
- ME 830 CONDUCTIVE HEAT TRANSFER 3 cr. (3 and 0)
- ME 831 CONVECTIVE HEAT TRANSFER 3 cr. (3 and 0)

- ME 832 RADIATIVE HEAT TRANSFER 3 cr. (3 and 0)
- ME 833 HEAT TRANSFER WITH CHANGE OF PHASE 3 cr. (3 and 0)
- ME 842 ADVANCED MECHANICAL ENGINEERING DESIGN 3 cr. (3 and 0)
- ME 845 VIBRATION OF CONTINUOUS MEDIA 3 cr. (3 and 0)
- ME 890 ENGINEERING PROJECT 1-3 cr. (0 and 3-9)
- ME 891 MASTER'S RESEARCH. Credit to be arranged.
- ME 893 SELECTED TOPICS IN MECHANICAL ENGINEERING 1-6 cr. (1-6 and 0)
- ME 930 ADVANCED TOPICS IN HEAT TRANSFER 1-6 cr. (1-6 and 0)
- ME 991 DOCTORAL RESEARCH. Credit to be arranged.

Medical Technology

Coordinator: M. B. Bishop

Anderson Memorial Hospital

Lecturers: E. E. Baillie, G. L. Bannister, A. S. Hollingsworth, Jr., J. H. Keffer, N. L. Long, J. D. McWhirter

Greenville General Hospital

Lecturers: F. Cantrell, E. C. Cox, E. A. Dreskin, D. G. Kilgore, Jr., J. H. McCarter, P. Thompson, W. M. Waters

Self Memorial Hospital (Greenwood)

Lecturers: J. L. Collins, R. G. Harris, E. C. Hentz, C. H. Magruder, H. W. May, R. E. Proctor

MED TECH 101 AN INTRODUCTION TO MEDICAL TECHNOLOGY 1 cr. (1 and 0)

An introduction to the operation and practices in a medical laboratory. This course is designed to integrate the academic year with the clinical year. Included will be lectures on current laboratory practices, a visit to a modern medical laboratory, current training of laboratory personnel and seminars on areas of specialization.

MED TECH 401 SEROLOGY AND IMMUNOLOGY 4 cr. (21,10,49)

Presents the basic principles of serology and immunology and the tests utilizing these principles to detect abnormalities helpful in the diagnosis of disease.

MED TECH 402 MICROBIOLOGY 7 cr. (59,6,470)

The principles of microbiology-bacteriology, mycology, and parasitology. Emphasis is placed on human pathogenic organisms, using both fresh and prepared organisms.

MED TECH 403 HEMATOLOGY 5 cr. (12,32,276)

Information on blood as a tissue, the theory of hematological tests, factors that affect test reliability. Knowledge of test results and knowledge of blood

Note: First figure represents lecture hours, second figure represents seminar hours, and the third figure represents clinical practice hours.

dyscrasias. Skill in the performance of hematological tests is emphasized and the use of automation techniques is covered.

MED TECH 404 BLOOD BANK 3 cr. (8,20,132)

History and principles of blood group systems and methods of cross matching. Testing for and quantitative determination of Rh antibodies with all available techniques. Selection, pretesting and bleeding of donors and processing of blood for transfusions.

MED TECH 407 URINALYSIS 2 cr. (10,8,102)

The study of renal function together with principles of urine analysis, pregnancy tests and anatomy of the urinary system. Emphasis is placed on laboratory procedures and their utilization to detect abnormalities helpful in the diagnosis of disease.

MED TECH 408 CHEMISTRY 10 cr. (40,50,470)

Introduction to the chemistry of carbohydrates, nitrogen, calcium, and phosphorus compounds, acid-base balance, etc., with emphasis on the chemistry of blood and urine using both qualitative and quantitative procedures in the laboratory.

MED TECH 409 RADIOISOTOPES 1 cr. (2,0,7)

Introduction to principles of diagnostic radioisotope procedures and the use of the scintillation detector, the well counter, and the scaler.

Microbiology

Professor: M. J. B. Paynter, Head

Associate Professors: O. W. Barnett, Jr., A. W. Baxter, J. H. Bond, B. V. Bronk, M. G. Johnson, L. L. Larcom, F. J. Stutzenberger

Assistant Professor: S. S. Hayasaka

Visiting Assistant Professor: V. J. Wainscott

MICRO 100 MICROBES AND HUMAN AFFAIRS 1 cr. (1 and 0)

An explanation of the roles of microorganisms in today's world and the significance of microbes to the future of mankind.

MICRO 305, 605 GENERAL MICROBIOLOGY 4 cr. (3 and 3)

Morphology, physiology, classification, distribution, and cultivation of microorganisms and health. *Prerequisite:* Introductory biology, Ch 101, 102 or 112.

MICRO 400, 600 PUBLIC HEALTH MICROBIOLOGY 3 cr. (3 and 0) The epidemiology of transmissible diseases including pathogenic characteristics of the infectious organism, modes of transmission, mechanism of infection, diagnostic aids, effective treatments, immunizing procedures and methods of preventing infection. *Prerequisite:* Micro 305.

MICRO 401, H401, 601 ADVANCED BACTERIOLOGY 4 cr. (2 and 6) Metabolism, nutrition, growth, and death of bacteria; microbiological assays and industrial fermentation; emphasis on laboratory procedures for the identification of the more common taxonomic groups. *Prerequisite:* Ch 201 or 223, 227, Micro 305.

MICRO 403, 603 MARINE MICROBIOLOGY 3 cr. (2 and 3)

A discussion of the microbes that inhabit the marine environment, their peculiar physiological traits, and contributions to the ecology of oceans. *Pre-requisite:* Micro 305, organic chemistry.

MICRO 405, H405, 605 FOOD AND DAIRY MICROBIOLOGY 4 cr. (3 and 3)

Physical-chemical factors limiting survival and growth of microorganisms during processing and manufacturing of food and dairy products. Standard methods for enumerating and identifying indicator bacteria, yeasts, molds and microbes producing food and foodborne illness. Starter cultures, fungal toxins, microbial cell injury and standards for food and dairy products. *Prerequisite:* Bjoch 210 or Ch 201 or 223, Micro 305.

MICRO 410, H410, 610 SOIL MICROBIOLOGY 3 cr. (2 and 3)

The role of microorganisms in the decomposition of organic substances, transformation of nitrogen and mineral substances in the soil; interrelationships between higher plants and microorganisms; importance of microorganisms in soil fertility. *Prerequisite:* Micro 305.

MICRO 411, H411, 611 PATHOGENIC BACTERIOLOGY 4 cr. (3 and 3)

A study of pathogenic bacteria, their morphology, cultural requirements and classification; diagnostic tests, methods of differentiation, and the diseases caused. *Prerequisite:* Micro 305.

MICRO 412, H412, 612 BACTERIAL PHYSIOLOGY 4 cr. (3 and 3)

A consideration of the cytology, physiology, metabolism, and genetics of bacteria. Included will be studies of growth and death, reproduction and mutation, nutrition and metabolic pathways, regulatory mechanisms, and effects of environment. *Prerequisite:* Micro 305, organic chemistry.

MICRO 413, H413, 613 INDUSTRIAL MICROBIOLOGY 3 cr. (2 and 3)

Microbial aspects of large-scale processes for the production of foods, antibiotics, enzymes, fine chemicals, and beverages. Topics include strain selection, culture maintenance, biosynthetic pathways, continuous cultivation and production of single cell protein. *Prerequisite:* Micro 305.

MICRO 414, H414, 614 BASIC IMMUNOLOGY 3 cr. (2 and 3)

A consideration of the nature, production, and function of basic immune responses in animals. Procedures and mechanisms of antigen-antibody and other immune reactions. *Prerequisite:* Micro 305, organic chemistry.

MICRO 415, H415, 615 MICROBIAL GENETICS 4 cr. (3 and 3)

The cytological basis of bacterial, fungal, and viral genetics; molecular aspects; mutations; mechanisms of genetic transfers; episomes and plasmids; and population changes. *Prerequisite:* Ch 224, Gen 302, Micro 305, or permission of the department head.

MICRO 416, H416, 616 INTRODUCTORY VIROLOGY 3 cr. (3 and 0)

A general introduction to the field of virology, including animal, bacterial, and plant viruses. Topics will include nomenclature and classification, biochemical and biophysical characteristics, mechanisms of replication, chemotherapy, and techniques for isolation, assay and purification. *Prerequisite:* Micro 305. MICRO 491 SPECIAL PROBLEMS IN MICROBIOLOGY 1-3 cr. (0 and 3-9)

Research problems in the various areas of microbiology designed to introduce undergraduate students to the planning and execution of research experimentation, and the presentation of research findings.

MICRO 802	BACTERIOLOGICAL TECHNIC 4 cr. (2 and 6)
MICRO 803 arranged.	SPECIAL PROBLEMS IN MICROBIOLOGY. Credit to be
MICRO 804	CURRENT TOPICS IN MICROBIOLOGY 1 cr. (1 and 0)
MICRO 807	SEMINAR 1 cr. (1 and 0)
MICRO 811 (4 and 0)	BACTERIAL CYTOLOGY AND PHYSIOLOGY 4 cr.
MICRO 812	BACTERIAL METABOLISM 3 cr. (3 and 0)
MICRO 815	ADVANCED MICROBIAL GENETICS 3 cr. (3 and 0)
MICRO 891	MASTER'S RESEARCH. Credit to be arranged.
MICRO 991	DOCTORAL RESEARCH. Credit to be arranged.

Military Science

Professor: Lt. Col. R. H. Herron, Head

Assistant Professors: Maj. P. R. Kelley, Maj. W. P. Merritt, Capt. F. C. Brown, Jr., Capt. S. E. Crouch, Capt. D. L. Smith

MS 101 FUNDAMENTALS (BASIC) 1 cr.

A study of the mission of the Reserve Officers' Training Corps and an orientation to the Department of Defense. Also a study of customs and traditions of the Service. Laboratory periods provide training in marksmanship and drill. One-hour lecture per week; two-hour laboratory every other week or equivalent.

MS 102 GENERAL MILITARY (BASIC) 1 cr.

A study of world change and military implications. An introduction to first aid, mass casualty treatment, and drug and alcohol abuse. Laboratory periods provide training in care and maintenance of weapons and drill. One-hour lecture per week; two-hour laboratory every other week or equivalent.

MS 201 FUNDAMENTALS OF SMALL UNIT OPERATIONS AND LAND NAVIGATION 1 cr.

An introduction to small unit tactics. Introduction to military maps and terrain association. Leadership laboratory provides the student practical experience in applying principles of land navigation, confidence building, and physical fitness testing. One-hour lecture per week; two-hour laboratory every other week or equivalent.

MS 202 MILITARY HISTORY (BASIC) 1 cr.

A survey of military history with emphasis on battles and factors which have patterned our military structure today. Leadership laboratory provides practical experience in small unit leadership and physical fitness testing. One-hour lecture per week; two-hour laboratory every other week or equivalent.

MS 300 MILITARY SCIENCE (ADVANCED) 6 cr. (ROTC 3, Elective 3)

Study and application of leadership, military teaching principles, small unit tactics, and communications. Cadets will enroll in one three-hour elective offered by other departments in the University outside the student's major academic discipline. Students must participate in leadership laboratory training throughout the school year.

MS 400 MILITARY SCIENCE (ADVANCED) 6 cr. (ROTC 3, Elective 3)

A study of military operations, logistics, military law, world change and military implication, and leadership laboratory. Cadets will enroll in one three-hour elective offered by other departments in the University outside the student's major academic discipline. Students must participate in leadership laboratory training throughout the school year.

Music

Professor: J. H. Butler, Head Associate Professor: B. F. Cook Assistant Professors: E. B. Card, E. A. Freeman Instructors: W. W. Campbell, L. U. Harder, S. D. Massey

MUS 151 APPLIED MUSIC 1 cr. (1 and 0)

Individual study in performance medium (voice, piano, flute, oboe, clarinet, saxophone, bassoon, cornet, trumpet, French horn, trombone, baritone, tuba, percussion). One hour-long private lesson each week, for which a minimum of four hours' practice is required. The student is guided in a continuing advance of his technical and artistic proficiency and is required to perform an appropriate solo in a student recital each semester. May be repeated for credit with departmental approval to allow for the study of differing performance media. *Prerequisite:* Permission of instructor, based on a qualifying audition.

MUS 152 APPLIED MUSIC 1 cr. (1 and 0)

A continuation of Mus 151. Prerequisite: Mus 151.

MUS 205 MUSIC THEORY 3 cr. (3 and 0)

The terminology and notation of traditional music are reviewed, and the techniques of sight-singing and sight-reading are practiced. Harmonic practices are studied, relating to the principal diatonic triads in all inversions. *Prerequisite:* Permission of instructor, based on musical literacy.

MUS 206 MUSIC THEORY 3 cr. (3 and 0)

Continuation of Mus 205 with emphasis on secondary chord structure, modulation, and nondiatonic harmony. Advanced sight-singing and melodic dictation are practiced. *Prerequisite:* Mus 205.

MUS 210 MUSIC APPRECIATION: MUSIC IN THE WESTERN WORLD 3 cr. (3 and 0)

Designed to deepen the student's appreciation of his musical heritage through a study of the elements of the musical language and its development in Western culture. MUS 251 APPLIED MUSIC 1 cr. (1 and 0)

A continuation of Mus 152. Prerequisite: Mus 152 and permission of instructor.

MUS 252 APPLIED MUSIC 1 cr. (1 and 0)

A continuation of Mus 251. Prerequisite: Mus 251.

MUS 305 MUSIC THEORY: ADVANCED HARMONY 3 cr. (3 and 0)

A study of harmonic usage involving chromaticism, free dissonance and atonality. Harmonic dictation is practiced. *Prerequisite:* Mus 206.

MUS 306 MUSIC THEORY: FORM AND ANALYSIS 3 cr. (3 and 0)

Principles of formal construction in music of all periods are studied by the inductive analysis of representative works. *Prerequisite:* Mus 206.

MUS 311 MUSIC APPRECIATION: AMERICAN MUSIC 3 cr. (3 and 0) Music in America from 1620 to the present. Indigenous and borrowed influences will be examined.

MUS 315 MUSIC HISTORY 3 cr. (3 and 0)

The development of Western music from antiquity to 1750, emphasizing representative literature from various styles and periods.

MUS 316 MUSIC HISTORY 3 cr. (3 and 0)

Continuation of Mus 315. Music from 1750 to present. Prerequisite: Mus 315.

MUS 361 MARCHING BAND 1 cr. (0 and 3)*

Ensembles: Devoted to the musical training of ensemble members through reading and rehearsal of appropriate music; public performances given periodically in addition to the minimum rehearsal time; may be repeated for credit, with a maximum of four hours of ensemble credit allowable toward a degree. Fall semester only. *Prerequisite:* Permission of director.

MUS 362 CONCERT BAND 1 cr. (0 and 3)*

Ensembles: Devoted to the musical training of ensemble members through reading and rehearsal of appropriate music; public performances given periodically in addition to the minimum rehearsal time; may be repeated for credit, with a maximum of four hours of ensemble credit allowable toward a degree. Spring semester only. *Prerequisite:* Permission of director.

MUS 365 UNIVERSITY CHORUS 1 cr. (0 and 3)*

Ensembles: Devoted to the musical training of ensemble members through reading and rehearsal of appropriate music; public performances given periodically in addition to the minimum rehearsal time; may be repeated for credit, with a maximum of four hours of ensemble credit allowable toward a degree. *Prerequisite:* Permission of director.

MUS 400 MUSIC IN THE ELEMENTARY SCHOOL CLASSROOM 3 cr. (3 and 0)

Designed to give the teacher in the elementary school a familiarity with music suitable for use with children at the elementary level. Recordings of appropriate music, preband instruments, unison and part singing will be included. No previous training in music is required.

[°] No more than a total of four semester credit hours earned in this group of courses (Mus 361, 362, 365) may be used in meeting degree requirements.

MUS 401 METHODS AND MATERIALS IN ELEMENTARY SCHOOL MUSIC 3 cr. (3 and 0)

Materials, methods and techniques in elementary school. Prerequisite: Mus 400.

MUS 421 VOCAL ARRANGING 3 cr. (3 and 0)

Techniques of arranging for voices and accompanying instruments are studied and appropriate arrangements prepared. *Prerequisite:* Mus 305.

MUS 422 INSTRUMENTAL ARRANGING 3 cr. (3 and 0)

Transpositions, characteristics and range of the instruments of the band and orchestra are studied. Techniques of arranging for small instrumental ensembles are studied and appropriate arrangements prepared. *Prerequisite:* Mus 305.

Nursing

(Associate in Arts Degree Program)

Associate Professors: A. S. Prevost, L. Roswal, Director

Assistant Professors: M. J. Lilley, H. Schwartz, P. M. Sellers, H. E. Whitley Instructors: M. F. Barber, E. S. Rosenwald

Visiting Instructors: J. S. Gillespie, P. M. Schwarz, J. C. Staedeli

NURS 103 NURSING I 6 cr. (3 and 9)

Multiple teaching media are utilized in presenting concepts and developing skills required for identifying needs and intervening as a nurse to assist persons to meet their health needs.

NURS 104 NURSING II 6 cr. (3 and 9)

This course deals with the need for survival of the species by reproduction. The bio-psycho-social factors involved in human reproduction and in maternal-infant nursing are identified throughout the course. The family-centered approach is used, and the family unit serves as a framework for the study of the nursing care of mothers and infants. *Prerequisite:* Engl 101, Nurs 103, Psych 201, Zool 110.

NURS 204 TRENDS IN NURSING 3 cr. (3 and 0)

A course planned to consider contemporary nursing, social, legal, and ethical forces that affect the nurse, the field of nursing, and society. Discussion will focus on socio-economic aspects, legislative, health, and nursing-care issues. *Prerequisite:* Nurs 205, Soc 201.

NURS 205 NURSING III 7 cr. (3 and 12)

This course is the first of two interrelated sequential courses designed to develop a knowledge of principles which can be applied when planning and giving nursing care to various age groups with major health problems (acute and long-term patients). *Prerequisite:* Engl 102, Nurs 104, Psych 321, Zool 111.

NURS 206 NURSING IV 11 cr. (6 and 15)

Continuation of Nurs 205. This course deals with common health problems that interfere with ability to meet one's basic needs and presents medical and nursing measures that support or restore the ability to achieve one's maximum level of wellness. *Prerequisite:* Nurs 205, Soc 201.

Nursing

(Baccalaureate Degree Program)

Professors: I. D. Cahill, A. M. Duvall, G. Labecki, Acting Director

Associate Professors: J. J. Chodil, H. T. Cotter, O. S. Hipps, G. A. Tanner

Assistant Professors: C. L. Belcher, S. M. Bradley,^o B. L. Drake, T. L. Duffee, M. D. Guest, J. H. Higgins, M. A. Kelly, M. G. Robinson, G. A. Snell,

R. A. Spadoni, R. Thompson, S. W. Thompson

Instructors: S. M. Andrews, R. M. Arblaster, C. J. Baker, K. E. Brock, B. F. Campbell, M. Flynn, L. A. Hall, G. Kizer-Brown, K. E. O'Rourke, V. F. Rempusheski, E. D. Schultz, A. K. Taylor, L. M. Vaughan

Lecturers: R. H. Burley, D. K. Freeman, Jr.

Visiting Assistant Professors: P. L. Hedges, S. A. Martz

Visiting Instructors: E. J. Crowe, C. J. Keller, G. Levine

Adjunct Associate Professors: A. K. Hood, E. F. Hyde, M. E. Shilling

NURS 100 ORIENTATION 1 cr. (1 and 0)

Series of lectures and discussions on nursing and careers in nursing; personal and professional guidance.

NURS 207 DYNAMICS OF HUMAN RELATIONS 3 cr. (2 and 3)

The nursing appraisal of theoretical and clinical approaches to the understanding of the dynamics of human behavior. The identification of behaviors through observing and participating in laboratory experiences in community agencies providing service to adults and children.

NURS 209 NURSING SKILLS LABORATORY 1 cr. (0 and 3)

An introduction to basic nursing skills utilizing a self-paced modular approach. A self-study laboratory and nursing practice laboratory will be used in learning and practicing the skills identified in each module.

NURS 309 HUMAN VALUES IN NURSING 3 cr. (3 and 0)

The values guiding nursing theory and practice, including common human needs; the nature of man and his community.

NURS 310 PERSPECTIVES IN NURSING INTERVENTION 3 cr. (3 and 0)

Analysis of processes used in making nursing judgments. Emphasis on planning, intervention, and evaluation.

NURS 311 NURSING DURING ALTERATIONS IN LIFE PATTERNS 5 cr. (2 and 9)

Study of the ways in which people perceive and cope with changes in their life patterns; emphasis on the synthesis of knowledge from the arts and sciences as a basis for deliberative nursing action. Laboratory experience in a variety of settings with all age groups.

NURS 312 NURSING OF THE ACUTELY AND CHRONICALLY DISTRESSED 5 cr. (2 and 9)

Nursing concepts based on a broad patho-psychophysiologic approach toward understanding changes in functions as a result of stress and/or disease. Laboratory experience in agencies providing care for the mentally and physically distressed.

• On leave.

NURS 313 THE PROMOTION OF HEALTH 3 cr. (2 and 3)

Role of the nurse in the teaching of health in the home and in agencies concerned with the prevention of illness. Emphasis on nutrition as a positive approach to the improvement of health throughout the life cycle. Laboratory experience in clinics, homes, and selected community programs.

NURS 314 NURSING IN THE HOME 3 cr. (2 and 3)

The dimensions of caring for the ill in the home; includes early detection, treatment, and the use of resources with emphasis on continuity of care. Laboratory experience with agencies providing home care.

NURS 413 COMPLEX NURSING INTERVENTION I 4 cr. (1 and 9)

A synthesis of knowledge, attitudes, and skills related to the care of individuals/families with health problems requiring complex nursing interventions. Emphasis on diagnosis and intervention in the care of persons presenting into the health-care system with nursing problems resulting from illness states due to serious medical and surgical conditions. Laboratory experiences in diverse settings. *Prerequisite:* All 300-level nursing courses and a C average in each nursing course numbered 300 and above.

NURS 414 COMPLEX NURSING INTERVENTION II 4 cr. (2 and 6)

A continuation of Nurs 413 with emphasis on nursing diagnosis and intervention in the care of individuals presenting into the health-care system with nursing problems resulting from illness states due to multiple trauma, conditions requiring external life support, and conditions resulting in residual functional impairment. Laboratory experiences in diverse settings. *Prerequisite:* C average in Nurs 413, 419, 421. C average for students who previously enrolled in Nurs 417 (currently not offered).

NURS 419 THE MULTIPROBLEM FAMILY 3 cr. (2 and 3)

Focus on the family as a unit of care. Use of the epidemiologic approach as a tool in understanding conditions influencing the family. Laboratory experience through community care facilities.

NURS 421 HISTORY AND PHILOSOPHY OF NURSING 3 cr. (3 and 0)

Analysis of the development of modern nursing. Emphasis will be placed on how the nursing profession articulates with society and the role of nurses as change agents. Consideration will be given to the legal and ethical implications in nursing practice.

NURS 422 CURRENT RESEARCH IN NURSING 3 cr. (3 and 0)

A study of approaches to problematic situations in nursing, with emphasis on interpretation of findings.

NURS 426 INDEPENDENT STUDY IN NURSING 4 cr. (2 and 6)

Opportunity for indepth study in an area of special interest in clinical nursing. Laboratory experience arranged. *Prerequisite:* Nurs 413, 419.

NURS 431 CARE OF THE HOSPITALIZED CHILD WITH LONG-TERM ILLNESS 4 cr. (2 and 6)

Role of nurse in caring for the child with a long-term or terminal illness with emphasis on adaptations to meeting basic child needs. Laboratory experience in facility providing hospitalization for children. *Prerequisite:* Nurs 413.

NURS 432 NURSING CARE OF THE PERSON IN CRISIS 4 cr. (2 and 6)

Study of the person with an emotional crisis precipitated by either a physiological or psychological problem. Various theories concerning crisis situations and the nursing interventions necessary to deal with the person in crisis are presented. Nursing laboratory experience in a variety of settings with all age groups. *Prerequisite*: Nurs 413, 419.

NURS 433 TRANSACTIONAL ANALYSIS AND NURSING 4 cr. (2 and 6)

NURS 434 TEACHING ROLE OF NURSE PRACTITIONER 4 cr. (2 and 6)

Study of the nurse's role in health teaching and application of principles of health promotion, maintenance, and restoration. Student selection of a variety of health teaching situations and development of learning resources. Laboratory experience in a variety of settings with all age groups. *Prerequisite:* Nurs 413, 419.

NURS 435 CARE OF INDIVIDUALS WITH COMPLEX AND CRITICAL ILLNESS PROBLEMS 4 cr. (2 and 6)

Comprehensive nursing care to individuals with complex and critical illness problems. Emphasis on care of individuals with neurological, respiratory, and cardiac problems; implications for first aid and emergency care. Laboratory experience in acute-care facilities. *Prerequisite:* Nurs 413, 419.

NURS 436 NURSING CARE OF THE ACUTELY INJURED PERSON 4 cr. (2 and 6)

Acute, emergent, and reconstructive phases of care of injured persons with emphasis on unstable physiological conditions and their impact on the individual's family and community. Laboratory experience in home and acutecare facilities. *Prerequisite:* Nurs 413, 419.

NURS 437 INTRODUCTION TO SCHOOL HEALTH NURSING 4 cr. (2 and 6)

Role of nurse in school health programs with emphasis on the health care of the school age child in his usual environment, the home and school. Laboratory experience through schools and community care facilities. *Prerequisite:* Nurs 413, 419.

NURS 438 COORDINATION IN NURSING CARE 4 cr. (2 and 6)

This course is designed to reinforce and expand the knowledge and skills needed in the coordination of nursing care. Guided activities in planning, implementing, and evaluating skilled nursing in clinical laboratory in healthcare agencies. Participation in and evaluation of activities relating to the delivery of nursing-care services is emphasized. *Prerequisite:* Nurs 413, 419.

NURS 439 NURSING OF THE AGED 4 cr. (2 and 6)

This course is designed to assist the senior student in bridging and synthesizing concepts extracted from a variety of disciplines and applying them to the nursing process in assessing, diagnosing, planning, implementing, and evaluating the care of the aged individual residing in the community. *Prerequisite:* Satisfactory completion of Nurs 413 and 419; Psych 321, Soc 309 or 311.

NURS 801 FAMILY HEALTH NURSING 3 cr. (1 and 6)

NURS 805 AFFILIATIVE EXPRESSIONS OF BEHAVIOR IN RELA-TION TO HEALTH CARE 2 cr. (2 and 0) NURS 807 SEMINAR 1-3 cr.

NURS 812 THE DYNAMICS OF COMMUNITY HEALTH 3 cr. (3 and 0)

NURS 815 THE PROMOTION AND MAINTENANCE OF HEALTH 3 cr. (1 and 6)

NURS 827 FOUNDATIONS OF NURSING EDUCATION 3 cr. (3 and 0)

NURS 828 THE COLLEGE TEACHER OF NURSING 3 cr. (3 and 0)

NURS 830 THE CLINICAL SPECIALTY IN NURSING 6 cr. (3 and 9)

NURS 891 MASTER'S RESEARCH. Credit to be arranged.

Nutrition

(See courses listed under Animal Science, Biochemistry, Dairy Science, Food Science, and Poultry Science)

Professors: B. D. Barnett, R. F. Borgman, D. M. Henricks, J. E. Jones, G. D. O'Dell, F. E. Pardue, G. C. Skelley, Jr., R. F. Wheeler, J. N. Williams II, W. P. Williams, Jr.

Associate Professors: J. C. Acton, R. G. Bursey, D. L. Cross, R. L. Edwards, D. L. Handlin, L. W. Hudson, J. J. Jen, J. C. McConnell, Jr., D. E. Turk Assistant Professors: D. P. Holder, B. F. Jenny, D. R. Sloan Visiting Instructor: C. N. Dunn

NUTR 201 INTRODUCTION TO NUTRITION 3 cr. (3 and 0) S

Principles of the nutrition of domestic animals and man includes: sources, digestion, absorption, utilization and functions of nutrients; effects of dietary deficiencies; and nutrients required for maintenance, growth, reproduction, lactation, work, and egg-shell quality. *Prerequisite:* Bioch 210, Ch 223, or permission of instructor.

NUTR 401, H401, 601 FUNDAMENTALS OF NUTRITION 3 cr. (3 and 0) F

Biochemical and physiological fundamentals of nutrition applicable to domestic animals and man. Considered are digestive processes, and absorption and metabolism of carbohydrates, lipids, proteins, water, minerals and vitamins. Energy metabolism and comparative anatomy and physiology of digestive systems are discussed. *Prerequisite:* Bioch 210, Ch 223, or permission of instructor.

NUTR 425, H425, 625 NUTRITION AND DIETETICS 3 cr. (3 and 0) Study of the nutritional value of foodstuffs, the influence of food preparation techniques upon these values, and the development of diets to meet human nutritional requirements. Current concepts in the formulation of therapeutic diets for the treatment of the ill will be emphasized. *Prerequisite:* Nutr 451 or equivalent.

NUTR 451, H451, 651 HUMAN NUTRITION 3 cr. (3 and 0)

Essentials of nutrition and principle nutritional deficiency conditions. Factors affecting adequacy of dietary intake, methods of determining nutritional status, the development of nutrition standards, and recent advances in human nutrition. *Prerequisite:* Permission of instructor.

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NUTR 452, H452, 652 CLINICAL NUTRITION 3 cr. (3 and 0)

A study of diseases of nutritional etiology and their treatment. The pathogenesis, symptoms, diagnosis, and principles of nutrition therapy of each of the malnutritive disease conditions will be discussed. *Prerequisite:* Nutr 451 or equivalent.

NUTR 701	THERAPEUTIC NUTRITION 3 cr. (3 and 0)
NUTR 702	PUBLIC HEALTH NUTRITION 3 cr. (3 and 0)
NUTR 703	NUTRITION EDUCATION 3 cr. (3 and 0)
NUTR 704	FOOD SERVICE SYSTEMS 3 cr. (3 and 0)
NUTR 705	NUTRITION PRACTICUM 1-6 cr. (0 and 1-6)
NUTR 801	TOPICAL PROBLEMS IN NUTRITION 1-3 cr.
NUTR 808	MONOGASTRIC NUTRITION 3 cr. (3 and 0)
NUTR 809	POLYGASTRIC NUTRITION 3 cr. (3 and 0)
NUTR 812 (3 and 0)	NUTRITION OF CARBOHYDRATES AND LIPIDS 3 cr.
NUTR 813 (1 and 3)	NUTRITION TECHNIQUES WITH LARGE ANIMALS 2 cr.
NUTR 814 2 cr. (1 at	NUTRITION TECHNIQUES WITH LABORATORY ANIMALS and 3)
NUTR 816	AMINO ACIDS AND PROTEIN NUTRITION 2 cr. (2 and 0)
NUTR 818	VITAMINS AND MINERALS 4 cr. (3 and 3)
NUTR 851	NUTRITION SEMINAR I 1 cr. (1 and 0)
NUTR 852	NUTRITION SEMINAR II 1 cr. (1 and 0)
NUTR 891	MASTER'S RESEARCH. Credit to be arranged.
NUTR 991	DOCTORAL RESEARCH. Credit to be arranged.

Philosophy

Assistant Professors: J. L. McCollough, D. F. White, Jr.

PHIL 201 INTRODUCTION TO PHILOSOPHIC PROBLEMS 3 cr. (3 and 0)

A discussion of representative philosophical questions which arise from human thought and action. Characteristic topics are as follows: The Conditions of Knowledge; The Nature of Man; The Individual and Society.

PHIL 202 INTRODUCTION TO LOGIC 3 cr. (3 and 0)

An introduction to methods of evaluating arguments. Simple valid argument forms are given which can be joined together to produce the logical form of virtually any argument. Informal fallacies may also be considered.

PHIL 203 PHILOSOPHY AND CURRENT ISSUES 3 cr. (3 and 0)

An introduction to philosophic reflection as found in writers from many fields analyzing today's cultural predicaments. This social criticism is discussed in a search for the philosophical basis of some familiar conflicts over the value system implicit in our way of life.

PHIL 303 PHILOSOPHY OF RELIGION 3 cr. (3 and 0)

A critical consideration of the meaning and justification of religious beliefs. Representative topics are as follows: The Nature and Existence of God; Religious Knowledge; Religious Language; The Problem of Evil.

PHIL 304 MORAL PHILOSOPHY 3 cr. (3 and 0)

A study of moral problems, their origin in conflicts between duty and desire, and alternative solutions proposed by classical and contemporary writers.

PHIL 312 MODERN PHILOSOPHY 3 cr. (3 and 0)

The development of the modern outlook as seen in the major Western philosophers of the seventeenth and eighteenth centuries. The thought of Descartes, Spinoza, Leibniz, Locke, Berkeley, Hume, Kant, and Hegel is considered, illustrating the development of rationalism, empiricism, and idealism.

PHIL 318 CONTEMPORARY PHILOSOPHY 3 cr. (3 and 0)

A study of the dominant movements in Western philosophy today, particularly existentialism and analytical philosophy. The object is to acquire sufficient background for reading current philosophical or philosophically influenced literature.

PHIL 322 SYMBOLIC LOGIC 3 cr. (3 and 0)

The fundamentals of modern symbolic logic. Leading topics are as follows: Translation from Ordinary Language to Logical Form; Rules of Inference for the Logic of Sentences and the Logic of Predicates; Tests of Validity. *Prerequisite:* Phil 202, or Math 108, or a computer programming course.

PHIL 325 PHILOSOPHY OF SCIENCE 3 cr. (3 and 0)

A study of the logic of the sciences: laws, theories, scientific methods; and of the relevance of science to other human interests.

PHIL 344 CURRENT ETHICAL THEORY 3 cr. (3 and 0)

An intensive study of a currently prominent moral problem. Readings are selected from recent work at the frontiers of ethical thought. *Prerequisite:* Phil 304 or permission of instructor.

Physical Science

(Jointly administered by the Chemistry Department and the Department of Physics and Astronomy)

PHY SC 101 PHYSICAL SCIENCE I 4 cr. (3 and 2)

An introduction to the physical sciences. Selected topics will be discussed to illustrate the structure and meaning of the physical sciences. Course cannot be taken for credit by students who have completed one year of a course in the physical science area. PHY SC 102 PHYSICAL SCIENCE II 4 cr. (3 and 2)

A continuation of Phy Sc 101. Course cannot be taken for credit by students who have completed one year of a course in the physical science area. May not be substituted for any other science course.

Physics

Professors: B. B. Bookmyer, P. B. Burt, R. L. Chaplin, Jr., W. E. Gettys, H. W. Graben, F. J. Keller, A. L. Laskar, J. P. McKelvey, *Head*; D. P. Miller, M. G. Miller, J. R. Ray, M. D. Sherrill, M. J. Skove, E. P. Stillwell, Jr., H. E. Vogel

Associate Professors: B. V. Bronk, J. L. Ging, L. L. Larcom, J. R. Manson,^o P. A. Steiner, R. C. Turner, C. W. Ulbrich

Assistant Professors: T. F. Collins, J. A. Gilreath

Visiting Instructors: W. L. Freeman, D. W. Welch

Adjunct Professors: R. C. Gentry, T. J. Roper

PHYS 101 CURRENT TOPICS IN MODERN PHYSICS 1 cr. (0 and 2) Demonstrations and lectures serving as an introduction to different areas of physics and astronomy will be presented by various members of the staff. These areas may include such topics as astrophysics, energy, relativity, and weather, as well as visits to the planetarium and electron microscope laboratory.

PHYS 115 CLASSICAL PHYSICS I 3 cr. (3 and 0)¹

An introductory calculus-based physics course. This course covers such topics as vectors, statics and dynamics of particles, work and energy, elasticity, harmonic motion, hydrostatics and hydrodynamics. *Corequisite:* A course in calculus.

PHYS 116 CLASSICAL PHYSICS II 3 cr. (3 and 0)²

Continuation of Phys 115. This course covers such topics as temperature, heat flow, first and second laws of thermodynamics and their applications, solar position and energy flow, waves, acoustics, electricity, magnetism, and electric circuits. *Prerequisite:* Phys 115 or permission of instructor.

PHYS 122, H122 PHYSICS WITH CALCULUS I 3 cr. (2 and 2)¹

The first of three courses in a calculus-based physics sequence. Topics include vectors, laws of motion, conservation principles, rotational motion, oscillations, and gravitation. *Corequisite:* Registration in Math 108.

PHYS 207 GENERAL PHYSICS I 4 cr. (3 and 2)¹

An introductory course for students who are not majoring in a pure science or engineering. Includes mechanics, light, and astronomy. *Corequisite:* A course that includes trigonometry.

PHYS 208 GENERAL PHYSICS II 4 cr. (3 and 2)²

Continuation of Phys 207. Includes electricity, magnetism, thermal phenomena, and quantum theory. *Prerequisite:* Phys 207.

PHYS 221, H221 PHYSICS WITH CALCULUS II 3 cr. (2 and 2)²

Continuation of Phys 122. Topics include thermodynamics, kinetic theory of gases, electric and magnetic fields, electric currents and circuits, and motions of charged particles in fields. *Prerequisite:* Phys 122.

[°]On leave.

¹ Credit toward a degree will be given for only one of the following: Phys 115, 122, or 207. 2 Credit toward a degree will be given for only one of the following: Phys 116, 208, or 221.

PHYS 222, H222 PHYSICS WITH CALCULUS III 3 cr. (2 and 2)

Continuation of Phys 221. Topics include wave motion, electromagnetic waves, interference and diffraction, relativity, atomic particles, and atomic and nuclear structure. *Prerequisite*: Phys 221.

PHYS 223 PHYSICS LABORATORY I 1 cr. (0 and 3)

An introduction to physical experimentation on mechanical and electrical systems. Oscillatory motion and resonance are emphasized. Calculators and computers are used in statistical treatment of data. *Corequisite:* Registration in Phys 221.

PHYS 224 PHYSICS LABORATORY II 1 cr. (0 and 3)

Continuation of Phys 223. Experiments involve atomic, molecular and nuclear systems. The wave-particle dualism of light and matter is emphasized. *Corequisite:* Registration in Phys 222.

PHYS 240 PHYSICS OF THE WEATHER 3 cr. (3 and 0)

A descriptive introduction to meteorology. Includes atmospheric thermodynamics, solar radiation, heat budget, atmospheric circulation, force laws governing air motion, fronts, precipitation, synoptic prediction. Special topics of current interest such as the effect of environmental pollution on weather, and the effect of weather on health are included.

PHYS 245 ENERGY SOURCES FOR THE FUTURE 3 cr. (3 and 0)

A study of possible sources of energy including fossil fuels, solar energy, nuclear energy, and their uses. The basic physical concepts, the economic feasibility, and the environmental impact of the use of these sources of energy are discussed. *Prerequisite:* One semester of a physical science.

PHYS 262 PHYSICS OF MUSIC 3 cr. (3 and 0)

An elementary, nontechnical study of the relationship between the laws of physics and the production of music for the music student or layman who wishes to understand the physical principles of the art. Topics include mechanical and acoustical laws, harmonic analysis, musical scales, sound production in instruments, physiology of hearing, etc.

PHYS 321, H321, 621 MECHANICS I 3 cr. (3 and 0)

Statics; motions of particles and rigid bodies; vibratory motion; gravitation; properties of matter, flow of fluids. *Prerequisite:* Phys 221.

PHYS 322, H322, 622 MECHANICS II 3 cr. (3 and 0)

Dynamics of particles and of rigid bodies, Lagrangian and Hamiltonian formulations, vibrations of strings, wave propagation. *Prerequisite:* Phys 321 or permission of instructor.

PHYS 325, H325, 625 EXPERIMENTAL PHYSICS I 4 cr. (2 and 6)

Introduction to experimental modern physics, measurement of fundamental constants, repetition of crucial experiments of modern physics (Stern-Gerlach, Zeeman effect, photoelectric effect, etc.). *Corequisite:* Phys 321 or permission of instructor.

PHYS 326, H326, 626 EXPERIMENTAL PHYSICS II 4 cr. (2 and 6) Continuation of Phys 325.

PHYS 340, H340, 640 ELECTRICITY AND MAGNETISM I 3 cr. (3 and 0)

Electric potential and electrostatic fields; solutions of Laplace's and Poisson's equations; properties of dielectrics and of capacitors; electrostatic energy; current and treatment of circuit problems. Vector analysis is used throughout after introduction. *Prerequisite:* Phys 221.

PHYS 401 SENIOR THESIS I 1-3 cr.

A semioriginal project performed under the direction of a physics staff member. Theoretical fields available include relativity, solid state, statistical mechanics, nuclear physics, and astrophysics. Experimental work may be done in various areas of solid-state physics, astronomy, biophysics, and atmospheric physics. *Prerequisite:* Three physics courses beyond General Physics.

PHYS 402 SENIOR THESIS II 1-3 cr.

A continuation of Phys 401.

PHYS 417, H417, 617 INTRODUCTION TO BIOPHYSICS I 3 cr. (3 and 0)

An introduction to the application of physics to biological problems. Topics include a review of elementary chemical and biological principles, physics of biological molecules, and fundamentals of radiation biophysics. *Prerequisite:* Math 206, Phys 221, or permission of instructor.

PHYS 418, H418, 618 INTRODUCTION TO BIOPHYSICS II 3 cr. (3 and 0)

Continuation of Phys 417. Further work in radiation biophysics, cell population kinetics, and selected special topics such as membrane biophysics, control theory and molecular biophysics, muscle studies, irreversible thermodynamics in biophysics, enzyme physics, etc. *Prerequisite:* Math 206, Phys 221, or permission of instructor.

PHYS 420, 620 ATMOSPHERIC PHYSICS 3 cr. (3 and 0)

A study of the physical processes governing atmospheric phenomena. Topics include thermodynamics of dry and moist air, solar and terrestrial radiative processes, convection and cloud physics, precipitation processes, hydrodynamic equations of motion and large-scale motion of the atmosphere, numerical weather prediction, atmospheric electricity. *Prerequisite:* Phys 221 or 208 and Math 108.

PHYS 432, H432, 632 OPTICS 3 cr. (3 and 0)

This course covers a selection of topics, depending on the interest of the student. Topics covered may include the formation of images by lenses and mirrors, design of optical instruments, electromagnetic wave propagation, interference, diffraction, optical activity, lasers, and holography. *Prerequisite:* Phys 221.

PHYS 441, H441, 641 ELECTRICITY AND MAGNETISM II 3 cr. (3 and 0)

A continuation of Phys 340. Magnetic fields and energy; magnetic properties of materials; electromagnetic induction; ac circuit problems with vector methods and complex numbers; Maxwell's field equations with applications. *Prerequisite:* Phys 340 or equivalent. PHYS 446, H446, 646 SOLID STATE PHYSICS 3 cr. (3 and 0)

An introductory treatment of the crystal structure of solids and the properties of solids which depend on crystal structure; free electron model of metals; band theory of solids; Brillouin zones, crystalline defects and diffusion. *Prerequisite:* Phys 222 or permission of instructor.

PHYS 452, H452, 652 NUCLEAR AND PARTICLE PHYSICS 3 cr. (3 and 0)

A study of our present knowledge concerning subatomic matter. The experimental results are stressed. Topics discussed include particle spectra, detection techniques, Regge pole analysis, quark models, proton structure, nuclear structure, scattering and reactions.

PHYS 455, H455, 655 QUANTUM PHYSICS I 3 cr. (3 and 0)

Discussion of solution of the Schroedinger equation for free particles, the hydrogen atom and the harmonic oscillator. *Prerequisite:* Phys 322, 340, or permission of instructor.

PHYS 456, H456, 656 QUANTUM PHYSICS II 3 cr. (3 and 0)

Continuation of Phys 455. Application of principles of quantum mechanics as developed in Phys 455 to atomic, molecular, solid state and nuclear systems. *Prerequisite:* Phys 455.

PHYS 457, H457, 657 BASIC HEALTH AND RADIOLOGICAL PHYSICS I 3 cr. (3 and 0)

Topics discussed in this course include a survey of nuclear physics, interaction of radiation with matter, biological effects of high and low energy radiation, and uses of radiation for therapy and diagnosis. *Prerequisite:* Phys 321, 340, or permission of instructor.

PHYS 458, H458, 658 BASIC HEALTH AND RADIOLOGICAL PHYSICS II 3 cr. (3 and 0)

Continuation of Phys 457. Topics covered will include dosimetry and radiation protection, ultraviolet radiation effects, shielding calculations, thermal effects, tracer use and kinetics, and ultrasonics. *Prerequisite:* Phys 457 or equivalent.

PHYS 460, H460, 660 CONTEMPORARY PHYSICS FOR HIGH SCHOOL TEACHERS 3 cr. (3 and 0)

A study of later developments including the measurements of atomic particles. The formulation of new laws and the modifications of old ideas needed to describe the interactions of these particles.

PHYS 465, H465, 665 THERMODYNAMICS AND STATISTICAL MECHANICS 3 cr. (3 and 0)

A study of temperature, development of the laws of thermodynamics and their application to thermodynamic systems. An introduction to low temperature physics is given. *Prerequisite:* Six hours of physics beyond Phys 222 or permission of instructor.

PHYS 471, H471, 671 ELECTRON MICROSCOPY 3 cr. (2 and 3)

This course presents an introduction to the theory, operation, and use of scanning and transmission electron microscopes. It includes a survey of specimen preparation techniques and instruction in the interpretation of micrographs. Applications in both the physical and biological sciences are discussed. *Prerequisite:* One year of General Physics, Math 106, and permission of instructor. PHYS 473, H473, 673 X-RAY CRYSTALLOGRAPHY 3 cr. (2 and 3)

Study of crystal symmetry, elementary group theory, X-ray diffraction by crystals. Experimental methods of goniometry, powder and single crystal diffraction are used to determine structures and electron density distribution. Application of X-ray diffraction to chemical, physical, and metallurgical problems.

PHYS 700 PHYSICAL SCIENCE IN ELEMENTARY SCHOOLS— PHYSICS 3 cr. (3 and 0)

- PHYS 701 PHYSICS FOR HIGH SCHOOL TEACHERS I 4 cr. (3 and 3)
- PHYS 702 PHYSICS FOR HIGH SCHOOL TEACHERS II 4 cr. (3 and 3)
- PHYS 703 MODERN PHYSICS FOR HIGH SCHOOL TEACHERS 3 cr. (3 and 0)
- PHYS 715 EXPERIMENTAL PHYSICS FOR HIGH SCHOOL TEACHERS I 4 cr. (2 and 4)
- PHYS 716 EXPERIMENTAL PHYSICS FOR HIGH SCHOOL TEACHERS II 4 cr. (2 and 4)
- PHYS 723 WEATHER SCIENCE FOR SCIENCE TEACHERS 3 cr. (3 and 0)
- PHYS 811 METHODS OF THEORETICAL PHYSICS I 3 cr. (3 and 0)
- PHYS 812 METHODS OF THEORETICAL PHYSICS II 3 cr. (3 and 0)
- PHYS 813 ADVANCED THERMODYNAMICS AND STATISTICAL MECHANICS I 3 cr. (3 and 0)
- PHYS 814 ADVANCED THERMODYNAMICS AND STATISTICAL MECHANICS II 3 cr. (3 and 0)
- PHYS 821 CLASSICAL MECHANICS I 3 cr. (3 and 0)
- PHYS 822 CLASSICAL MECHANICS II 3 cr. (3 and 0)
- PHYS 841 ELECTRODYNAMICS I 3 cr. (3 and 0)
- PHYS 842 ELECTRODYNAMICS II 3 cr. (3 and 0)
- PHYS 845 SOLID STATE PHYSICS I 3 cr. (3 and 0)
- PHYS 846 SOLID STATE PHYSICS II 3 cr. (3 and 0)
- PHYS 853 NUCLEAR PHYSICS 3 cr. (3 and 0)
- PHYS 875 SEMINAR IN CONTEMPORARY PHYSICS 1-3 cr. (1-3 and 0)
- PHYS 890 DIRECTED ACTIVITIES IN APPLIED PHYSICS 1-6 cr.
- PHYS 891 MASTER'S RESEARCH. Credit to be arranged.
- PHYS 951 QUANTUM MECHANICS I 3 cr. (3 and 0)
- PHYS 952 QUANTUM MECHANICS II 3 cr. (3 and 0)
- PHYS 966 RELATIVITY 3 cr. (3 and 0)
- PHYS 971 ADVANCED QUANTUM THEORY I 3 cr. (3 and 0)

PHYS 972 ADVANCED QUANTUM THEORY II 3 cr. (3 and 0)

PHYS 991 DOCTORAL RESEARCH. Credit to be arranged.

Plant Pathology

Professors: L. W. Baxter, N. D. Camper, W. M. Epps, Head; F. H. Smith, W. Witcher

Associate Professors: O. W. Barnett, Jr., G. C. Kingsland, S. A. Lewis, R. W. Miller, Jr., E. I. Zehr

Assistant Professor: G. E. Carter, Jr.

PL PA 401, H401, 601 PLANT PATHOLOGY 3 cr. (2 and 3) F, S

The principles of the interrelationships between plant pathogens, their hosts, and the environment. Economically important plant diseases are used to illustrate these principles and the application of these principles to disease control. *Prerequisite:* Biol 103 and 105 or 110.

PL PA 405, H405, 605 FOREST PATHOLOGY 3 cr. (2 and 3) F

Principles of plant pathology as related to forest tree diseases; casual agents and their effects on the suscept; prevention and control and minimizing losses; relation of disease control to silviculture, management, and forest products utilization. *Prerequisite:* Biol 103 and 105 or 110, Bot 421, or permission of instructor.

PL PA 451, 651 BACTERIAL PLANT PATHOGENS 3 cr. (2 and 3) S, Odd-numbered years.

The nature, development, and control of plant diseases caused by bacteria. Taxonomic considerations, host-parasite relations and techniques used in isolating, identifying, and preserving bacterial plant pathogens. *Prerequisite:* Pl Pa 401 or 405, Micro 305, or permission of instructor.

PL PA 456, H456, 656 PLANT VIROLOGY 3 cr. (3 and 0) F, Evennumbered years.

Plant viruses with emphasis on their morphology, biochemistry, purification and transmission; symptoms resulting from virus infection; virus-vector relationships; and serological procedures. The importance and control of plant virus diseases will be discussed. *Prerequisite*: Biol 103 and 105 or 110.

PL PA 458, H458, 658 PLANT PARASITIC NEMATODES 3 cr. (2 and 3) F, Odd-numbered years.

Morphology and taxonomy of stylet bearing nematodes and their relationship with plant diseases. *Prerequisite:* Biol 103, 104, 105, 106 or 110, 111.

PL PA 800 ADVANCED PLANT PATHOLOGY I 3 cr. (3 and 0)

- PL PA 801 ADVANCED PLANT PATHOLOGY II 3 cr. (3 and 0)
- PL PA 804 PHYSIOLOGICAL PLANT PATHOLOGY 3 cr. (3 and 0)
- PL PA 805 SPECIAL PROBLEMS IN PLANT PATHOLOGY. Credit to be arranged.
- PL PA 807 SEMINAR 1 cr. (1 and 0)
- PL PA 808 TECHNIQUES AND METHODS IN PLANT PATHOLOGY I 1 cr. (0 and 3)

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PL PA 809 TECHNIQUES AND METHODS IN PLANT PATHOLOGY II 1 cr. (0 and 3)

PL PA 811 PLANT DISEASE DIAGNOSIS I 1 cr. (0 and 3)

PL PA 812 PLANT DISEASE DIAGNOSIS II 1 cr. (0 and 3)

PL PA 891 MASTER'S RESEARCH. Credit to be arranged.

PL PA 991 DOCTORAL RESEARCH. Credit to be arranged.

Political Science

Professor: H. E. Albert

Associate Professors: E. M. Coulter, C. W. Dunn, Head; H. W. Fleming, Jr., W. H. Owens, Jr., M. W. Slann

Assistant Professors: M. A. Morris, S. H. Wainscott

Instructors: M. R. Cline, M. R. Pilo

POL SC 101 AMERICAN NATIONAL GOVERNMENT 3 cr. (3 and 0) An introduction to American National Government and politics with an emphasis on the functions of governmental organizations, the behavior of po-

litical parties and personalities, and the role of public opinion.

POL SC 201 INTRODUCTION TO POLITICAL SCIENCE 3 cr. (3 and 0)

A basic introduction to the study, analysis, scope, and sources of government. Emphasis is given to the comparative institutions of government, the international relations of government, the theoretical conceptions man has entertained about government, and analysis of the ways in which man has behaved in response to government. *Prerequisite:* Pol Sc 101 or permission of instructor.

POL SC 300 SPECIAL ACTIVITIES 1-3 cr. (0 and 1-3)

This course encompasses special projects, approved by the department head, which involve students in research, simulation, internships, or other actions requiring the study and application of political principles, and which are engaged in for at least one semester or its equivalent.

POL SC 302 STATE AND LOCAL GOVERNMENT 3 cr. (3 and 0)

The structural features, functions, and legislative, executive and judicial processes of American state and local government.

POL SC 321 GENERAL PUBLIC ADMINISTRATION 3 cr. (3 and 0)

An introduction to public administration including the elements of organization, personnel and financial management, and administrative law, and administrative responsibility. *Prerequisite:* Pol Sc 101, 201.

POL SC 341 POLITICAL SCIENCE METHODOLOGY 3 cr. (2 and 1)

An introduction to political science methodology. Examination of the different research settings and various techniques for collecting political data. A critical review of the contemporary literature of political science. Laboratory training and fieldwork in interviewing. Includes exercises in computer use for elementary quantitative analysis of political data. *Prerequisite:* Math 101 and Pol Sc 101 or the equivalent or permission of instructor.

POL SC 351 CLASSICAL POLITICAL THOUGHT 3 cr. (3 and 0)

Political philosophy from the pre-Socratic period to Machiavelli. Prerequisite: Pol Sc 101, 201.

POL SC 352 MODERN POLITICAL THOUGHT 3 cr. (3 and 0)

The early theories of the nation state in the sixteenth century and the major political thinkers, problems and movements through the twentieth century. *Prerequisite:* Pol Sc 101, 201.

POL SC 361 INTERNATIONAL POLITICS 3 cr. (3 and 0)

An introduction to foreign policy, international law, and international organizations. *Prerequisite:* Pol Sc 101, 201.

POL SC 371 COMPARATIVE EUROPEAN POLITICS 3 cr. (3 and 0)

Major emphasis on the United Kingdom, France, Germany, and the U.S.S.R., with brief attention given to Italy and Switzerland. Current methods of comparison will be studied and applied to the formal and informal functioning of these governments. *Prerequisite:* Pol Sc 101, 201.

POL SC 372 TOTALITARIAN POLITICAL SYSTEMS 3 cr. (3 and 0)

A continuation of Pol Sc 371. This course will deal specifically with the Soviet Union as an example of totalitarian political systems, with references made to Nazi Germany and the present Eastern European political systems. *Prerequisite:* Pol Sc 101, 201.

POL SC 403 THE AMERICAN CONGRESS 3 cr. (3 and 0)

An examination of the behavior and processes of decision making in the American Congress together with an analysis of the interaction between Congress and the executive and judicial branches of the national government.

POL SC 405 THE AMERICAN PRESIDENCY 3 cr. (3 and 0)

An examination of the organizational patterns, administrative behavior, and political forces in the Presidency with considerable emphasis on relations between the Presidency and Congress, the courts, and administrative-regulatory agencies. *Prerequisite:* Pol Sc 101, 201, or permission of instructor.

POL SC 409, 609 DIRECTED STUDY IN AMERICAN INSTITUTIONS 3 cr. (3 and 0)

Supervised reading and/or research in selected areas of American government. *Prerequisite:* Eighteen semester hours in political science and permission of instructor.

POL SC 422, 622 PROBLEMS OF PUBLIC ADMINISTRATION 3 cr. (3 and 0)

Selected views of public administration and the problems involved. *Pre-requisite:* Pol Sc 101 or permission of instructor.

POL SC 423, 623 MUNICIPAL ADMINISTRATION 3 cr. (3 and 0)

Interaction of political, technical, and administrative processes in urban America. *Prerequisite:* Pol Sc 101 or permission of instructor.

POL SC 424, 624 ADMINISTRATIVE LAW 3 cr. (3 and 0)

Examination of the legal principles governing procedures and policy making processes of administrative agencies with emphasis upon delegation of powers, elements of fair administrative procedure, and judicial review and control of administrative determinations.

POL SC 425, 625 GOVERNMENTAL BUDGETARY PROCESS 3 cr. (3 and 0)

Examination of the budgetary structures and processes at the national, state, and local levels of government. Special emphasis is devoted to the Office of Management and Budget in the national government and to the political elements of the budgetary process at all levels of government.

POL SC 426, 626 GOVERNMENT ORGANIZATION THEORY 3 cr. (3 and 0)

A study of the political-economic approach to the analysis of organization, management, and policy administration. Emphasis will be placed on organizational design, structure, and operation; participation and leadership; and evaluation of organizational effectiveness. *Prerequisite:* Pol Sc 321.

POL SC 427, 627 GOVERNMENT PERSONNEL ADMINISTRATION 3 cr. (3 and 0)

Government personnel systems; current trends and problems; essentials of recruitment, classification, compensation, motivation, evaluation, training, and discipline.

POL SC 428, 628 AMERICAN DEFENSE POLICY ANALYSIS 3 cr. (3 and 0)

A study of the possibilites and problems in formulating policies of national defense. Examination of alternatives, consequences and effectiveness of current techniques in nuclear weaponry, guerrilla and conventional warfare. *Prerequisite:* Pol Sc 101, 201, or permission of instructor.

POL SC 429, 629 AMERICAN POLITICS AND EDUCATION 3 cr. (3 and 0)

A consideration of the political context for the making of public policy for education and for educational administration in the United States. Selected educational issues will be analyzed in the framework of modern political science. *Prerequisite:* Ed 301 or Pol Sc 101, 201.

POL SC 432 AMERICAN CONSTITUTIONAL LAW I 3 cr. (3 and 0)

A brief introduction to the judicial process followed by a detailed examination of leading cases pertaining to the judiciary, the Congress, the Presidency, and the federal system. *Prerequisite:* Pol Sc 101, 201.

POL SC 433, 633 AMERICAN CONSTITUTIONAL LAW II 3 cr. (3 and 0)

An examination of the relationship of the individual to his government; focusing on the safeguards of liberty and property including freedoms of speech, press and religion, and criminal procedures. *Prerequisite:* Pol Sc 101, 201.

POL SC 434 THE JUDICIAL PROCESS AND JURISPRUDENCE 3 cr. (3 and 0)

Courts as political subsystems; judicial decision making; the development of public policy through the judicial process; theories of law and jurisprudence. *Prerequisite:* Pol Sc 101, 201.

POL SC 435 ADMINISTRATION OF JUSTICE 3 cr. (3 and 0)

Examination of selected issues and questions adjudicated in the nation's courts with emphasis upon the manners in which the courts and related law enforcement agencies deal with problems of deviance under the criminal law; an evaluation from a social science perspective of the courts and these

related agencies as arbiters in the resolution of conflicts under the law. Prerequisite: Pol Sc 101, 201.

POL SC 439 PUBLIC LAW AND AMERICAN EDUCATION 3 cr. (3 and 0)

A consideration and analysis of the constitutional standards for public education. Special emphasis will be placed on the areas of church-state relations, academic freedom, educational finance, and race relations. *Prerequisite:* Pol Sc 101 and preferably 429 or 433.

POL SC 442, 642 POLITICAL PARTIES AND POLITICS 3 cr. (3 and 0)

A study of the historical development of political parties, and the role they play in the organization and functions of our national government, and the influence of politics in policymaking. *Prerequisite:* Pol Sc 101, 201.

POL SC 443 PUBLIC OPINION AND PROPAGANDA 3 cr. (3 and 0)

This course examines the nature of public opinion, its social and political context, the social-psychological processes basic to it, the dynamics of its formation and change and its measurement. *Prerequisite:* Pol Sc 341, IM 410, or permission of instructor.

POL SC 453 AMERICAN POLITICAL THOUGHT 3 cr. (3 and 0)

American political philosophy from the seventeenth century to the present with an emphasis on political and social developments since the 1770s. *Pre-requisite:* Pol Sc 101, 201.

POL SC 454 SOUTHERN POLITICS 3 cr. (3 and 0)

Southern politics since 1950 with emphasis upon the characteristics of sectional politics, decline of the one-party system, impact of desegregation and civil rights activism, political resurgence of the South in the 1970s and its impact on national politics. *Prerequisite:* Pol Sc 101.

POL SC 462 INTERNATIONAL ORGANIZATIONS 3 cr. (3 and 0)

Emphasis on international organizations. Analysis of current problems and proposed solutions. *Prerequisite:* Pol Sc 101, 201.

POL SC 463 UNITED STATES FOREIGN POLICY 3 cr. (3 and 0)

Focus on foreign policy in its historical perspective, examining the decision-making process in foreign policy; evaluates contemporary American capabilities, and analyzes specific issues. *Prerequisite:* Pol Sc 101, 201.

POL SC 464 INTERNATIONAL LAW 3 cr. (3 and 0)

An examination of cases and other legal materials on the nature of international law, recognition of states, succession, the territory of states, and nationality. *Prerequisite:* Pol Sc 101, 201.

POL SC 465 FOREIGN POLICIES OF THE MAJOR POWERS 3 cr. (3 and 0)

A study in the foreign policies of the leading world powers with special reference to the geographic, economic, historical and political determinants of each. A general introduction to the field of foreign policy. United States foreign policy is not emphasized. *Prerequisite:* Pol Sc 361.

POL SC 474 COMPARATIVE ASIAN GOVERNMENTS 3 cr. (3 and 0) Major emphasis on China, India, and Japan. A study of the adaptation of three classic Asian cultures to the Western nation state system, and the particular solutions sought or found by each to the problems of modern government. Each country's foreign policy will also be examined. *Prerequisite:* Pol Sc 101, 201, or permission of instructor.

POL SC 475 POLITICAL SYSTEMS OF LATIN AMERICA 3 cr. (3 and 0)

An examination of political processes in Latin America from both institutional and national perspectives. *Prerequisite:* Pol Sc 101, 201, or permission of instructor.

POL SC 476 POLITICAL SYSTEMS OF THE MIDDLE EAST 3 cr. (3 and 0)

A comparative examination of the political processes of the Middle East, emphasizing a socio-cultural approach to the problems of political development. The overview of the course concentrates upon the Arab and non-Arab states of Jordan, Lebanon, Syria, the United Arab Republic, Iran, Israel, and Turkey. *Prerequisite:* Pol Sc 101, 201, or permission of instructor.

POL SC 482 THE POLITICAL NOVEL AND THE CINEMA 3 cr. (3 and 1)

A consideration of how political science is treated in political novels and cinema, and how political opinions are shaped by these media. *Prerequisite:* Pol Sc 101, 201, or permission of instructor.

Poultry Science

Professors: B. D. Barnett, *Head*; K. A. Holleman, J. E. Jones Associate Professors: K. K. Hale, Jr., B. L. Hughes Assistant Professors: J. W. Dick, D. P. Holder, D. R. Sloan, R. J. Thurston

PS 202 AVIAN SCIENCE 3 cr. (2 and 3)

A study of the basic principles of poultry production and marketing and a fundamental study of the anatomy and physiology of the fowl. *Prerequisite:* Agric 103 or permission of instructor.

PS 321 INCUBATION AND HATCHERY MANAGEMENT 2 cr. (1 and 3) F, Even-numbered years.

The course deals with the basic principles of incubation and provides fundamental instruction on the operation and maintenance of a hatchery. *Prerequisite:* PS 202 or permission of instructor.

PS 322 POULTRY BREEDING AND GENETICS 3 cr. (2 and 3)

Principles of genetics and breeding of commercial fowl will be studied. This includes physiology of reproduction, mechanism of inheritance, selection methods, recordkeeping, and artificial insemination. *Prerequisite:* Gen 302 and PS 202 or permission of instructor.

PS 323 POULTRY AND POULTRY PRODUCTS EVALUATION 2 cr. (0 and 4)

Selection of layers, broilers, and turkeys will be studied. Grading of poultry products according to USDA grade standards will also be studied. Students enrolled in this course are eligible to compete in Intercollegiate Poultry Judg-ing Contests. *Prerequisite:* PS 202 or permission of instructor.

PS 355, 655 POULTRY PRODUCTS GRADING AND TECHNOLOGY 3 cr. (2 and 3) F, Even-numbered years.

Factors important in the quality of poultry products will be considered. The effects of production, handling, packaging and storage on consumer acceptability will be discussed. Quality evaluation will be considered from the standpoint of tenderness, flavor, microbiology, and USDA grades.

PS 359, 659 MANAGEMENT OF EGG, BROILER AND TURKEY ENTERPRISES 3 cr. (2 and 3) S, Odd-numbered years.

The application of technology to the production of commercial eggs, broilers and market turkeys. The application of labor and equipment to animal requirements in such a way as to result in efficient production of wholesome meat and eggs.

PS 363 PROPAGATION OF GAME AND EXOTIC BIRDS 3 cr. (2 and 3) F

Study of the techniques of production in confinement of game and exotic birds for use in recreation and for ornamental purposes. Discussion of the use of various avian species for nonfood purposes in the home, parks, zoos, and in hunting preserves.

PS 401, H401, 601 ANIMAL ENVIRONMENTAL TECHNOLOGY 2 cr. (2 and 0) F, Even-numbered years.

A study of the physiological response of all domestic animals to environmental factors of importance in their production. Physical aspects of light, temperature, humidity, and the gaseous environment and control of these factors by housing systems, ventilation, artificial light, insulation, and waste disposal will be discussed. *Prerequisite:* Agric 103, An Sc 202, or PS 202.

PS 403, 603 ANIMAL ENVIRONMENTAL TECHNOLOGY LABORATORY 1 cr. (0 and 3) F, Even-numbered years.

Demonstrations of subjects covered in PS 401.

PS 405, 605 TOPICAL PROBLEMS 1-3 cr. (0 and 3-9)

Topics of interest to the student at senior, master, doctor, and professional levels. The course is designed to give experience with avian problems not covered in other courses or on thesis research. Credit varies with the problem selected.

PS 451, 651 POULTRY NUTRITION 2 cr. (2 and 0) S, Even-numbered years.

The nutrient requirements of chickens, turkeys, and game birds and methods of determining these requirements will be discussed. Deficiencies and excesses of vitamins and minerals and the effects of naturally occurring toxins are considered. Hand formulation and linear programming are introduced.

PS 454, 654 LEAST COST FEED FORMULATION 2 cr. (1 and 2) F

Study of least cost formulation of animal diets. Encompasses development of ingredient composition tables, nutrient specifications, along with formulation evaluation. Linear programming and computers will be used. *Prerequisite:* Nutr 201, 401, or PS 451.

PS 458, 658 AVIAN MICROBIOLOGY AND PARASITOLOGY 4 cr. (3 and 3) F, Even-numbered years.

Agents causing poultry diseases; the diagnosis, prevention, and treatment of specific diseases and their economic and public health significance.

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PS 460, 660 SEMINAR 1 cr. (1 and 0) S, Odd-numbered years.

Current research reported in journals covering the various areas of avian science. Students will practice scientific writing and interpretation of technical material for lay readers. *Prerequisite:* Permission of instructor.

PS 804 POULTRY PATHOLOGY 3 cr. (1 and 6)

PS 805 SEMINAR 1 cr. (1 and 0)

PS 891 MASTER'S RESEARCH. Credit to be arranged.

Psychology

Professor: B. Caffrey, Head

Associate Professors: S. N. Cole, J. D. Davenport, D. J. Senn

Assistant Professors: L. Berger, E. G. Brainerd, Jr., J. D. Frey, C. Furry, R. H. Lowe, G. W. O'Neill, L. I. Park, N. R. Schultz, Jr.

Instructor: N. C. Simmons

Visiting Assistant Professor: R. H. Nowaczyk

PSYCH 101 ORIENTATION TO PSYCHOLOGY 1 cr. (1 and 0)

A general orientation to the field of psychology; emphasis on areas treated by the discipline as well as interests which psychologists hold in common. Not open to students who have taken Psych 201.

PSYCH 105 PSYCHOLOGY OF OCCUPATIONAL CHOICE 1 cr. (1 and 0)

Techniques of personnel selection, career development, and vocational counseling as applied to the individual seeking a vocation. Topics to be discussed include matching oneself to a job, how to apply for various jobs, and the measurement of job success.

PSYCH 201, H201 GENERAL PSYCHOLOGY 3 cr. (3 and 0)

An introduction to the study of behavior. An analysis of the biological bases of behavior, learning, thinking, motivation, perception, human development, social behavior, and the application of basic principles to more complex phenomena such as education, personal adjustment, and interpersonal relations.

PSYCH 263 INTRODUCTORY EXPERIMENTAL PSYCHOLOGY 3 cr. (3 and 0)

A survey of the major areas of psychological research with emphasis on methods of experimentation and other forms of research. Required of all Psychology majors and minors. *Prerequisite:* Psych 201.

PSYCH 265 INTRODUCTORY EXPERIMENTAL PSYCHOLOGY LABORATORY 1 cr. (0 and 3)

Demonstrations and applications of principles of experimental methodology discussed in Psych 263. *Prerequisite:* To be taken concurrently with Psych 263.

PSYCH 301 INDUSTRIAL PSYCHOLOGY 3 cr. (3 and 0)

Topics in personnel selection, including application forms, testing and interviews, job analysis, performance appraisal, and achievement tests. The applied use of learning principles, supervisory training methods, discovery of training needs, motivation and morale in industry, consumer psychology, financial incentive plans, and organizational theories. *Prerequisite:* Psych 201.

PSYCH 302 SOCIAL PSYCHOLOGY 3 cr. (3 and 0)

A survey course analyzing human social behavior from the perspective of the individual as a participant in social relationships. The major emphasis is on the scientific study of such contemporary social processes as attitude formation and change, interpersonal relations, conformity, conflict resolution, aggression and violence, social communication, and group phenomena. *Prerequisite:* Psych 201.

PSYCH 303 THE PSYCHOLOGY OF ADJUSTMENT 3 cr. (3 and 0)

A course in personal adjustment dealing with the appropriate and inappropriate reactions to frustration and stress, including ways of handling conflicts, anxiety, fears, and the promotion of personal emotional adjustment. Not included in the Psychology major. *Prerequisite:* Psych 201 or permission of instructor.

PSYCH 305 APPLIED PSYCHOLOGY 3 cr. (3 and 0)

A study of the concepts of psychology as applied to individual, business, and professional behavior. *Prerequisite:* Psych 201.

PSYCH 315 THE PSYCHOLOGY OF RELIGION 3 cr. (3 and 0)

Religious experience and religious personality in the context of an objective study of human behavior. The development of faith and its place in psychological adjustment. *Prerequisite:* Psych 201.

PSYCH 321 DEVELOPMENTAL PSYCHOLOGY 3 cr. (3 and 0)

A survey of current theory and research concerned with the psychological aspects of human growth and development. *Prerequisite:* Psych 201.

PSYCH 323 PERSONALITY 3 cr. (3 and 0)

An examination of the contributions of psychological theories and current research to the study of personality. Major topics include: stress and psychological trauma, frustration and aggression, adaptive personality changes, conflict and defensive reactions, and personality development. *Prerequisite:* Psych 201.

PSYCH 325 HUMAN SEXUAL BEHAVIOR 3 cr. (3 and 0)

The subject of sexual behavior is to be approached from the psychophysiological, behavioral, and cultural points of view. Evolutionary, historical, and cross-cultural perspectives will be considered.

PSYCH 332 PRINCIPLES OF BEHAVIOR 3 cr. (2 and 3)

A study of basic conditioning principles including classical conditioning, operant conditioning, and imitation. Initial emphasis on animal studies followed by human applications and techniques. Laboratory work will include animal handling and training. *Prerequisite:* Psych 201, 263.

PSYCH 341 PHYSIOLOGICAL PSYCHOLOGY 3 cr. (3 and 0)

The study of human neuroanatomy, with an emphasis on the functions of the nervous system. Treats of the biological bases of behavior in both normal and abnormal dimensions. *Prerequisite:* Psych 201, 263.

PSYCH 344 PHYSIOLOGICAL PSYCHOLOGY LABORATORY 1 cr. (0 and 3)

Demonstrations and techniques of selected physiological procedures are presented to elucidate the principles discussed in Psych 341. *Prerequisite:* To be taken concurrently with Psych 341.

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PSYCH 361 MOTIVATION 3 cr. (3 and 0)

The various aspects of motivation are considered through a study of contributions of biologists, sociologists, anthropologists, and psychologists. The orientation is empirical rather than theoretical, with emphasis on pertinent research and applications and on the measurement of motives. *Prerequisite:* Psych 201.

PSYCH 363 ADVANCED EXPERIMENTAL PSYCHOLOGY 4 cr. (3 and 3)

A continuation of Psych 263 with a stress on the carrying out of original research in the scientific study of human and animal behavior. Laboratory periods stress the refinement of techniques and the execution of research in a guided setting. *Prerequisite:* Psych 201, 263, 265, and achievement of a satisfactory score on the departmental competency examination.

PSYCH 402, 602 ABNORMAL PSYCHOLOGY 3 cr. (3 and 0)

The study of the physiological, psychological and sociological factors involved in such behavioral disorders as transient situational disturbances, personality disorders, psychoneuroses, psychoses, and psychosomatic disturbances. Special emphasis is placed on the advantages and disadvantages of particular conceptual models in labeling and describing behaviors as either normal or abnormal. *Prerequisite:* Psych 201 and one psychology course higher than 300.

PSYCH 411 PERSONALIZED INSTRUCTION METHODS 3 cr. (2 and 3)

A consideration of the behavioral principles underlying the Personalized System of Instruction approach. Students will utilize these principles while serving as proctors for the introductory psychology course. *Prerequisite:* Admission by invitation only.

PSYCH 423 THEORIES OF PERSONALITY 3 cr. (3 and 0)

An analysis of classical and contemporary theories of personality, with an emphasis on the theories of Freud, Jung, Skinner, Rogers, Cattell, Sheldon, and the neo-Freudians. *Prerequisite:* Psych 201.

PSYCH 425 THE PSYCHOLOGY OF AGING 3 cr. (3 and 0)

A special consideration of the social, biological, and cultural aspects of aging. Included is the influence of aging on the senses and perception, psychomotor skills, learning, thinking and intelligence, employment and productivity, personality changes, and psychopathology. *Prerequisite:* Psych 201.

PSYCH 432 BEHAVIORAL TECHNIQUES 3 cr. (2 and 2)

A survey of specific techniques that employ psychological principles to deal with maladaptive human behavior. The techniques include systematic desensitization, assertive training, modeling, operant conditioning, extinction, and aversive conditioning. *Prerequisite:* Psych 201, 263, 332, 402.

PSYCH 442, 642 SENSATION AND PERCEPTION 3 cr. (3 and 0)

A continuation of Psych 341. Psychophysics, sensory neurophysiology, and perceptual processes related to vision, hearing, and the other senses. *Pre-requisite:* Psych 201, 263, 265.

PSYCH 444, 644 SENSATION AND PERCEPTION LABORATORY 1 cr. (0 and 3)

Selected experiments are conducted to demonstrate the phenomena involved in sensation and perception. *Prerequisite:* To be taken concurrently with Psych 442.

PSYCH 451 SYSTEMS AND THEORIES OF PSYCHOLOGY 3 cr. (3 and 0)

A treatment of the science of psychology as understood in the light of the ideas of men who have been responsible for its development. *Prerequisite:* Psych 201.

PSYCH 471 PSYCHOLOGICAL TEST EVALUATION 3 cr. (3 and 0)

An introduction to the theory of psychological testing. Emphasis is on essentials of testing with experience in administering, scoring, and interpreting tests, including those of scholastic achievement, mental ability, scholastic aptitude, interests and personality. *Prerequisite:* Nine hours of psychology excluding Math 203, Psych 201, 263.

PSYCH 475 GROUP DYNAMICS 3 cr. (3 and 0)

A review of current research and theory on small-group processes with special emphasis on group structure, the dynamic forces within a group, social power, group problem solving, and leadership. *Prerequisite:* Psych 201, 302, or permission of instructor.

PSYCH 482 ATTITUDES AND PERSUASIVE COMMUNICATION 3 cr. (3 and 0)

A review of current research and major theoretical positions concerning the processes involved in attitude formation, attitude organization, and attitude change. Primary emphasis will be on the role of attitudes in modern society, the structure and composition of persuasive communication, and the application of techniques of persuasion. *Prerequisite:* Psych 201, 302, or permission of instructor.

PSYCH 487 PRACTICUM IN APPLIED PSYCHOLOGY 3 cr. (1 and 5) Designed to give the student practical experience in the application of psychology in industry. The student will begin a project which will aid in the solution of some industrial problem. Problems to be studied include labor turnover, coordination of managerial and staff decision making, motivation, and organizational development. *Prerequisite:* Psych 301, 302, or permission of instructor.

PSYCH 490, 690 SPECIAL TOPICS IN CLINICAL PSYCHOLOGY 3 cr. (3 and 0)

Selected aspects of clinical psychology related to counseling, psychotherapy, psychological assessment and its relationship with psychiatry, social work, and other mental health disciplines. *Prerequisite:* Psych 263, 402, and six hours of 300-400 level psychology courses, or permission of instructor.

PSYCH 493 PRACTICUM IN CLINICAL PSYCHOLOGY 3 cr. (1 and 5)

Students will have an opportunity to apply classroom theory in solving individual and community problems through interaction with community agencies and other professional groups in the mental health area. The student will have limited but well-controlled contact with patients on both an individual and group basis. *Prerequisite:* Permission of instructor. PSYCH 494 TOPICAL SEMINAR IN SOCIAL PSYCHOLOGY 3 cr. (3 and 0)

A topical seminar on current theory and research in a selected subject area of social psychology. The specific seminar topic will change from semesterto-semester. Topics will be announced prior to each semester's registration. *Prerequisite:* Psych 201, 302, and permission of instructor.

PSYCH 497 DIRECTED STUDIES IN PSYCHOLOGY 2 cr. (2 and 0)

Study of a particular topic area in psychology under the direction of a faculty member. Specific program is to be organized by the student and faculty member and submitted to the department head for approval. May be repeated for a maximum of four credits. *Prerequisite:* Psych 363 and permission of instructor.

PSYCH 499, 699 CURRENT ISSUES IN PSYCHOLOGY 3 cr. (3 and 0) Reading and discussion of research being published in current psychological and related journals. For advanced psychology students. *Prerequisite:* Psych 201, 363, or permission of instructor.

Recreation and Park Administration

Professors: H. Brantley, Head; L. W. Gahan, G. E. Howard, R. W. McLellan, J. L. Stevenson

Associate Professors: R. M. Frye, H. J. Grove, C. R. White, Jr.

Assistant Professors: G. R. Boettner, R. A. Conover, Jr., A. E. James, B. E. Trent, M. H. Wynn

Instructors: C. P. Kriese, E. A. Merrell, Jr., C. E. Poteat

Lecturer: J. R. Pope, Jr.

Visiting Instructors: M. K. King, P. R. Saunders

RPA 101 INTRODUCTION TO LEISURE SERVICES 3 cr. (3 and 0)

Introduces recreation professions and organizations: government, voluntary, and commercial. Overviews professional preparation. Outlines development of man's uses of leisure and evolution of recreation, city parks, natural resources conservation and preservation movements as philosophical forces affecting leisure services.

RPA 102 ISSUES IN LEISURE SERVICES 3 cr. (3 and 0)

Considers current trends, problems, laws, and issues affected by and/or affecting recreation in America. *Prerequisite:* RPA 101 or permission of instructor.

RPA 203 PERSONAL AND COMMUNITY HEALTH 3 cr. (3 and 0)

The course deals with health problems, disease prevention and control, school health practices, public health administration, and other health information which may enable one to live intelligently in today's complex society.

RPA 204 SPORTS IN RECREATION 3 cr. (2 and 3)

Administrative and supervisory skills indigenous to public and/or private agency athletic programs are considered. Group instruction is given in individual and team sports and officiating techniques applicable to these sports are taught. RPA 205 LEISURE PROGRAMS I 3 cr. (2 and 3)

Principles and methods of program development. Time and facility utilization for sports activities, social functions, arts and crafts, outdoor activities, hobbies or special-interest groups, and activities in the cultural and performing arts will be pursued. *Prerequisite:* RPA 101.

RPA 206 LEISURE PROGRAMS II 1 cr. (0 and 3)

Provides the opportunity for a student to conduct a recreation program in a supervised setting. A minimum of 160 hours with a leisure service agency approved by the University is required. *Prerequisite:* RPA 205, Sophomore standing in Recreation and Park Administration.

RPA 207 LEISURE PROGRAMS III 1 cr. (0 and 3)

Continuation of RPA 206. Experience will be gained in a leisure situation different from the RPA 206 exposure. *Prerequisite:* RPA 205, Sophomore standing in Recreation and Park Administration.

RPA 300 HISTORY AND PHILOSOPHY OF RECREATION SERVICE AGENCIES 3 cr. (3 and 0)

A comprehensive study of the history and philosophy of recreation service agencies that includes recreation programs as an integral part of their purposes and objectives. Course includes such agencies as the Boy Scouts, Girl Scouts, YMCA, YWCA, Red Cross, boys' clubs, girls' clubs, college unions, and others.

RPA 302 CAMP ORGANIZATION AND ADMINISTRATION 3 cr. (2 and 3)

Surveys the development and trends of camping in America. Considers programming for the operations of agency and private camps. Enables student to master the techniques of group living. Laboratory offers practical experience in camp craft including trips and outdoor cooking.

RPA 307 PARK MAINTENANCE AND OPERATION 3 cr. (2 and 3)

Maintenance techniques and materials. Job planning and scheduling problems of overuse and preventive maintenance are included.

RPA 308 LEADERSHIP AND GROUP PROCESSES IN RECREATION 3 cr. (3 and 0)

Leadership is analyzed through experience-based learning. Various styles of leadership and communication and their probable consequences are examined. Techniques for planning of large and small group meetings are considered. Examination is made of literature in the field of leadership and group processes.

RPA 311 THERAPEUTIC RECREATION 3 cr. (3 and 0)

Examination of the profession of therapeutic recreation by analyzing the history, philosophy, concepts, roles, and functions involved in therapeutic recreation services.

RPA 320 RECREATION POLICYMAKING 3 cr. (3 and 0)

Structures and processes for public park and/or recreation policy formation in the United States. *Prerequisite:* Pol Sc 101 or permission of instructor.

RPA 321 RECREATION ADMINISTRATION 3 cr. (3 and 0)

An analysis of the internal organization of a recreation department dealing with finances and accounting; records and reports; publicity and public relations; state and federal legislation; staff organization; coordination of community resources. *Prerequisite:* Junior standing.

RPA 330 INTRODUCTION TO ENVIRONMENTAL INTERPRETATION 3 cr. (3 and 0)

An introduction to the philosophy and principles of the art of environmental interpretation. A comprehensive survey of interpretive theory as it applies to the recreation and parks practitioner and the varying settings within the profession.

RPA 390 SPECIAL PROJECTS IN RECREATION AND PARKS 1 cr. (1 and 0)

Comprehensive studies and investigation of special topics not covered in other courses. Emphasis will be placed on field studies, community service, and independent readings. May be repeated for a maximum of 3 credits. *Prerequisite:* Junior standing and permission of instructor.

RPA 400, 600 SUPERVISION OF RECREATION PERSONNEL

PATTERNS AND PROCESSES 3 cr. (3 and 0)

A comprehensive study of the supervisory process in relation to individuals, programs, and groups in recreation agencies. *Prerequisite:* IM 307, RPA 308, or permission of instructor.

RPA 403 ELEMENTS OF RECREATION AND PARK PLANNING 3 cr. (2 and 3)

Basic recreation and park planning principles and processes, trends in area and facility development combine to form the basis for formulation of a relevant knowledge and philosophy of planning. *Prerequisite:* Senior standing.

RPA 405 FIELD TRAINING IN RECREATION 8 cr. (0 and 24)

The student, in a ten-week program, has the opportunity to observe recreation programs in operation. The student will also have responsibilities of organizing and conducting activities under supervision. Maintenance and operation of facilities will be observed and practiced. Total of 360 hours required. *Prerequisite:* Senior standing in Recreation and Park Administration and 2.0 grade-point ratio.

RPA 409 METHODS OF RECREATION RESEARCH I 3 cr. (3 and 0)

An analysis of the principle methods of recreation research, the application of descriptive statistics to recreation research, and the development of a research proposal. *Prerequisite:* Senior standing and permission of instructor.

RPA 410 METHODS OF RECREATION RESEARCH II 3 cr. (3 and 0)

A continuation of RPA 409 to include the supervised execution and reporting of the results of the research proposal developed in RPA 409 and the application of inferential statistics to recreation research. *Prerequisite:* RPA 409 or permission of instructor.

RPA 411, 611 THERAPEUTIC RECREATION FOR SELECTED POPULATIONS 3 cr. (2 and 3)

Therapeutic recreation services for the mentally retarded, aging, and incarcerated populations. Emphasis is directed to planning services appropriate to the needs of clients and to the goals of the various agencies and institutions. *Prerequisite:* RPA 311 or permission of instructor. RPA 412, 612 THERAPEUTIC RECREATION AND MENTAL HEALTH 3 cr. (3 and 0)

Therapeutic recreation services in mental health clinics, institutions, and outdoor settings. Review of disorders and current modes of treatment as they relate to therapeutic recreation. *Prerequisite:* RPA 311 or permission of instructor.

RPA 413, 613 THERAPEUTIC RECREATION FOR PHYSICALLY DISABLED 3 cr. (2 and 3)

Examination of the potential psychological, physical, and sociological implications of disability to the individual and to the planning and direction of therapeutic recreation services. *Prerequisite:* RPA 311 or permission of instructor.

RPA 421, 621 RECREATION FINANCIAL RESOURCES MANAGEMENT 3 cr. (3 and 0)

Analysis of recreation financial resources management. Deals with revenue sources and their allocation. *Prerequisite:* RPA 321 and Senior standing in Recreation and Park Administration.

RPA 431, 631 METHODS OF ENVIRONMENTAL INTERPRETATION 3 cr. (2 and 3)

Practice and instruction in the use of equipment and methods available to the interpreter in public contact work. Coaching in presentation and evaluation of live programs and in design, execution, and evaluation of mediated programs will be the major emphasis. Programs will be delivered to public audiences in the Clemson area. *Prerequisite:* RPA 330, Senior standing in Recreation and Park Administration, or permission of instructor.

RPA 432, 632 HISTORIC SITE INTERPRETATION 3 cr. (3 and 0)

The development and implementation of the specialized interpretive programs required at historic sites. An overview of the historic movement in the United States and its presentation to the American people. *Prerequisite:* RPA 330.

RPA 433, 633 INTRODUCTION TO MUSEOLOGY 3 cr. (2 and 3)

An introduction to the museum concept with insight into current museum practices. Course will include principles and methods of museum practice including conservation/restoration techniques. *Prerequisite*: RPA 330.

RPA 441, 641 COMMERCIAL RECREATION 3 cr. (3 and 0)

Components of offering leisure services and products to the public by individuals, partnerships, and corporations for the purpose of making a profit.

RPA 442, 642 TOURISM 3 cr. (3 and 0)

A survey of travel and tourism in the United States with focus on terminology, demographics, financial significance, and trends. *Prerequisite:* RPA 441.

RPA 701 PHILOSOPHICAL FOUNDATIONS OF RECREATION AND PARK ADMINISTRATION 3 cr. (3 and 0)

RPA 702 GROUP PROCESSES IN LEISURE SERVICES 3 cr. (3 and 0)

RPA 703 SEMINAR IN RECREATION AND PARK ADMINISTRATION 3 cr. (3 and 0)

- RPA 704 COMPREHENSIVE RECREATION PLANNING 3 cr. (3 and 0)
- RPA 705 RECREATIONAL ASPECTS OF WATER RESOURCES 3 cr. (3 and 0)
- RPA 706 URBAN RECREATION ANALYSIS 3 cr. (3 and 0)
- RPA 707 PRINCIPLES OF ENVIRONMENTAL INTERPRETATION 3 cr. (3 and 0)
- RPA 708 SELECTED TOPICS 3 cr. (3 and 0)
- RPA 709 SPECIAL PROBLEMS 1-3 cr. (1-3 and 0)
- RPA 710 CURRENT ISSUES IN RECREATION 1 cr. (1 and 0)

Religion

Assistant Professors: L. J. Greenspoon, C. H. Lippy, D. F. White, Jr.

REL 300 NATURE AND FORMS OF RELIGIOUS EXPERIENCES 3 cr. (3 and 0)

The variety of religious experience and expression in human life.

REL 301 THE OLD TESTAMENT 3 cr. (3 and 0)

A survey of books of the Old Testament with special consideration given to the development of the concepts, institutions, and theology of the ancient Hebrews.

REL 302 A SURVEY OF NEW TESTAMENT LITERATURE 3 cr. (3 and 0)

A study of the books of the New Testament from the standpoint of their occasion, content, literary form, and basic theology.

REL 308 RELIGIONS OF THE ANCIENT WORLD 3 cr. (3 and 0)

Selected religious movements in ancient Mesopotamia, Egypt, Canaan, and the Greco-Roman world with emphasis on movements outside of the Judaeo-Christian tradition.

REL 309 ORIENTAL PHILOSOPHIES AND RELIGIONS 3 cr. (3 and 0) A study of the philosophical and religious teachings of Hinduism, Buddhism, Confucianism, and Taoism.

REL 310 RELIGION IN THE UNITED STATES 3 cr. (3 and 0)

The development of religion in the United States from the Colonial period to the 20th century. Attention will be devoted to analyzing broad currents in religious movements and religious thought which have given shape to the American pluralistic experience.

Rural Sociology

Professors: J. E. Faris, Head; E. L. McLean Assistant Professor: T. A. Lyson

RS 301 RURAL SOCIOLOGY 3 cr. (3 and 0) F, S

A study of human social relationships as influenced by life in the open country and in small towns and villages including considerations of the rural population, rural social institutions, processes of change in agricultural technology, and community area planning and development.

RS 359, 659 THE COMMUNITY 3 cr. (3 and 0) F

An examination of the sociological aspects of contemporary communities and of their growth and development. The structural relations of social class, status and power and the relationships among social institutions within the community are examined. Emphasis is placed on the organization and development of communities in a constantly changing environment.

RS 401, 601 HUMAN ECOLOGY 3 cr. (3 and 0)

Analysis of the interrelationships between man and his natural and manmade environments; study of settlement patterns, social organization, and institutions of human populations. Special emphasis will be given to interdependence of natural resources, human resources, and man-land relationships. *Prerequisite:* Permission of instructor.

RS 881 SPECIAL PROBLEMS IN RURAL SOCIAL RESEARCH 3 cr. (3 and 0)

Russian

Lecturer: L. A. Savitsky

RUSS 101, H101 ELEMENTARY RUSSIAN 4 cr. (3 and 1)

Training in pronunciation, grammatical forms, and syntax with a view to giving the student the fundamentals necessary to read simple Russian texts. Three hours a week classroom instruction and one hour a week in the language laboratory.

RUSS 102, H102 ELEMENTARY RUSSIAN 4 cr. (3 and 1)

A continuation of Russ 101; three hours a week classroom instruction and one hour a week in the language laboratory. *Prerequisite:* Russ 101.

RUSS 201, H201 INTERMEDIATE RUSSIAN 3 cr. (3 and 0)

The reading of simple Russian prose; a review of grammar and syntax. Drill on vocabulary and idiom. *Prerequisite:* Russ 101, 102.

RUSS 202, H202 INTERMEDIATE RUSSIAN 3 cr. (3 and 0) A continuation of Russ 201. *Prerequisite:* Russ 201.

RUSS 303 SURVEY OF RUSSIAN LITERATURE I 3 cr. (3 and 0)

Literary movements and authors from the beginning to 1850. Prerequisite: Russ 201, 202.

RUSS 304 SURVEY OF RUSSIAN LITERATURE II 3 cr. (3 and 0) Literary movements and authors from 1850 to the present. *Prerequisite:* Russ 201, 202.

Safety and Health

Professor: C. R. Smith

Visiting Assistant Professor: L. D. S. Ramsay Visiting Instructor: P. F. Petersen

SH 201 SCOPE OF OCCUPATIONAL SAFETY AND HEALTH 3 cr. (3 and 0)

Safety history, supervisor safety, and the Occupational Safety and Health Acts requirements of general industry.

SH 301 INDUSTRIAL ACCIDENT PREVENTION AND LOSS CONTROL I 3 cr. (3 and 0)

Philosophies and techniques involved in development of accident prevention and loss control methods, procedures, and programs. The principles and concepts relating to the identification, appraisal, and correction of accident and loss-producing conditions.

SH 302 INDUSTRIAL ACCIDENT PREVENTION AND LOSS CONTROL II 3 cr. (3 and 0)

A continuation of SH 301. Technical aspects of industrial accident prevention and loss control. *Prerequisite:* SH 301 or permission of instructor.

SH 303 INDUSTRIAL HEALTH MANAGEMENT 3 cr. (3 and 0)

Appraisal of environmental health hazards, sampling techniques, instrumentation and analytical methods; noise control, radiation control, toxicology, and ecology of industrial diseases. *Prerequisite:* SH 301, 302, or permission of instructor.

SH 401 FIRE PROTECTION AND PREVENTION 3 cr. (3 and 0)

Analysis of fire safety problems; design of adequate protection and prevention measures; concentration in the areas of construction, occupancy, exposure, and protection as they apply to the industrial environment. *Prerequisite:* SH 301, 302.

SH 404 INDUSTRIAL SAFETY MANAGEMENT 3 cr. (3 and 0)

Safety as a real part of the production process; the safety programs effect on costs, quality, profits, policy, accountability, safety training, and safety motivation. *Prerequisite:* SH 303, 401.

SH 410 SAFETY IN BUILDING CONSTRUCTION 3 cr. (3 and 0)

The fundamentals of accident prevention and the Occupational Safety and Health Act as they apply to the planning, design, and construction stages of construction projects.

Sociology

Professors: F. A. Burtner, J. E. Lowe, Jr.

Associate Professors: K. W. Crader, R. J. Knapp

Assistant Professors: O. R. Cunningham, H. M. Fleishman, C. A. Hope, D. D. Owens, Ir., L. G. Peppers, C. M. Sieverdes, R. G. Stover

Instructors: G. M. James,* J. D. Wells

Visiting Instructor: S. S. Brown

SOC 201 THE SOCIOLOGICAL PERSPECTIVE 3 cr. (3 and 0)

An introduction to the sociological perspective; study of contemporary society from the perspective of social structure and social behavior. Not open to students with credit for Soc 204.

SOC 202 SOCIAL PROBLEMS 3 cr. (3 and 0)

A survey of major social problems in the contemporary United States.

SOC 204 SOCIAL ORGANIZATION 3 cr. (3 and 0)

An introduction to the discipline and profession of sociology; emphasis on the problem of order, the central theme in sociology. First required course for Sociology majors.

SOC 206 INTRODUCTION TO METHODS OF SOCIOLOGICAL RESEARCH 3 cr. (3 and 0)

An introduction to the use of scientific methods in sociology, their purpose, and limitations; the relationship between theory and research; research design, sampling, measurement, reliability, and validity. Required of all Sociology majors. *Prerequisite:* Soc 201 or 204.

SOC 208 ELEMENTS OF SOCIOLOGICAL THEORY 3 cr. (2 and 2) Elements of sociological theory with emphasis upon contemporary theoretical perspectives and the construction and verification of theoretical models. Laboratory exercises in model building and theory construction. Required of all Sociology majors. *Prerequisite*: Soc 201 or 204.

SOC 302 INTRODUCTION TO SOCIAL SERVICES 3 cr. (3 and 0)

An introduction to the social service fields and profession; emphasis on socio-cultural factors affecting the development of social services. *Prerequisite:* Soc 201 or 204.

SOC 304 SOCIAL SERVICE DELIVERY SYSTEMS 3 cr. (3 and 0)

Fundamental elements of an integrated approach to social service practice by means of various delivery systems. *Prerequisite:* Soc 302.

SOC 305 SOCIOLOGICAL APPROACH TO LAW ENFORCEMENT 3 cr. (3 and 0)

A sociological analysis of contemporary law enforcement in the overall criminal justice process. *Prerequisite:* Soc 201 or 204.

SOC 309 MARRIAGE AND FAMILY RELATIONS 3 cr. (3 and 0)

An examination of courtship, marriage and family development in America; the problems and alternative forms of marriage and family in contemporary American society. *Prerequisite:* Soc 201 or 204.

SOC 311 THE FAMILY 3 cr. (3 and 0)

A cross-cultural analysis of the family as a basic social institution; the history, structure, and functions of the family in various cultures; effects of social change on the family. *Prerequisite:* Soc 201 or 204.

°On leave.

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SOC 321 INTRODUCTORY ANTHROPOLOGY 3 cr. (3 and 0)

Man as a biosocial animal, including theory of evolution and archaeological evidence of physical and cultural development, with emphasis on the relation of man to the environment. *Prerequisite:* Soc 201 or 204.

SOC 322 CULTURAL ANTHROPOLOGY 3 cr. (3 and 0)

The general nature of human culture; emphasis on the constants and variants in human behavior affecting technology, social relations, social control, family systems, language, religion, and art. *Prerequisite:* Soc 201 or 204.

SOC 324 SOCIAL AND CULTURAL CHANGE 3 cr. (3 and 0)

An examination of theory and research on the processes of change; factors inducing or inhibiting change; the character, mechanisms, rate, extent, direction, and relative stabilization of change at different levels of social phenomena. *Prerequisite:* Soc 201 or 204.

SOC 331 URBAN SOCIOLOGY 3 cr. (3 and 0)

A study of urbanization as a social process and related changes in such areas as work, family structure, social mobility, and lifestyle; analysis of the problems confronting contemporary urban man and how these problems might be resolved in the future; special consideration of changing technology and development of cities in the future. *Prerequisite:* Soc 201 or 204.

SOC 341 POPULATION AND SOCIETY 3 cr. (3 and 0)

A study of the social, economic, and political consequences of population structure and change; illustrations from developing countries, less developed regions, and the United States; discussion of theories of growth, migration, fertility, and mortality; problems of food and resources; population goals and policies. *Prerequisite:* Soc 201 or 204.

SOC 343 SOCIOLOGY OF DEATH 3 cr. (3 and 0)

The sociological study of death and dying as social processes; concerned with how various aspects of death are defined and with plans of action which man develops to guide him as he confronts death. Topics will include bereavement, death as social behavior, attitudes toward death, suicide, euthanasia, etc. *Prerequisite:* Soc 201 or 204.

SOC 351 INDUSTRIAL SOCIOLOGY 3 cr. (3 and 0)

Industry as a social organization; the factory as a social system; personality in industrial relations; power groupings within industry; industry and the community. *Prerequisite:* Soc 201 or 204.

SOC 361 COLLECTIVE BEHAVIOR 3 cr. (3 and 0)

Spontaneous, transitory and sporadic group behavior: crowds, panics, riots, fads, and social movements. *Prerequisite:* Soc 201 or 204.

SOC 381 SOCIALIZATION AND INTERPERSONAL BEHAVIOR 3 cr. (3 and 0)

The effects of society upon interpersonal behavior; topics include socialization, self-concept, attitude formation and change, interpersonal attraction, and social power and influence. *Prerequisite:* Soc 201 or 204.

SOC 391 SOCIOLOGY OF DEVIANT BEHAVIOR 3 cr. (3 and 0)

Analysis of advanced theory and research on the social processes by which behavior becomes defined as deviant, the conditions promoting such behavior, and the career patterns of deviant persons. *Prerequisite:* Soc 201 or 204.

SOC 393 CRIME IN SOCIETY 3 cr. (3 and 0)

The nature, extent, and causes of criminal behavior; societal attempts to control crime; social responses to crime, criminals, and the criminal justice system. *Prerequisite:* Soc 201 or 204.

SOC 405 COMMUNITY DEVELOPMENT 3 cr. (3 and 0)

Community development as a planning process involving decision-making, problem solving, and goal achievement. *Prerequisite:* Soc 201 or 204.

SOC 420 ADVANCED RESEARCH METHODS 3 cr. (2 and 3)

Advanced analysis of scientific methods in social research; consideration of various techniques, methodological approaches, and research designs; laboratory experience in various phases of research. *Prerequisite:* Soc 201 or 204; 206, 208.

SOC 421, 621 CONTEMPORARY SOCIOLOGICAL THEORY 3 cr. (3 and 0)

A survey of the development of sociological theory in the twentieth century. *Prerequisite:* Soc 201 or 204; 206, 208.

SOC 431, 631 APPLIED ORGANIZATIONAL SOCIOLOGY 3 cr. (3 and 0)

The analysis of administrative organizations and voluntary associations; applied analysis of their formal and informal group relations, communications, and effectiveness. *Prerequisite:* Soc 201 or 204.

SOC 433 SOCIOLOGY OF AGING 3 cr. (3 and 0)

Theories of aging and the social impact of aging populations on social institutions such as schools, retirement systems, pensions, and the like are considered. Alternative systems to those in practice are considered along with special problems of early retirement. *Prerequisite:* Soc 201 or 204.

SOC 441 SOCIAL STRATIFICATION 3 cr. (3 and 0)

Class, status and power in society; class differences in behavior, values, social mobility. *Prerequisite:* Soc 201 or 204.

SOC 443 RELIGION IN SOCIETY 3 cr. (3 and 0)

A sociological analysis of religious systems and movements and their impacts on social institutions. *Prerequisite:* Soc 201 or 204.

SOC 451, 651 SOCIOLOGY OF HEALTH AND ILLNESS 3 cr.

(3 and 0)

Socio-biological factors relating to the origin, prevention, and treatment of illness; an examination of the organization of health-care delivery systems. *Prerequisite:* Soc 201 or 204.

SOC 461 SOCIOLOGY OF SEX ROLES 3 cr. (3 and 0)

Analysis of female and male socialization, statuses, roles, and opportunities in the major institutions of contemporary society, with cross-cultural comparisons; consideration of demographic, technological, and social developments likely to affect the sex roles of the future. *Prerequisite:* Soc 201 or 204.

SOC 481 RACIAL AND ETHNIC RELATIONS 3 cr. (3 and 0)

The study of the problem of racial and ethnic groups in adjusting to American society. The nature and causes of prejudice and discrimination. Programs for the reduction of intergroup tensions and conflicts are evaluated in the light of observed facts and sociological principles. *Prerequisite:* Soc 201 or 204.

SOC 490 REHABILITATION SYSTEMS FOR CRIMINAL OFFENDERS 3 cr. (3 and 0)

An introduction to and analysis of the problems of society in dealing with the incarceration, punishment, rehabilitation, and reintegration into society of persons handled by the criminal justice system. Course covers historical, philosophical and legal framework of institutions, probation, parole, and comparative rehabilitative efforts. *Prerequisite:* Soc 201 or 204.

SOC 492 JUVENILE DELINQUENCY 3 cr. (3 and 0)

A detailed study of deviance and delinquency among juveniles; major emphasis upon factors affecting juvenile behavior and societal reactions to delinquency. *Prerequisite:* Soc 201 or 204.

SOC 494 LAW AND SOCIETY 3 cr. (3 and 0)

The manner in which law, as a means of social control, has developed in society and the effect it has on other social institutions. The relationship of law to crime and deviancy. The proliferation and emergence of law as central to social organization in modern societies. *Prerequisite:* Soc 201 or 204.

SOC 495 FIELD EXPERIENCE 3 cr. (1 and 8)

Students participate in selected field placements under supervision for eight hours weekly and in a one-hour seminar per week. May be repeated for a maximum of six credits. *Prerequisite:* Fifteen hours of sociology including Soc 204, 206, 208, and permission of department head.

SOC 498 INDEPENDENT STUDY 3 cr. (1 and 6)

Individual readings or projects in sociological areas not covered in other courses. A written proposal must be approved by the instructor directing the work and by the department head prior to registration. *Prerequisite:* Permission of department head.

SOC 499 SEMINAR IN SELECTED TOPICS IN CONTEMPORARY SOCIOLOGY 3 cr. (3 and 0)

Sociological areas of current interest will be explored. May be repeated by special arrangement for a maximum of six credits. *Prerequisite:* Permission of department head.

Spanish

Associate Professor: G. J. Fernandez

Assistant Professors: B. G. Durham, S. C. King, R. F. Mixon, P. F. Parrado, L. E. Seamon, M. M. Sinka,^o J. M. Whitmire

Instructor: L. T. Perry

Lecturer: E. G. Fernandez

SPAN 101, H101 ELEMENTARY SPANISH 4 cr. (3 and 1)

A course for beginners in which the essentials of grammar are taught and a foundation is provided for a conversational and reading knowledge of the language. Three hours a week of classroom instruction and one hour a week in the language laboratory.

SPAN 102, H102 ELEMENTARY SPANISH 4 cr. (3 and 1)

A continuation of Span 101; three hours a week of classroom instruction and one hour a week in the language laboratory.

^oOn leave.

SPAN 201, H201 INTERMEDIATE SPANISH 3 cr. (3 and 0)

Grammar, vocabulary, and idioms; conversation, composition, and translation. *Prerequisite:* Span 102.

SPAN 202, H202 INTERMEDIATE SPANISH 3 cr. (3 and 0)

Introduction to Spanish literature: representative short stories, essays, novels, poetry, and plays. *Prerequisite:* Span 201.

SPAN 205 ELEMENTARY SPANISH CONVERSATION AND COMPOSITION 3 cr. (3 and 0)

Intensive oral and written training in Spanish through conversation groups, speeches, written compositions, and controlled vocabulary acquisition. Required of all Spanish majors and minors. May be taken concurrently with Span 202, 303, or 310. *Prerequisite:* Span 201.

SPAN 299 FOREIGN LANGUAGE DRAMA LABORATORY 1 cr. (0 and 3)

Participation in foreign language drama productions. No formal class meetings, but an average of three hours per week in a foreign language drama workshop for production. May be repeated for a total of three semester credits. *Prerequisite:* Permission of instructor directing the play.

SPAN 303 SURVEY OF SPANISH LITERATURE I 3 cr. (3 and 0)

Literary movements, influences, and authors from the beginnings to the end of the seventeenth century. Representative works, discussions. Required of Spanish majors. *Prerequisite:* Span 201, 202.

SPAN 304 SURVEY OF SPANISH LITERATURE II 3 cr. (3 and 0)

Literary movements, influences, and authors from the eighteenth century to the present. Required of Spanish majors. *Prerequisite:* Span 201, 202.

SPAN 305 INTERMEDIATE SPANISH CONVERSATION AND COMPOSITION I 3 cr. (3 and 0)

Practice in spoken Spanish with emphasis on vocabulary, pronunciation, intonation, and comprehension. Some written work to increase accuracy. Assignments in the language laboratory. *Prerequisite:* Span 205.

SPAN 306 INTERMEDIATE SPANISH CONVERSATION AND COMPOSITION II 3 cr. (3 and 0)

A continuation of Span 305 with more emphasis on written Spanish. *Pre-requisite:* Span 305 or permission of the Head of the Department of Languages.

SPAN 307 SPANISH CIVILIZATION 3 cr. (3 and 0)

A study of the significant aspects of the culture of Spain from its origins to the present. *Prerequisite:* Span 202 or permission of the Head of the Department of Languages.

SPAN 308 SPANISH-AMERICAN CIVILIZATION 3 cr. (3 and 0)

A study of the significant aspects of the culture of Spanish-American countries from the pre-Colonial period to the present. *Prerequisite:* Span 202 or permission of the Head of the Department of Languages.

SPAN 310 SURVEY OF SPANISH-AMERICAN LITERATURE I 3 cr. (3 and 0)

A study of Spanish-American literature from the Colonial period to Modernism. *Prerequisite:* Span 202 or permission of the Head of the Department of Languages.

SPAN 311 SURVEY OF SPANISH-AMERICAN LITERATURE II 3 cr. (3 and 0)

Literary movements, influences, authors, and works from Modernism to the present. *Prerequisite:* Span 202 or permission of the Head of the Department of Languages.

SPAN 401 MODERN SPANISH LITERATURE 3 cr. (3 and 0)

The generation of 1898 to the Civil War: Readings from Unamuno, Azorin, Valle-Inclan, Antonio Machado, Ortega y Gasset, Garcia Lorca, and Alejandro Casona. *Prerequisite:* Span 303, 304, 310, or 311.

SPAN 402 CONTEMPORARY SPANISH LITERATURE 3 cr. (3 and 0) Spanish literature from the Civil War reconstruction period to the present with emphasis on the contemporary novel and theatre. *Prerequisite:* Span 303, 304, 310, or 311.

SPAN 405 NINETEENTH CENTURY SPANISH LITERATURE 3 cr. (3 and 0)

Representative authors and movements of the nineteenth century; Romanticism, *costumbrismo*, and the regional novel. *Prerequisite:* Span 303, 304, 310, or 311.

SPAN 406 CERVANTES AND THE GOLDEN AGE 3 cr. (3 and 0) A study of Cervantes, the picaresque novel, and other representative prose

works of the Spanish Golden Age. Prerequisite: Span 303, 304, 310, or 311.

SPAN 407 GOLDEN AGE DRAMA AND POETRY 3 cr. (3 and 0)

Representative poets and dramatists of the Spanish Golden Age: emphasis on Lope, Tirso, Calderon, Garcilaso de la Vega, Luis de Leon, and San Juan de la Cruz. *Prerequisite:* Span 303, 304, 310, or 311.

SPAN 409 ADVANCED GRAMMAR AND CONVERSATION 3 cr. (3 and 0)

An intensive study of syntax and stylistics through composition and translations. Intensive practice in spoken Spanish. *Prerequisite:* Senior standing or permission of the Head of the Department of Languages.

SPAN 421 THE SPANISH-AMERICAN NOVEL 3 cr. (3 and 0)

A study of the Spanish-American novel from its beginning to the 1940's. Prerequisite: Span 303, 304, 310, or 311.

SPAN 422 THE CONTEMPORARY SPANISH-AMERICAN NOVEL 3 cr. (3 and 0)

New trends in the development of the Spanish-American novel from the 1940's to the present. *Prerequisite:* Span 303, 304, 310, or 311.

SPAN 498 INDEPENDENT STUDY 1-3 cr. (1-3 and 0)

Independent indepth study of selected topics in Spanish literature. May be repeated for a maximum of six credits. *Prerequisite:* Permission of the Head of the Department of Languages.

Systems Engineering

Professors: J. A. Chisman, J. C. Martin

Associate Professors: T. E. Burke, R. M. Harnett, E. L. Thomas, Jr., Director Assistant Professor: E. R. Baker IV

SE 450, 650 INTRODUCTION TO SYSTEMS ENGINEERING 3 cr. (3 and 0)

Definition of systems engineering, fundamental concepts of systems engineering, subsystems, environments for systems, microscopic aspects of systems. Problem definitions of technical and economic environment, theory of value and needs and decision making are studied. *Prerequisite:* Math 206 and 301 or equivalent, or permission of instructor.

SE 452, 652 RELIABILITY ENGINEERING 3 cr. (3 and 0)

A probabilistic approach to assessing system reliability. Methods for analyzing serial, parallel, and complex systems include decomposition and cut-set analysis. Reliability life testing and its acceleration are covered. Essential elements of maintainability are identified and related to system availability. *Prerequisite:* Math 301 or permission of instructor.

SE 480, 680 INTRODUCTION TO METHODS OF OPERATIONS RESEARCH 3 cr. (3 and 0)

Methods and applications of selected topics from operations research. Topics include linear programming, nonlinear programming, dynamic programming, queuing theory, Markov processes, and simulation. *Prerequisite:* Math 206 and 301 or equivalent, or permission of instructor.

SE 481, 681 LINEAR METHODS OF OPERATIONS RESEARCH AND APPLICATIONS 3 cr. (3 and 0)

Methods and applications of methods for solving linear problems in operations research. Topics include primal and dual simplex algorithms, revised simplex algorithm, sensitivity analysis, decomposition and partitioning, transportation and assignment problems, network analysis, and goal programming. *Prerequisite:* SE 480 or equivalent or permission of instructor.

SE 484, 684 ENGINEERING ECONOMIC ANALYSIS 3 cr. (3 and 0) Basic principles and techniques of economic analysis of engineering projects. Consideration of time value of money, short- and long-term investments, replacement analysis, depreciation methods, cost allocation and measures of cost effectiveness. *Prerequisite:* Senior standing in Engineering or permission of instructor.

SE 486, 686 WORK-FLOW SYSTEMS AND CONTROL 3 cr. (3 and 0)

Fundamentals underlying the determination of production capacity requirements, economic lot sizes, and the regulation of flow and storage of materials to, within, and from the production system. Elements of forecasting, determination of materials requirements, scheduling, inventory control, etc. Consideration of data processing methods. *Prerequisite:* Math 301, permission of instructor.

SE 803 ENGINEERING OPTIMIZATION AND APPLICATIONS 3 cr. (3 and 0)

SE 804 ADVANCED PHYSICAL SYSTEMS ANALYSIS 3 cr. (3 and 0)

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- SE 807 DISCRETE SYSTEMS SIMULATION 3 cr. (3 and 0)
- SE 808 CONTINUOUS SYSTEMS SIMULATION 3 cr. (3 and 0)
- SE 860 DYNAMIC PROGRAMMING 3 cr. (3 and 0)
- SE 885 DESIGN AND ANALYSIS OF SIMULATION MODELS 3 cr. (3 and 0)
- SE 886 OPERATIONS RESEARCH IN PRODUCTION CONTROL 3 cr. (3 and 0)
- SE 888 APPLIED QUEUING THEORY AND MARKOV PROCESSES 3 cr. (3 and 0)
- SE 890 SPECIAL TOPICS IN SYSTEMS ENGINEERING 1-6 cr. (1-6 and 0)
- SE 891 MASTER'S RESEARCH. Credit to be arranged.

SE 895 SYSTEMS ENGINEERING SEMINAR 1 cr. (1 and 0)

SE 991 DOCTORAL RESEARCH. Credit to be arranged.

Textile Chemistry

Professors: R. H. Barker, E. S. Olson, J. J. Porter, C. W. Roberts Associate Professors: H. M. El-Behery, E. A. Vaughn, Head

Assistant Professors: M. J. Drews, J. D. Hatcher

TC 303 TEXTILE CHEMISTRY 3 cr. (3 and 0)

A study of the properties and reactions of aliphatic and aromatic organic compounds. Emphasis will be placed on mechanistic interpretations and the development of synthetic schemes leading to polyfunctional compounds of the types encountered in the textile industry. *Prerequisite:* Ch 102, Math 206.

TC 304 TEXTILE CHEMISTRY 3 cr. (3 and 0)

Fundamental principles of physical and organic chemistry with emphasis on areas frequently encountered in the textile industry including thermodynamics, kinetics, and solution properties. These concepts will be applied to the study of aliphatic organic compounds and organic reaction mechanisms. The basic principles of stereochemistry and conformational analysis will be developed. *Prerequisite:* TC 303.

TC 305 TEXTILE CHEMISTRY LABORATORY 1 cr. (0 and 3)

An introduction to the techniques used in the synthesis and characterization of organic compounds. To be taken concurrently with TC 303.

TC 306 TEXTILE CHEMISTRY LABORATORY 1 cr. (0 and 3)

The techniques used in the synthesis of organic compounds and the measurement of their physio-chemical properties. To be taken concurrently with TC 304.

TC 315, 615 INTRODUCTION TO POLYMER SCIENCE AND ENGINEERING 3 cr. (3 and 0)

The chemistry of monomers and polymers and the chemical and physical properties of polymers are discussed emphasizing fiber forming, synthetic polymers. Kinetics of polymerization, molecular characterization, structure, morphology, and mechanical properties of polymers are studied demonstrating design of polymer systems for end use in textiles. *Prerequisite:* Ch 201 and 330, Ch 224, TC 304, or permission of instructor.

TC 316, 616 CHEMICAL PREPARATION OF TEXTILES 3 cr. (2 and 3)

The chemicals used in the preparation of fabric for dyeing and finishing. Oxidizing and reducing agents and their control and effect on various fibers. Colloidal and surface active properties of various compounds and the fundamental factors influencing these properties.

TC 317 POLYMER AND FIBER LABORATORY 1 cr. (0 and 3)

High polymers, prepared from monomers, are characterized and spun to make fibers. Chemical and physical properties of fiber forming polymers are measured as functions of parameters critical to properties of textiles. To be taken concurrently with TC 315.

TC 457, 657 DYEING AND FINISHING I 3 cr. (3 and 0)

A study of the different classes of dyestuffs and the chemistry of their applications to different fibers. The theories, principles and mechanisms for the dyeing of textile fibers and fabrics will be presented as well as the reaction mechanisms of various finishing agents applied to different substrates. *Prerequisite:* TC 315.

TC 458, 658 DYEING AND FINISHING II 3 cr. (3 and 0)

The kinetics and equilibria of dyeing processes. The use of conductivity, diffusion and other methods useful for measuring absorption isotherms and dyeing rates and the general thermodynamic relationships applicable to dyeing operations. Fiber properties such as zeta potential, dye sites, relative amorphous area available will be included.

TC 459, 659 DYEING AND FINISHING LABORATORY I 1 cr. (0 and 3)

To be scheduled concurrently with TC 457. The course will introduce the student to common dyeing and printing methods and to some of the machinery necessary to carry out dyeing operations.

TC 460 DYEING AND FINISHING LABORATORY II 1 cr. (0 and 3) To be scheduled concurrently with TC 458. The course will cover finishing in addition to dyeing operations and their instrumental control.

TC 475, 675 CELLULOSE CHEMISTRY 2 cr. (2 and 0)

The organic chemistry of cellulose and its derivatives is developed from the basic principles of carbohydrate chemistry. Emphasis is placed in the substitution and degradation reactions which are of particular importance in textile applications. Fiber morphology is treated in relation to its effect on textile chemical processing. *Prerequisite:* TC 315 or permission of instructor.

- TC 811 POLYMER SCIENCE I 3 cr. (3 and 0)
- TC 812 POLYMER SCIENCE II 3 cr. (3 and 0)
- TC 821 CHEMISTRY OF NATURAL POLYMERS 3 cr. (3 and 0)
- TC 831 THE PHYSICAL CHEMISTRY OF DYEING 3 cr. (3 and 0)
- TC 891 MASTER'S RESEARCH. Credit to be arranged.

Textile Science and Textile Technology

Professors: T. D. Efland, J. C. Hubbard, Jr., D. W. Lyons, C. W. Roberts, F. T. Simon

Associate Professors: E. B. Berry, H. M. El-Behery, J. H. Marvin, Jr., E. A. Vaughn, Head

Assistant Professors: M. J. Drews, J. D. Hatcher

Visiting Instructor: R. L. Barker

TEXT 122 INTRODUCTION TO TEXTILES 2 cr. (1 and 3)

An introduction to the broad fields of textile, fiber and polymer science and engineering with emphasis on the description and formation of polymers, fibers, yarns, and fabrics including nonwoven structures and the dyeing, finishing, and chemistry and physics of textiles, fibers and polymers.

TEXT 301 FIBER PROCESSING I 3 cr. (2 and 2)

A study of fibrous materials and their relationship to the fiber processing systems. The objectives, theories, principles, and mechanisms of the machines used in the earlier stages of fiber processing. The course is directed primarily to the staple fiber processing systems. Mechanical and mathematical fundamentals are applied to the machines concerned.

TEXT 302 FIBER PROCESSING II 3 cr. (2 and 2)

Continuation of Text 301 emphasizing the later stages of fiber processing for the ultimate yarn strand. *Prerequisite:* Text 301.

TEXT 305 BASIC FIBERS 3 cr. (3 and 0)

A thorough survey of the origin, characteristics and properties of various textile fibers, both natural and man-made. The classification, identification, and the principal fields of applications will be studied.

TEXT 306 YARN FORMATION 3 cr. (3 and 0)

A fundamental study of the various systems of yarn formation from natural and man-made fibers and their blends. The course provides for the basic understanding of machines, theories and operations.

TEXT 311 FABRIC DEVELOPMENT I 3 cr. (2 and 2)

A study of the basic theory of the cam loom weaving machine. The principles of designs of the basic plain, twill, and sateen fabric, and other weaves such as the honeycomb, the mock leno, and the huckaback weave. Weave analysis and preparation of necessary drafts are included.

TEXT 312 FABRIC DEVELOPMENT II 3 cr. (2 and 2)

A study of the theory and operation of the dobby head, Knowles head, Staubli dobby, Jacquard head, and multicolor selection for the above looms. Weave design for compound fabrics using two or more systems of warp and filling threads for three dimensional weaves, weave analysis, and preparation drafts are covered. *Prerequisite:* Text 311.

TEXT 313 FABRIC FORMATION 3 cr. (3 and 0)

An examination of the theories involved in the assembly of fibers and yarns into fabrics. The application of design, analysis and production of woven, knitted and nonwoven fabrics. A brief survey of the fabric producing machines. TEXT 314 DYEING AND FINISHING 3 cr. (3 and 0)

The concepts of current procedures and future trends in the textile finishing industry are examined. The preparation of fabrics, dye processes and the application of various materials used in the finishing process are presented.

TEXT 321, 621 FIBER SCIENCE 3 cr. (2 and 2)

Fiber properties and the scientific evaluation of these properties. Dimensional, mechanical, optical, electrical, thermal, and moisture relationships are established and investigated.

TEXT 322, 622 PROPERTIES OF TEXTILE STRUCTURES 3 cr. (2 and 2)

Yarn and fabric properties, their scientific significance and analysis. Dimensional, structural, and mechanical interrelationships are established and evaluated.

TEXT 324 TEXTILE STATISTICS 3 cr. (3 and 0)

An introduction to statistics with particular application to the textile industry. Measures of central value and variation, probability, the normal curve, tests of hypotheses, elementary correlation and regression. *Prerequisite:* Junior standing.

TEXT 333 THE TEXTILE ARTS 3 cr. (2 and 3)

A survey of the textile arts from prehistoric times to the present with emphasis on the correlation between man's accomplishments in these arts and his progress from the simple tools of ancient origin to the automated systems currently employed in industry.

TEXT 403, 603 FIBER PROCESSING III 3 cr. (2 and 2)

The concepts of current fiber processing machines, techniques, practices, and their validity are investigated. Problems are assigned that require use of acquired knowledge, textile testing equipment, and processing machines. The relation of fibrous material properties and processing dynamics to the fiber assemblies produced is studied. *Prerequisite:* Text 301, 302.

TEXT 411, 611 FABRIC DEVELOPMENT III 3 cr. (2 and 2)

A study of specifications and loom details for the production of fabrics woven to the customer's order to include multicolor layouts. Warp and filling preparation are covered as well as size formulations and their methods of application. Warping and dressing plans are developed for the warper and the slasher. *Prerequisite:* Text 312.

TEXT 414 NONWOVEN AND KNITTED STRUCTURES 3 cr. (3 and 0)

A survey of nonwoven and knitted structures dealing with the principles and mechanisms involved. Various systems are covered with emphasis on yarn requirements and fabric properties.

TEXT 426, 626 INSTRUMENTATION 3 cr. (3 and 0)

The principles of industrial and process instrumentation and process control. Static and dynamic characteristics of measurement devices. Transducer techniques for measurement of physical properties such as pressure, temperature, flow, weight, etc. Principles of process controllers.

TEXT 428 TEXTILE RESEARCH 1-3 cr.

An original investigation of a problem in textile, fiber, or polymer science under the direct supervision of a faculty member. After completing his experimental work, the student prepares a formal, written report which he defends before the textile faculty. *Prerequisite:* Senior standing or permission of instructor.

TEXT 429 TEXTILE RESEARCH 1-3 cr. Same as Text 428.

TEXT 440, 640 COLOR SCIENCE 3 cr. (2 and 3)

The application of the science of color to industrial practice in textiles, plastics, paints, lighting, and ceramics. The laboratory work will be performed on modern instruments and computers.

TEXT 450 TEXTILES IN SPORTS AND RECREATION 3 cr. (3 and 0)

This course provides a basic understanding of the various types of fabrics used in athletic and recreational activities. Methods and procedures for the evaluation of fabric performance and properties as well as criteria for the selection and care of textile materials used in sports and recreational activities are provided.

TEXT 460, 660 TEXTILE PROCESSES 3 cr. (3 and 0)

Survey of machinery and processes of textile manufacturing from fiber formation through fabric finishing. For students with a nontextile background.

TEXT 475 TEXTILE MARKETING 3 cr. (3 and 0)

An examination of the activities involved in the distribution of textile products in today's market. Emphasis will be placed on the role of consumer research and the analysis of fashion in the design and promotion of textile products.

TEXT 821 FIBER PHYSICS 3 cr. (3 and 0)

TEXT 835 TEXTILE STRUCTURES 3 cr. (3 and 0)

TEXT 840 ADVANCED COLOR SCIENCE 3 cr. (2 and 3)

TEXT 866 FIBER FORMATION 3 cr. (3 and 0)

TEXT 870 ADVANCES IN TEXTILE MANUFACTURING 3 cr. (3 and 0)

TEXT 880 SELECTED TOPICS 3 cr. (3 and 0)

TEXT 891 MASTER'S RESEARCH. Credit to be arranged.

TEXT 991 DOCTORAL RESEARCH. Credit to be arranged.

Visual Studies

Professors: J. T. Acorn, Head; H. N. Cooledge, Jr., V. S. Hodges, R. H. Hunter Associate Professors: T. E. McPeak, I. G. Regnier, S. Wang

Assistant Professors: M. R. Hudson, J. B. Mulholland, J. A. Stockham, M. V. Vatalaro

VIS 203 VISUAL ARTS STUDIO 3 cr. (1 and 6)

Studio work in visual elements and their organization, form, line, texture, space, light, and color. Principles of design and formal organization of visual arts.

VIS 205 BEGINNING DRAWING 3 cr. (1 and 6)

Studio work in drawing and related media. *Prerequisite:* Arch 102, Vis 203, or permission of instructor.

VIS 207 BEGINNING PAINTING 3 cr. (1 and 6)

Studio work in painting and related media. *Prerequisite:* Arch 102, Vis 203, or permission of instructor.

VIS 209 BEGINNING SCULPTURE 3 cr. (1 and 6)

Studio work in sculpture and related media. *Prerequisite:* Arch 102, Vis 203, or permission of instructor.

VIS 211 BEGINNING PRINTMAKING 3 cr. (1 and 6)

Studio work in lithography, silk screen, woodcuts, and graphics and related media. *Prerequisite:* Arch 102, Vis 203, or permission of instructor.

VIS 213 BEGINNING PHOTOGRAPHY 3 cr. (1 and 6)

Studio work in photography and related media. *Prerequisite:* Arch 102, Vis 203, or permission of instructor.

VIS 215 BEGINNING GRAPHIC DESIGN 3 cr. (1 and 6)

Study and studio work with historical, contemporary and experimental letter forms. Emphasis is placed on the application of letter design components to convey visual images and ideas beyond normal word and sentence formulation. *Prerequisite:* Arch 102, Vis 203, or permission of instructor.

VIS 217 BEGINNING CERAMICS 3 cr. (1 and 6)

Applied studio work in ceramic hand building and pottery; creative experience in process of forming, decorating, glazing, and firing. *Prerequisite:* Arch 102, Vis 203, or permission of instructor.

VIS 305 DRAWING 3 cr. (1 and 6)

Studio work in drawing and related material. Prerequisite: Vis 205.

VIS 306 DRAWING 3 cr. (1 and 6) Continuation of Vis 305. *Prerequisite:* Vis 305.

VIS 307 PAINTING 3 cr. (1 and 6)

Studio work in painting and related media. Prerequisite: Vis 207.

VIS 308 PAINTING 3 cr. (1 and 6) Continuation of Vis 307. *Prerequisite:* Vis 307.

VIS 309 SCULPTURE 3 cr. (1 and 6) Studio work in sculpture and related media. *Prerequisite:* Vis 209.

VIS 310 SCULPTURE 3 cr. (1 and 6) Continuation of Vis 309. *Prerequisite:* Vis 309.

VIS 311 PRINTMAKING 3 cr. (1 and 6)

Studio work in lithography, silk screen, etching, woodcuts and related media. *Prerequisite:* Vis 211.

VIS 312 PRINTMAKING 3 cr. (1 and 6) Continuation of Vis 311. Prerequisite: Vis 311.

VIS 313 PHOTOGRAPHY 3 cr. (1 and 6) Studio work in still photography and related media. *Prerequisite:* Vis 213. VIS 314 PHOTOGRAPHY 3 cr. (1 and 6) Continuation of Vis 313. *Prerequisite:* Vis 313.

VIS 315 GRAPHIC DESIGN 3 cr. (1 and 6)

Study and studio work in layout, composition, illustration, investigation of studio skills; terminology and theories of layout and composition; emphasis on the different graphic formats and their use in advertising art. *Prerequisite:* Vis 215 or permission of instructor.

VIS 316 GRAPHIC DESIGN 3 cr. (1 and 6)

Study and studio experimentation of original design layout compositions, utilizing specific techniques and graphic process in offset, gravure, and letter press printing. *Prerequisite:* Vis 315 or permission of instructor.

- VIS 317 CERAMIC ARTS 3 cr. (1 and 6) Continuation of Vis 217. *Prerequisite:* Vis 217.
- VIS 318 CERAMIC ARTS 3 cr. (1 and 6) Continuation of Vis 317. *Prerequisite:* Vis 217.

VIS 405, 605 DRAWING 3 cr. (0 and 9)

Studio work in advanced drawing and related media. *Prerequisite:* Vis 306 or permission of instructor.

- VIS 406, 606 DRAWING 3 cr. (0 and 9) Continuation of Vis 405. Prerequisite: 405.
- VIS 407, 607 PAINTING 3 cr. (0 and 9)
- Studio work in advanced painting and related media. *Prerequisite:* Vis 308 or permission of instructor.
- VIS 408, 608 PAINTING 3 cr. (0 and 9) Continuation of Vis 407. *Prerequisite:* Vis 407.
- VIS 409, 609 SCULPTURE 3 cr. (0 and 9)

Advanced studio work in sculpture and related media. *Prerequisite:* Vis 310.

- VIS 410, 610 SCULPTURE 3 cr. (0 and 9) Continuation of Vis 409. *Prerequisite:* Vis 409.
- VIS 411, 611 PRINTMAKING 3 cr. (0 and 9) Advanced studio in printmaking and related media. *Prerequisite:* Vis 312.

VIS 412, 612 PRINTMAKING 3 cr. (0 and 9) Continuation of Vis 411. Prerequisite: Vis 411.

- VIS 413, 613 PHOTOGRAPHY 3 cr. (0 and 9) Advanced studio work in photography. *Prerequisite:* Vis 314.
- VIS 414, 614 PHOTOGRAPHY 3 cr. (0 and 9) Continuation of Vis 413. Prerequisite: Vis 413.

VIS 415, 615 GRAPHIC DESIGN 3 cr. (0 and 9)

Utilization of graphic, scenic and other visual design requirements for motion picture and television. Emphasis on imagination and use of visual design in relation to media and function: entertainment, documentary, institutional or advertising. *Prerequisite:* Vis 316 or permission of instructor.

VIS 416, 616 GRAPHIC DESIGN 3 cr. (0 and 9)

Advanced study and studio investigation as it applies to specific areas of advertising art, book illustration, fashion, or institutional illustration. *Pre-requisite:* Vis 415 or permission of instructor.

VIS 417, 617 CERAMIC ARTS 3 cr. (0 and 9)

Advanced applied studio work in ceramic sculpture and pottery. Prerequisite: Vis 318.

VIS 418, 618 CERAMIC ARTS 3 cr. (0 and 9)

Continuation of Vis 417. Prerequisite: Vis 417.

VIS 490, 690 DIRECTED STUDIES 1-5 cr.

Comprehensive studies and research of special topics not covered in other courses. Emphasis will be placed on field studies, research activities, and current developments in visual studies. *Prerequisite:* Permission of department head.

VIS 850 VISUAL ARTS STUDIO 3 cr. (0 and 9)

VIS 851 VISUAL ARTS STUDIO 3-6 cr.

VIS 870 VISUAL ARTS STUDIO 6 cr. (1 and 15)

VIS 871 VISUAL ARTS STUDIO 3-6 cr.

VIS 880 VISUAL ARTS STUDIO 3-15 cr.

VIS 891 MASTER'S RESEARCH 3-15 cr.

Water Resources Engineering

Associate Professor: J. E. Clark, Acting Director

WRE 450, 650 WATER RESOURCES ENGINEERING 3 cr. (3 and 0)

This course covers currently important topics in the water resources engineering area. Included is a consideration of the objectives and uses of water resources and how these have evolved over time. Emphasized are the comprehensive and systems aspects of water resources development. An introduction to the use of mathematical modeling and optimization in water resources planning and management is provided.

WRE 460, 660 PHYSICAL OCEANOGRAPHY 3 cr. (3 and 0)

An integrated treatment of the fluid dynamic, ecologic, geologic, and resource aspects of physical oceanography. The basic principles of the physical aspects of the oceans are presented together with techniques for the application of these fundamentals. Primary emphasis is placed on relating the oceanographic phenomena to relevant problems in the marine environment. *Prerequisite:* Ch 102, Phys 222, and permission of instructor.

WRE 461, 661 OCEANOGRAPHICAL ENGINEERING 3 cr. (3 and 0) An integrated coverage of various facets of coastal and ocean engineering. Emphasis is placed on introducing the student to selected areas of oceanographical engineering and indicating the basic principles and current appli-

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cations in these areas. Although the course is engineering oriented, the interaction of the engineer and the marine environment is included where applicable. *Prerequisite:* EM 320.

- WRE 865 HYDROLOGY I 3 cr. (3 and 0)
- WRE 866 HYDROLOGY II 3 cr. (3 and 0)
- WRE 870 STREAM AND ESTUARINE ANALYSIS 3 cr. (3 and 0)
- WRE 871 COASTAL HYDRODYNAMICS 3 cr. (3 and 0)
- WRE 872 MARINE POLLUTION CONTROL 2 cr. (2 and 0)
- WRE 875 WATER RESOURCES PLANNING 3 cr. (3 and 0)
- WRE 876 WATER RESOURCES SYSTEMS 3 cr. (3 and 0)
- WRE 881 SPECIAL PROBLEMS IN WATER RESOURCES ENGINEERING 1-4 cr. (1-4 and 0)

WRE 883 SELECTED TOPICS IN WATER RESOURCES ENGINEERING 1-3 cr. (1-3 and 0)

WRE 891 MASTER'S RESEARCH. Credit to be arranged.

Wildlife Biology

Professor: S. B. Hays, Head

Associate Professor: L. G. Webb

Assistant Professors: A. G. Eversole, T. T. Fendley, J. R. Sweeney

WB 306 WILDLIFE RESOURCES OF THE SOUTHEASTERN UNITED STATES 2 cr. (2 and 0) F, S

A study of the wildlife resources of the Southeastern states, including population trends, life histories and economic importance. Conservation and proper utilization by man is emphasized. Not open to students who have had WB 412 or Zool 411.

WB 412, H412, 612 WILDLIFE MANAGEMENT 3 cr. (2 and 3) F, S Basic principles and general practices of wildlife management and conservation will be covered. Major problems concerning the management of wildlife resources, with emphasis on upland game species. Laboratory work includes practical work on the Clemson University woodlands and field trips to several areas where wildlife management is being practiced. Fall: Open to Forestry majors only. Spring: Open to non-Forestry majors only.

WB 416, 616 FISH CULTURE 3 cr. (2 and 3)

Principles underlying fish production; water quality as measured by chemical and biological means receive primary emphasis. Water pollution, fertilization and feeding of fish will be studied as they affect water quality and fish production. Identification of sport fishes, pond construction, and management practices are observed in the laboratory.

WB 460, 660 BIOLOGY OF MARINE ORGANISMS 3 cr. (2 and 3)

A study of the biology of common marine fauna with emphasis on economically important species. Lectures include discussion of adaptive significance of the structure and physiological characteristics of selected faunal groups in relation to their ecological distribution. Laboratory includes field trips to various marine environments. *Prerequisite:* Biol 104, 106, or permission of instructor.

WB 462, H462, 662 AQUATIC PRODUCTIVITY 3 cr. (3 and 0)

Study of selected topics in oceanography and limnology with special reference to fundamental work on organic productivity. Class consists of lectures and discussions of ecological principles of biochemical cycles, energy transfer, trophic levels, and productivity of aquatic systems. Includes consideration of related topics in the development and utilization of marine resources. *Prerequisite:* Zool 201, 202, or permission of instructor.

- WB 809 WILDLIFE BIOLOGY SEMINAR I 1 cr. (1 and 0)
- WB 810 WILDLIFE BIOLOGY SEMINAR II 1 cr. (1 and 0)
- WB 815 PRINCIPLES OF WILDLIFE BIOLOGY 3 cr. (2 and 3)
- WB 816 APPLIED WILDLIFE BIOLOGY 3 cr. (2 and 3)
- WB 818 ECOLOGY AND MANAGEMENT OF WETLAND WILDLIFE 3 cr. (2 and 3)
- WB 840 IMPOUNDMENT AND STREAM MANAGEMENT 3 cr. (2 and 3)
- WB 850 MARINE AQUACULTURE 3 cr. (3 and 0)
- WB 852 PARASITES AND DISEASES OF MARINE ANIMALS 3 cr. (2 and 3)
- WB 856 DIRECTED STUDIES AND FIELDWORK IN MARINE BIOLOGY 4 cr. (2 and 6)
- WB 863 SPECIAL PROBLEMS 1-4 cr. (1-4 and 0)
- WB 891 MASTER'S RESEARCH. Credit to be arranged.

Zoology

Professors: S. A. Gauthreaux, Jr., C. W. Helms, Head

Associate Professors: R. L. Hays, J. E. Schindler, J. B. Wourms

Assistant Professors: R. R. Montanucci, G. P. Noblet, E. B. Pivorun, J. B. Waide, R. F. Walker,[•] A. P. Wheeler, D. G. Yardley

Instructor: M. M. Allan

Visiting Associate Professor: G. R. Murdock

Visiting Assistant Professors: J. M. Colacino, K. F. Sigmon, C. K. Wagner

ZOOL 100 THE BIOLOGY OF HUMAN SURVIVAL 1 cr. (1 and 0)

A biological overview of those aspects of contemporary life which constitute threats to the individual and the social welfare of man now and in the future: rampant reproduction, venereal disease, illegitimacy, sterility, crowding, famine, death control, genetic engineering, and hallucinogenic drugs.

• On leave.

ZOOL 110 INTEGRATED BASIC SCIENCE AS RELATED TO MAN I 4 cr. (3 and 3)

A general course surveying basic biological principles, chemistry, microbiology, genetics, human anatomy, and physiology, emphasizing the chemical and physical bases for physiology. *Prerequisite:* Admission to Associate in Arts Nursing program or permission of instructor.

ZOOL 111 INTEGRATED BASIC SCIENCE AS RELATED TO MAN II 4 cr. (3 and 3)

A continuation of Zool 110. *Prerequisite:* Admission to Associate in Arts Nursing program or permission of instructor.

ZOOL 201 INVERTEBRATE ZOOLOGY 4 cr. (3 and 3)

A survey of the phyla of invertebrate animals, including their taxonomy, morphology, development, and evolution. *Prerequisite:* Biol 111 or permission of instructor.

ZOOL 202 VERTEBRATE ZOOLOGY 4 cr. (3 and 3)

An introductory study of vertebrates, emphasizing selected aspects of gross, microscopic, and developmental structure and basic function from a phylogenetic point of view. *Prerequisite:* Biol 111 or permission of instructor.

ZOOL 220 HUMAN ANATOMY AND PHYSIOLOGY I 4 cr. (3 and 3) A basic and systematic study of anatomy and physiological processes of mammals, with particular emphasis being placed on the human. Designed for nursing students and other non-Zoology majors only. Skeletal, muscular, and nervous systems will be covered. *Prerequisite:* Biol 104 or 111 or equivalent.

ZOOL 221 HUMAN ANATOMY AND PHYSIOLOGY II 4 cr. (3 and 3) A continuation of Zool 220. Circulatory, lymphatic, respiratory, digestive, urinary, endocrine, and reproductive systems will be covered. *Prerequisite:* Zool 220 or permission of instructor.

ZOOL 301, H301 COMPARATIVE VERTEBRATE ANATOMY 4 cr. (3 and 3)

A comparative study of the gross morphology of vertebrates. Recommended only for Zoology majors. *Prerequisite:* Zool 202.

ZOOL 340, H340 CELL BIOLOGY 3 cr. (3 and 0)

An introduction to structure and function of cells, emphasizing biomembranes, the cell cycle, energy transduction, motility, secretion, and cellular digestion with a major focus on these processes in animals. *Prerequisite:* Bioch 301 or permission of instructor.

ZOOL 350, H350 DEVELOPMENTAL BIOLOGY 4 cr. (3 and 3)

Events and mechanisms responsible for the development of multicellular animals. Gametogenesis, fertilization, embryonic development, cellular differentiation, morphogenesis, larval forms and metamorphosis, asexual reproduction, regeneration, malignancy, and aging will be analyzed in terms of fundamental concepts and control processes. *Prerequisite:* Zool 340 or permission of instructor.

ZOOL 403, H403, 603 PROTOZOOLOGY 3 cr. (2 and 3)

Taxonomy of the subkingdom protozoa with special reference to the parasitic forms directly affecting man. Representative types of free-living forms are surveyed with emphasis on their morphology, physiology and distribution. *Prerequisite:* Zool 201 or permission of instructor.

ZOOL 405, 605 ANIMAL HISTOLOGY AND HISTOLOGY TECHNIQUE 4 cr. (2 and 6)

This course is a study of functional microscopic anatomy of animal cells and tissues. Invertebrate and vertebrate tissue will be used in learning basic histological techniques in the laboratory and in providing material for classroom discussion.

ZOOL 410, H410, 610 LIMNOLOGY 4 cr. (3 and 3)

A detailed introduction to the physical, chemical, and biological interrelationships that characterize inland water environments. A fundamental approach to the interactions of components of the environment is developed at the theoretical level. Field and laboratory instruction in techniques of analysis are utilized to illustrate applications of theoretical concepts. *Prerequisite:* Zool 201, 411, General Chemistry.

ZOOL 411, H411, 611 ANIMAL ECOLOGY 4 cr. (3 and 3)

A fundamental approach to basic ecological principles underlying the interrelationships of organisms with their abiotic environment. A variety of aquatic and terrestrial ecosytems will be studied both in the field and in the laboratory. *Prerequisite:* Math 301, Zool 201 and 202, or permission of instructor.

ZOOL 412, H412, 612 AQUATIC ECOLOGY 4 cr. (3 and 3)

A study of ecological principles in aquatic systems, emphasizing functional relationships and productivity of biotic communities as they are influenced by the dynamics of physical, chemical, and biotic environmental parameters. *Prerequisite:* Bot 441, or Zool 411, or permission of instructor.

ZOOL 415, 615 INTRODUCTION TO MATHEMATICAL ECOLOGY 3 cr. (3 and 0)

This course will focus on current and broadly applicable mathematical models in ecology emphasizing ecological assumptions underlying mathematical approaches, theories and limitations of specific models, and the ecological insights provided. *Prerequisite:* Math 108 and Zool 411 or permission of instructor.

ZOOL 420, H420, 620 PRINCIPLES OF EVOLUTION 3 cr. (3 and 0)

An introduction to the fundamental principles and major concepts of the evolutionary process in animals, including a consideration of evolutionary theories, adaptive processes in populations, and major evolutionary patterns. *Prerequisite:* Gen 302, Zool 202, or permission of instructor.

ZOOL 421, 621 ADVANCED INVERTEBRATE ZOOLOGY 4 cr. (3 and 3)

A detailed survey of the invertebrate phyla with emphasis on taxonomy, morphology, evolution, and ecology, but with some reference to development and physiology. Laboratories will emphasize structure and identification. *Prerequisite:* Zool 201, 411, General Chemistry, or permission of instructor.

ZOOL 450, H450, 650 COMPARATIVE VERTEBRATE EMBRYOLOGY 4 cr. (3 and 3)

A comparative study of the developing vertebrate body from fertilization through organogenesis. Patterns of reproduction and embryonic development, morphogenesis, organogenesis, and the functional differentiation of cells and tissues will be considered. *Prerequisite:* Zool 350 or permission of instructor.

ZOOL 456, 656 PARASITOLOGY 4 cr. (3 and 3)

An introduction to the phenomenon of parasitism in the animal kingdom with emphasis on basic principles. Classical and experimental approaches to the study of parasitism are examined in reference to the protozoa, helminths and arthropods. *Prerequisite:* Zool 201.

ZOOL 457, H457, 657 COMPARATIVE PHYSIOLOGY 4 cr. (3 and 3) A comparative study of physiological processes throughout the animal kingdom. Laboratories will introduce the use of basic instrumentation and will provide an opportunity to perform original experiments. *Prerequisite:* Zool 340 or permission of instructor.

ZOOL 458, H458, 658 CELL PHYSIOLOGY 4 cr. (3 and 3)

Chemical and physical principles of function, largely at the cellular level. Laboratories will demonstrate the principles discussed and will provide an introduction to methodology. *Prerequisite:* Zool 340 or permission of instructor.

ZOOL 459, H459, 659 SYSTEMS PHYSIOLOGY 4 cr. (3 and 3)

Physiological systems (neutral, muscular, skeletal, endocrine, circulatory, respiratory, digestive, and excretory) of vertebrates and their homeostatic controls. *Prerequisite:* Zool 202, 340, or permission of instructor.

ZOOL 462, 662 HERPETOLOGY 3 cr. (2 and 3)

Systematics, life history, distribution, ecology, and current literature of amphibians and reptiles. Laboratory study of morphology and identification of world families, and U.S. genera, as well as all southeastern species. Field trips will be required. *Prerequisite:* Zool 202 or permission of instructor.

ZOOL 463, 663 ICHTHYOLOGY 3 cr. (2 and 3)

Systematics, life history, distribution, ecology, and current literature of fish. Laboratory study of morphology and identification of U.S. genera, as well as all southeastern species. Field trips will be required. *Prerequisite:* Zool 202 or permission of instructor.

ZOOL 464, 664 MAMMALOGY 3 cr. (2 and 3)

Origin, evolution, distribution, structure, and function of mammals, with laboratory emphasis on the mammals of South Carolina. Field collection required. *Prerequisite:* Zool 202 or permission of instructor.

ZOOL 465, 665 ORNITHOLOGY 3 cr. (2 and 3)

The identification, life history and ecology of birds. Field trips, work with bird specimens and correlated reading will give the student a working knowledge of at least 100 species of the common birds. *Prerequisite:* Zool 202 or permission of instructor.

ZOOL 470, 670 ANIMAL BEHAVIOR 3 cr. (3 and 0)

Historical and modern developments in animal behavior emphasizing the evolutionary and ecological determinants of behavior. A synthesis of ethology and comparative psychology. *Prerequisite:* Zool 202 or permission of instructor.

ZOOL 471, 671 ANIMAL BEHAVIOR LABORATORY 1 cr. (0 and 3)

Laboratory exercises that explore the behavior of animals. Emphasis is on behavioral observation and analysis and presentation of findings in a report format. *Prerequisite:* Zool 202, 470, or permission of instructor. ZOOL 474, 674 INVERTEBRATE ENDOCRINOLOGY 3 cr. (2 and 3) An introduction to the hormonal mechanisms which control certain physiological systems of invertebrates from cnidaria to arthropoda and including enchinodermata. *Prerequisite:* Zool 201.

ZOOL 475, 675 VERTEBRATE ENDOCRINOLOGY 3 cr. (3 and 0)

An introduction to the basic principles of neuroendocrine integration and homeostatic maintenance in vertebrates. Comparative morphology and physiology of various endocrine tissues and hormone chemistry and modes of action are considered. *Prerequisite:* Zool 202, organic chemistry, or permission of instructor.

ZOOL 476, 676 EXPERIMENTAL VERTEBRATE ENDOCRINOLOGY LABORATORY 2 cr. (0 and 6)

Laboratory to demonstrate principles discussed in Zool 475. Experiments conducted by individuals will be drawn from classical papers which demonstrate specific endocrine functions; original experiments will examine hormonal effects on selected physiological parameters, and assays and determinations of unknown hormones will be made. *Prerequisite:* Zool 475 or permission of instructor.

ZOOL 480, 680, ANALYSIS OF DEVELOPMENT 3 cr. (3 and 0)

Concepts, problems, and experimental observations central to the study of cellular differentiation and development, particularly in animals. Emphasis is on the critic reading of research literature on the control of genetic expression and nucleo-cytoplasmic, cell-cell, and cell-environment interactions. *Prerequisite:* Zool 350 or permission of instructor.

ZOOL 481, 681 METHODS IN DEVELOPMENTAL BIOLOGY 2 cr. (0 and 6)

Laboratory to be taken in conjunction with Zool 480. Observations and experiments, conducted on an individual basis, will emphasize techniques used to study developing animal systems. *Corequisite:* Completion of or enrollment in Zool 480.

ZOOL 491 SPECIAL PROBLEMS IN ZOOLOGY 2-4 cr.

Library and laboratory experience in experimental design and research in selected biological disciplines. Results will be presented in an open seminar and in a research paper to be evaluated by at least two faculty members. May be taken for credit no more than twice for a maximum of 8 credits. *Prerequisite:* Junior or Senior standing and permission of instructor.

ZOOL 493 UNDERGRADUATE SEMINAR 1 cr. (1 and 0)

Exploration of current zoological literature in topical areas. *Prerequisite:* Junior or Senior standing.

ZOOL 700 MODERN DEVELOPMENTS IN ZOOLOGY FOR HIGH SCHOOL TEACHERS 3 cr. (3 and 0)

ZOOL 701 MAN'S IMPACT ON ECOLOGY 3 cr. (3 and 0)

ZOOL 702 FIELD METHODS IN ZOOLOGY FOR HIGH SCHOOL TEACHERS 3 cr. (2 and 3)

ZOOL 803 POPULATION DYNAMICS 4 cr. (2 and 6)

ZOOL 810 BEHAVIORAL ECOLOGY 3 cr. (3 and 0)

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- ZOOL 812 SEMINAR 1 cr. (1 and 0)
- ZOOL 813 EVOLUTION 2 cr. (2 and 0)
- ZOOL 815 PHYSIOLOGICAL ECOLOGY 4 cr. (3 and 3)
- ZOOL 816 ADVANCED ECOSYSTEM ANALYSIS I 4 cr. (3 and 3)
- ZOOL 817 ADVANCED ECOSYSTEM ANALYSIS II 4 cr. (3 and 3)
- ZOOL 835 INTERPRETATIVE ELECTRON MICROSCOPY 3 cr. (3 and 0)
- ZOOL 852 PRINCIPLES AND METHODS OF SYSTEMATIC ZOOLOGY 2 cr. (2 and 0)
- ZOOL 856 HELMINTHOLOGY 3 cr. (2 and 3)
- ZOOL 861 SPECIAL TOPICS 1-4 cr. (1-4 and 0)
- ZOOL 863 SPECIAL PROBLEMS 1-4 cr.
- ZOOL 891 MASTER'S RESEARCH. Credit to be arranged.
- ZOOL 991 DOCTORAL RESEARCH. Credit to be arranged.



Faculty

ROBERT COOK EDWARDS, President B.S., Clemson University; LL.D., The Citadel; LL.D., Wofford College

VICTOR HURST, Vice President for Academic Affairs; Dean of the Univer-sity; Professor of Dairy Science B.S., 1938, M.S., 1940, Rutgers University; Ph.D., University of Missouri, 1948

- ABERNATHY, ATWELL RAY, Professor of Environmental Systems Engineering A.B., Lenoir-Rhyne College, 1953; M.S.P.H., 1959, Ph.D., 1963, University of North Carolina
- ABRAMOVITCH, RUDOLPH ABRAHAM, Head of Chemistru and Geologu Department: Professor of Chemistry B.S., Alexandria University, 1950; Ph.D., King's College (England), 1953: D.Sc., University of London, 1964
- ACKER, JAMES DAVID, Assistant Professor of Accounting and Finance B.S., University of South Carolina, 1958; M.Ed., Clemson University, 1965; Ed.D., North Carolina State University, 1971
- ACKERMAN, CARL WILLIS, Associate Professor of Animal Science B.S., 1953, M.S., 1960, Clemson University
- ACORN, JOHN THOMSON, Head of History and Visual Studies Department; Professor of History and Visual Studies B.A., Montclair State College, 1959; M.F.A., Cranbrook Academy of Art, 1961
- ACTON, JAMES CROCKETT, Associate Professor of Food Science B.S., 1965, Ph.D., 1970, University of Georgia
- ADAIR, JOSEPH HENRY, Assistant Professor of Education A.B., 1948, B.D., 1951, Johnson C. Smith University; M.Ed., Furman University, 1967
- ADAMS, HEWITT DAYNE, Assistant Professor of History B.S., United States Naval Academy, 1937; M.A., Claremont Graduate School, 1964
- ADDISON, CLARENCE LEE BENJAMIN, Associate Professor of Building Science
 - B.Arch., Howard University, 1959; M.Arch., Clemson University, 1974
- ADKINS, THEODORE ROOSEVELT, JR., Professor of Entomology and Economic Zoology B.S., 1952, M.S., 1954, Ph.D., 1958, Auburn University
- AITKEN, JAMES BRUCE, Associate Professor of Horticulture, Sandhill Experiment Station

B.S., 1962, M.S., 1964, Clemson University; Ph.D., University of Florida, 1967 ALAM, KURSHEED, Professor of Mathematical Sciences

- B.S., 1941, M.S., 1943, Patna Science College; Ph.D., University of Minnesota, 1963 ALBERT.
- LBERT, HAROLD EDWARD, Professor of Political Science B.S., Madison College, 1957; B.D., United Theological Seminary, 1960; M.A.T., Miami University (Ohio), 1960; Ph.D., Florida State University, 1972
- ALBRECHT, JOHN ERNEST, Associate Professor of Animal Science B.S., Delaware Valley College, 1965; M.S., 1968, Ph.D., 1971, North Carolina State
- University ALCONERO, RODRIGO, Adjunct Associate Professor of Plant Pathology and
- Physiology

B.S., Utah State University, 1961; M.A., Washington University, 1963; Ph.D., University of Wisconsin, 1966

- ALLAN, MARY MACKAY, Instructor in Zoology
- B.A., University of South Florida, 1965; M.S., University of Georgia, 1972

- ALLEN, JOE FRANK, Associate Professor of Chemistry
- A.B., Berry College, 1955; M.S., University of Mississippi, 1959; Ph.D., Georgia Institute of Technology, 1963
- ALLEN, LEONARD RAY, Associate Professor of Agronomy and Soils B.S., Clemson University, 1952; M.S., 1962, Ph.D., 1965, Auburn University
- ALLEN, ROBERT MAX, Head of Forestry Department; Professor of Forestry B.S., 1947, M.S., 1951, Iowa State University; Ph.D., Duke University, 1958
- ALLEN, WILLIAM HAROLD, Assistant Professor of Agricultural Engineering B.S., 1966, M.S., 1969, Clemson University; Ph.D., University of Tennessee, 1972
- ALLEY, FORREST CHRISTOPHER, Professor of Chemical Engineering B.S., 1951, M.S., 1956, Auburn University; Ph.D., University of North Carolina, 1962; P.E.
- ALPHIN, JOHN GILBERT, Professor of Agricultural Engineering, Pee Dee Experiment Station

B.S., 1960, M.S., 1962, Ph.D., 1965, North Carolina State University

- ALSTON, ROWLAND POOLE, Instructor in Agronomy and Soils B.S., 1970, M.Ag., 1972, Clemson University
- ANAND, SUBHASH CHANDRA, Professor of Civil Engineering B.S., Banaras Hindu University (India), 1955; M.S., 1965, Ph.D., 1968, Northwestern University; P.E.
- ANAND, VERA BARATA, Visiting Instructor in Mechanical Engineering B.S., University of Para Belem (Brazil), 1961; M.S., Northwestern University, 1966
- ANDERSON, AEMER DELANO, Visiting Associate Professor of Mechanical Engineering
- B.S., 1956, M.S., 1959, University of Minnesota; Ph.D., Stanford University, 1970
- ANDERSON, LUTHER PERDEE, Dean, College of Agricultural Sciences; Professor of Agronomy and Soils
- B.S., 1949, M.S., 1962, Clemson University; Ph.D., University of Georgia, 1968
- ANDREWS, SUSAN MEREDITH, Instructor in Nursing, Baccalaureate Degree Program
- B.S.N., University of Alabama, 1970; M.S.N., Medical College of Georgia, 1974 ANDREWS, TAMSEY KAY, Visiting Instructor in History B.A., University of Washington, 1970; M.A., Brandeis University, 1972
- B.A., University of Washington, 1970; M.A., Brandeis University, 1972 ARBENA, JOSEPH LUTHER, Associate Professor of History
- A.B., George Washington University, 1961; Ph.D., University of Virginia, 1970
- ARBLASTER, ROSE MARIE, Instructor in Nursing, Baccalaureate Degree Program
- B.S., University of Miami, 1959; M.S.N., Clemson University, 1977
- ARNOLD, EDWIN PRATTE, Instructor in German
- A.B., University of South Carolina, 1958; M.A., Kent State University, 1968
- ASHWORTH, RALPH PAGE. Professor of Botany B.S., Wake Forest University, 1939; M.A., 1945, Ph.D., 1960, University of North Carolina
- AUCOIN, CLAIRE RUSSELL, Assistant Professor of Mathematical Sciences A.B., Shorter College, 1951; M.S., Auburn University, 1954
- AUCOIN, CLAYTON VERL, Professor of Mathematical Sciences and Industrial Management B.A., Louisiana College, 1951; M.S., 1953, Ph.D., 1956, Auburn University; Post Doctorate, Stanford University, 1960-61
- BAILEY, ROY HORTON, JR., Associate Professor of Chemistry B.S., 1948, Ph.D., 1958, University of North Carolina
- BAILLIE, EARLE EUGENE, Adjunct Professor of Biochemistry; Lecturer in Medical Technology; Director, School of Medical Technology and Pathologist, Anderson Memorial Hospital B.S., M.D., University of Nebraska, 1967
- BAKER, CATHY JOAN, Instructor in Nursing, Baccalaureate Degree Program B.S.N., 1968, M.S.N., 1976, University of Rhode Island
- BAKER, DONALD NELSON, Adjunct Professor of Agriculture
- B.S., Pennsylvania State University, 1956; M.S., 1959, Ph.D., 1962, Cornell University BAKER, ELISHA REMINGTON IV, Assistant Professor of Engineering Technology and Systems Engineering B.S. 1970, M.S. 1975, Clorecon University
 - B.S., 1970, M.S., 1972, Ph.D., 1975, Clemson University

- BAKER, GEORGE HOMER, State 4-H and Youth Development Coordinator; Assistant Professor of Agronomy and Soils B.S., Clemson University, 1950
- BALK, WILLIAM ARMSTRONG, Associate Professor of Agricultural Engineering, Edisto Experiment Station B.S., University of Georgia, 1948; M.S., Clemson University, 1972
- BALLARD, ROBERT EDWARD, Assistant Professor of Botanu B.S., 1966, M.A., 1968, Miami University; Ph.D., University of Iowa, 1975
- BANNISTER. GEORGIA LOU, Lecturer in Medical Technology; Educational Coordinator, School of Medical Technology, Anderson Memorial Hospital B.S., 1967, M.Ed., 1973, Clemson University
- BARBER, MARY FRANCES, Instructor in Nursing, Associate Degree Program B.S.N., 1973, M.S.N., 1976, Hunter College
- BARFIELD, RAYFORD ELLIOTT, JR., Associate Professor of English A.B., LaGrange College, 1961; M.A., University of Georgia, 1963; Ph.D., University of Tennessee, 1969
- BARKER, ROBERT HENRY, J. E. Sirrine Professor of Textile Chemistry B.S., Clemson University, 1959; Ph.D., University of North Carolina, 1963
- BARKER, ROCER LEE, Visiting Instructor in Textiles B.S., 1967, M.S., 1969, University of Tennessee
- BARLAGE, WILLIAM BERDELL, JR., Head of Chemical Engineering Department; Professor of Chemical Engineering
 B.S., Lehigh University, 1954; M.Ch.E., University of Virginia, 1955; Ph.D., North Carolina State University, 1960
- BARNETT, BOBBY DALE, Head of Poultry Science Department; Professor of Poultry Science B.S., 1950, M.S., 1954, University of Arkansas; Ph.D., University of Wisconsin, 1957
- BARNETT, ORTUS WEBB, JR., Associate Professor of Microbiology, Plant Pathology and Physiology B.S.A., 1961, M.S., 1965, University of Arkansas; Ph.D., University of Wisconsin, 1968; Post Doctorate, Scottish Horticultural Institute, 1968-69
- BARNETT, WILLIAM JACKSON, Associate Professor of Electrical and Computer Engineering

B.S., Clemson University, 1963; M.S., Rutgers University, 1965; Ph.D., Clemson University, 1972

- BARNHILL, JAMES WALLACE, Assistant Professor of History B.A., Presbyterian College, 1947; M.A., Northwestern University, 1949
- BARON, WILLIAM, Associate Professor of Civil Engineering B.S.C.E., City College of New York, 1960; M.S.C.E., 1963, Ph.D., 1966, Purdue University; P.E.
- BARTH, CLYDE LEWIS, Professor of Agricultural Engineering B.S., University of Illinois, 1955; M.S., 1961, Ph.D., 1971, University of Wisconsin
- BARTMESS, EUGENIE VENTRE, Instructor in Mathematical Sciences B.S., 1945, M.S., 1949, Louisiana State University
- BAUER, LARRY LEE, Associate Professor of Agricultural Economics and Rural Sociology B.S., University of Illinois, 1961; M.S., Purdue University, 1963; Ph.D., North Carolina State University, 1968
- BAULD, NELSON ROBERT, JR., Professor of Mechanical Engineering and Engineering Mechanics B.S.M.E., 1958, M.S., 1960, West Virginia University; Ph.D., University of Illinois, 1963; P.E.
- BAUMGARDNER, REGINALD ANDREW, Associate Professor of Horticulture B.S., Clemson University, 1957; M.S., 1960, Ph.D., 1962, University of Maryland

BAXTER, ANN WEBSTER, Associate Professor of Microbiology B.A., Rockford College, 1938; M.A.T., 1964 Ph.D., 1967, University of North Carolina BAXTER, LUTHER WILLIS, Professor of Plant Pathology and Physiology

- B.S., Eastern Kentucky State College, 1950; M.S., 1952, Ph.D., 1954, Louisiana State University
- BEARD, JOHN NELSON, JR., Associate Professor of Chemical Engineering B.S., University of South Carolina, 1958; M.S., 1970, Ph.D., 1971, Louisiana State University

BECKWITH, WILLIAM FREDERICK, Associate Professor of Chemical Engineering

B.S., 1957, M.S., 1961, Ph.D., 1963, Iowa State University

BEER, DONALD CHARLES, Assistant Professor of Chemistry B.S., Bluffton College, 1964; Ph.D., Indiana University, 1972

BELCHER, CYNTHIA LEAHY, Assistant Professor of Nursing, Baccalaureate Degree Program

B.S.N., University of Miami, 1969; M.S.N., Emory University, 1971

BENNETT, JOHN EVERETT, Associate Professor of Electrical and Computer Engineering

B.S.E.E., 1958, M.S.E.E., 1968, Ph.D., 1970, University of Tennessee

BENSON, ROBERT TIDD, Professor of Vocational Education B.S., 1960, M.S., 1963, Cornell University; Ed.D., Pennsylvania State University, 1968

BERGER, LEONARD, Assistant Professor of Psychology A.B., 1968, M.A., 1969, Ph.D., 1972, Temple University

BERRY, ELIZABETH BRUNSON, Associate District Leader; Associate Professor of Home Economics B.S., Winthrop College, 1944

- BERRY, ERNEST BEZOLD, Associate Professor of Textiles B.S., Clemson University, 1951
- BEYERLEIN, ADOLPH LOUIS, Professor of Chemistry

B.S., Fort Hays Kansas State College, 1960; Ph.D., University of Kansas, 1966

- BIRD, NEALE ELDRIDGE, Assistant Professor of Agricultural Engineering, South Carolina Marine Resources Center B.S.. United States Naval Academy, 1953; M.S., North Carolina State University, 1975
- BIRKHEAD, PAUL KENNETH, Professor of Geology A.B., 1951, A.M., 1960, University of Missouri; Ph.D., University of North Carolina, 1965

BISHOP, CARL BARNES, Associate Professor of Chemistry

B.S., Clemson University, 1954; Ph.D., Michigan State University, 1959

BISHOP, EUGENE HARLAN, Head of Mechanical Engineering Department; Professor of Mechanical Engineering B.S., Mississippi State University, 1955; Ph.D., University of Texas, 1964

BISHOP, MURIEL BOYD, Associate Professor of Chemistry; Coordinator of

Medical Technology Program B.A., Huntingdon College, 1952; M.S., Emory University, 1955; Ph.D., Michigan State University, 1958; Post Doctorate, Yale University, 1958-59

- BISHOP, PATRICIA JOY, Assistant Professor of Mechanical Engineering B.S.E., Florida Technological University, 1971; M.S.M.E., Purdue University, 1972
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Morris A. King, Ed.D Morris A. King, Ed.D. Jones C. Koonts, Ph.D. Virginia K. Laycock, Ed.D. Gerald G. Lovedahl, Ph.D. Stanley M. Lukawecki, Ph.D. Oliver R. Lumpkin, Ph.D. Rodney H. Mabry, Ph.D. John P. Martin, Ed.D. James E. Matthews, Ed.D. Bill Michog Ph D. James E. Matthews, Ed.D. Bill Mishoe, Ph.D. Alfred F. Newton, Ed.D. James C. Nolen, M.Ed. Edward F. Olive, Ed.D. Myrton A. Packer, Ed.D. Eugene Park, M.A. Thomas H. Parry, Ed.D. William W. Pennscott, Ed.D. David H. Prince, Ph.D. Frederick T. Raetsch, Ph.D. William D. Rentz, Ed.S. Bruce L. Sandberg, Ph.D. Jerold J. Savory, Ph.D. Russell D. Shannon, Ph.D. Jerold J. Savory, Ph.D. Russell D. Shannon, Ph.D. Luther F. Shealy, Ed.D. Virginia B. Stanley, M.Ed. Rebecca G. Swanson, Ph.D. Holley H. Ulbrich, Ph.D. Malcolm O. Usrey, Ph.D. John H. Walker, Ph.D. William E. West, Ph.D. Marvin C. Woodson, Ph.D. Gilbert G. Woolard, Ed.D.

The College of Education offered off-campus courses through the Office of Educational Services for school districts and other agencies in South Carolina. The following is an official record of the courses offered from the spring semester through the fall semester 1977.

430 Public Service Activity

ANDERSON Spring In Ed 410, 610 Practices of Prevocational Education® BELTON Summer Ed 434, 634 Curriculum Workshop^o Fall Ed 469, 669 Characteristics of Children with Emotional Handicaps BENNETTSVILLE In Ed 410, 610 Metric Education for Vocational Education Teachers® Spring BISHOPVILLE Audio Visual Aids for Vocational Education^o Spring In Ed 410, 610 CHARLESTON Fall Ed 434, 634 Identifying Children with Special Needs^o COLUMBIA Ag Ed 736 Spring Internship in Teaching In Ed 410, 610 Vocational Curriculum Development^o Fall In Ed 310 Methods of Trade Teaching DUNCAN Ed 461, 661 Teaching Reading in the Elementary School Fall FLORENCE Fall Ed 434, 634 Identifying Children with Special Needs^o GAFFNEY Spring In Ed 410, 610 Synopsis of Vocational Education^o GREENVILLE Spring Econ 350, 650 Economics of the Consumer and the Firm in a Market System Ed 405, 605 Principles of Guidance Ed 461, 661 Ed 462, 662 Teaching Reading in the Elementary School 662 Reading Diagnosis and Remediation Ed 470, 670 Characteristics of Children with Learning Disabilities Ed 494, 694 Ed 801 School and Community Relationships Seminar in Human Growth and Development Seminar in Human Growth and Development Human Development: Psychology of Learning Advanced Methods of Teaching in the Secondary School Advanced Methods of Teaching in the Elementary School Ed 802 Ed 803 Ed 804 Ed 808 **Educational Tests and Measurements** Ed 809 Analysis of the Individual Ed 817 Development of Counseling Skills Engl 751 Children's Literature for Teachers Math 701 Modern Mathematics for Elementary School Teachers-Number Systems I Math 703 Modern Mathematics for Elementary School Teachers-Geometry Summer Econ 350, 650 Economics of the Consumer and the Firm in a Market System Fall Econ 350, 650 Economics of the Consumer and the Firm in a Market System Ed 405, 605 Principles of Guidance Ed 434, 634 Ed 475, 675 Identifying Children with Special Needs^o Educational Procedures for Children with Learning Disabilities Ed 494, 694 School and Community Relationships Ed 633 Teaching Reading in Content Areas^a Ed 721 Legal Phases of School Administration Ed 801 Seminar in Human Growth and Development Human Development: Psychology of Learning Advanced Methods of Teaching in the Elementary School Ed 802 Ed 804 Ed 808 Educational Tests and Measurements Theories and Techniques of Counseling Ed 810 Modern Mathematics for Elementary Teachers-Number Math 701 Systems I

* Special Institute course with subjects organized according to Institute needs.

GREENWOOD			
Spring	Ed 405, Ed 460, Ed 461, Ed 494, Ed Ed Ed Ed Ed	660 661 694 665 801 802 803 803 808 810 703	Comprehensive Studies Principles of Guidance Curriculum Development in the Elementary School Teaching Reading in the Elementary School School and Community Relationships Secondary School Curriculum Seminar in Human Growth and Development Human Development: Psychology of Learning Advanced Methods of Teaching in the Secondary School Educational Tests and Measurements Theories and Techniques of Counseling Modern Mathematics for Elementary School Teachers— Geometry Non-Euclidean Geometry
Summer		799	Comprehensive Studies Economics of the Consumer and the Firm in a Market
Fall	Ed 405, Ed 465, Ed Ed Ed Ed Ed Ed Ed Ed Math Math Math GS	605 665 802 803 808 830 861 751 701 703 725 799	System Principles of Guidance Secondary School Curriculum Human Development: Psychology of Learning Advanced Methods of Teaching in the Secondary School Educational Tests and Measurements Techniques of Supervision in the Public Schools Organization and Supervision of Reading Programs Children's Literature for Teachers Modern Mathematics for Elementary School Teachers— Number Systems I Modern Mathematics for Elementary School Teachers— Geometry Gombinatorial Mathematics for Teachers Comprehensive Studies
	Ed 405, Ed 462, Ed 494, Ed 498, Ed Ed Ed Ed Ed	605 662 698 801 804 808 813 851 852	Principles of Guidance Reading Diagnosis and Remediation School and Community Relationships Teaching Secondary School Reading Seminar in Human Growth and Development Advanced Methods of Teaching in the Elementary School Educational Tests and Measurements Educational and Vocational Informational Service and Placement Organization and Administration of the Elementary School Organization and Administration of the Secondary School Modern Mathematics for Elementary School Teachers— Number Systems I
LAURENS			
Spring		721 808	Legal Phases of School Administration Educational Tests and Measurements
Summer	Ed 461, Ed 494, Ed		Teaching Reading in the Elementary School School and Community Relationships Seminar in Human Growth and Development
Fall	Ed 460, Ed Math	660 830 701	Curriculum Development in the Elementary School Techniques of Supervision in the Public Schools Modern Mathematics for Elementary School Teachers
LEXINGTON			
Fall	Ed 434,	634	Identifying Children with Special Needs ^o
MARION Spring Ir	n Ed 410,	610	Advanced Techniques of Trade Teaching ^e
PENDLET Fall In	DN 1 Ed 405,	605	Course Organization and Evaluation
PICKENS			
Spring	Ed 460, Ed Ed 410,	830	Curriculum Development in the Elementary School Techniques of Supervision in the Public Schools Synoposis of Vocational Education ⁹
• Engelal Institute course with subjects extensional according to Institute would			

^o Special Institute course with subjects organized according to Institute needs.

SENECA Ed 434, 634 Spring Psychology of the Disadvantaged* Ed 434, 634 Ed 436, 636 The Role of the Library in the Reading Program[®] Supervision of Instructional Programs^a Summer Econ 350, 650 Economics of the Consumer and the Firm in a Market System SPARTANBURG Spring In Ed 410, 610 Practices of Prevocational Education® Fall In Ed 410, 610 Audio Visual Aids for Teachers^o WALTERBORO Summer In Ed 410, 610 Group Dynamics^o WINNSBORO Fall In Ed 410, 610 Metric Education for Teachers® COLUMBIA COLLEGE Spring Ed 662 Reading Diagnosis and Remediation Ed 669 Characteristics of Children with Emotional Handicaps Engl 623 American Literature II Summer Ed 661 Teaching Reading in the Elementary School Ed 662 Ed 669 Reading Diagnosis and Remediation Characteristics of Children with Emotional Handicaps Engl 627 The Victorian Period Fall Ed 661 Teaching Reading in the Elementary School ERSKINE COLLEGE Summer Ed 606 History and Philosophy of Education NEWBERRY COLLEGE Reading Diagnosis and Remediation Secondary School Curriculum Summer Ed 662 Ed 665 PRESBYTERIAN COLLEGE Ed 673 Spring Teaching the Mentally Retarded History and Philosophy of Education Summer Ed 606 Characteristics of Children with Learning Disabilities Ed 670 Ed 672 Psychology of Mental Retardation Fall Ed 670 Characteristics of Children with Learning Disabilities WOFFORD COLLEGE Summer Ed 665 Secondary School Curriculum

* Special Institute course with subjects organized according to Institute needs.

GRADUATES OF 1977 ASSOCIATE AND BACHELORS' DEGREES CONFERRED MAY 6, 1977

COLLEGE OF AGRICULTURAL SCIENCES

LUTHER PERDEE ANDERSON, Dean

BACHELOR OF SCIENCE

Agricultural Economics

Agricultural	Economics
*Carroll Glenn Allen, Jr. Latta Jeffrey Alan Lindsay Walton, N.Y. Michael William McCarty Blue Anchor, N.J.	William Ralph Poole
Agricultural Mechani	zation and Business
*William DeVaughn Bell Ward Keitt Hane Fair St. Matthews *William Greggory Henderson Ninety Six	William Hamner Livingston, Jr. Elloree *Stephen Philip Mace Friendship Harold Bell Pridgen Aiken
Animal I	ndustries
Kathy Marie Barrioz Spartanburg †*Craig Lewis Bishop Harleyville *Frank Gilbert Carll Hopkins *David Patrick Coleman Saluda *James Bryant Duncan Martin *George Wesley Eargle Leesville Krista Frane Hawkins Summerville Susan McGuire Hawkins Greenville *Daniel Michael Howard Greenville *Taniel Harold Keisler Lexington *Raymond Wade Lawson Jonesville	Stephen Crews Lyles Spartanburg Carl Clay McCall Fountain Inn †***Donna Jane McCrea Cedar Swamp *David Bennett Nichols Prosperity James Madison Payne, Jr. Anderson Lee-Ila Harding Riley Bakersfield, Cal Jessie Marie Rushton Greenwood *Carol Theresa Schumacher Aiken *Lydia Ann Silver Westerly, R.I. Judith Rebecca Squires Latta *Joseph Rush Wingard Lexington
Economic	
Joseph Hansford Cleveland Fort Valley, Ga *Alan Holbert Edwards Conway *Carol Lynn Hill Burton *Barry Hershel Maddox Easley	*Michael Tyrone McCarty Batesburg Thomas Wesley Orr Columbia Harry Lee Swygert Columbia †*Richard Whittington Whiteside Mobile, Ala.
Food S	cience
Timothy Lynn Cole West Pelzer	**Ann Sheppard Cox
Plant S	ciences
*Linda Colleen Askey North Augusta **Catherine Louise Bliss Pinopolis *William Bruce Caughman Leesville ***Mark Homer Corley Edgefield *David Walter Demarest River Vale, N J **Jeannette Ellen Doeller Severna Park, Md. Ernestine Grier Fields Spartanburg *Jeanne Marie Fischer Plantation, Fla. Thomas Christopher Furqueron McCormick *Richard Henry Gambrell Oakway Joseph Aaron Golson Columbia Cecil Harding Hanna, Jr. Kingstree William Carroll Inabinet, Jr. Greenwood ***Gary Jean Keever Rock Hill *John William Kelly, Jr. Easley Frederic David Kunz Florence	Phillip Bruce Lewis Pickens *William Wesley Livingston Charlotte, N.C. Evangeline Edith Long Conway Claude Wells Massengill Greenwood *Robert McSwain McConnell Clemson John Edward McKenzie III Garnett Francis Warren Moore Aiken Jeffrey Dean Norton Alexandria, Va. *Jane Elizabeth Sams Beaufort David Alan Sapp Dillon *Phillip Howard Smith Greer *Leidi Michele Speissegger Charleston Gary Rice Williams Laurel, Md. Kathryn Ruth Williams Beaufort

Pre-Professional Studies

John Dewitte Cottingham, Jr. Lynchburg

James Alonzo Eidson, Jr.

Charleston

Columbia

COLLEGE OF ARCHITECTURE

HARLAN EWART McCLURE, Dean

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*James Allen Binger
Varian Crews Brandon
Charles Griffin Coleman
Albert Henry Eleazer, Jr
*Joseph Earl Goforth
Beaty Andrew Hall, Jr
*Katherine Grace Hawkins
*James Phillip Jones
*Catherine Elaine Lonas

Clemson Columbia Herndon, Va Williston North Augusta . Anderson Bambero Abbeville Waynesboro, Va.

*Pluma Chucknow Mahon		Greenville
*Stephen Thomas Morgan		Aiken
Willie Wymon Murphy, Jr.		Orangeburg
William Heyward Pelham		Greenville
*Brian Bethea Smith		Orangeburg
*Charles Farish Smith		Gaffney
Lex William Stapleton		Greenville
*Jane Quinn Sweeney	India	anapolis, Ind.
*Edward Tate Zeigler, Jr	N	lorth Augusta

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Beaufort Irmo Seneca Belton Honea Path Hackettstown, N.J. Honea Path . . . Newberry Belton Greenville . . Camden Ware Shoals

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*James Michael LaClair	Marion, NY.
Glenn Billy Lewis	Batesburg
John Terrell Mills	Georgetowr.
Forace Milton Mungo	Rock Hill
William David Murray	Rock Hill
Ronald Lee Poston	. Lake City
William Lee Powell	Dixon, Ky.
*Richard Alan Rogers	. Charleston
Richard Leo Scherman	. Columbia
William Brian Watkins	Anderson
Robert Herbert Zander	Colts Neck, N J.

Pre-Architecture

Horace Adams III
Eric Bernard Anderson
Steven Douglas Black
*Michiel Arie Boender
John Joseph Burger
Richard Moore Burns .
*States Rights Gist Finley III
*Addison Cassel Gottshalk III
James Freeman Harvley
Gregory Thomas Jones
Christopher Matthew Kane
Jeffrey Bennett Lazarus
Michael David Leighton
*Camala Sue McCarter
Randall Keith McClain
Garry Montgomery Price

Wilton Manors, Fla. Georgetown Ardsley, NY Commacic, NY. Moorestown, N.J. Chattanooga, Tenn. West Simsbury, Conn. Spartanburg . Piscataway, N J. . DeLand, Fla. . Stamford, Conn. Gray, Maine Schenectady, NY. Pelzer ... Lincroft, N.J.

Asheville, N.C. Melvin Gerald Ross

*David Mitchell Settle Feasterville, Pa. Marlene Walli Shade Gap, Pa. David Lee Shook Anderson Donald Allen Simmons Greenville
David Lee Shook Anderson
Donald Allen Simmons Greenville
Paul Curtis Steelman Longport, N.J.
John Howard Tabor Greenville
Cambridge Munro Trott IV . Wadmalaw Island
Charles Thomas Vinson
**Steven Mitchell Wagner Greenville
Robert Stanley Walters Ft. Lauderdale, Fla.
Gordon Wayne Windham, Jr
*Ralph Fryant Witt Columbia
*Joseph Columbus Wood III
John Kenneth Ziegler, Jr Cranbury, N.J

Bachelor of Architecture

John Bristow Jackson	_ Sur	nter *Alice	Anne Nixon	
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COLLEGE OF EDUCATION

HAROLD FOCHONE LANDRITH, Dean

BACHELOR OF ARTS Early Childhood Education

**Barbara Gail Abbott Janice Lu Bethea Carol Williams Bray *Sandra Lynn Cassell **Ann Lucile Copeland *Karen Bernice Critz *Rose Anne Cromer Sara Carol Gambrell Sara Garon de *Kathryn Ruth Gill Kathryn Susan Grice Donna Marie Hancock Karen Yvonne Hanley Richmond, Va Florence Nancy Adams Hudnall Florence **Shelia Ann Jolley Chesnee Joanna Jody Kartus

Seneca Lancaster Easley Pickens Clemson Florence Spartanburg ... Clemson Bock Hill

Susan Anita Kytle *Loretta Joan Landreth *Katherine Paige Lanev Anita Gail Ford Madden Ann Haywood Mapp Laura Ellen McCrary *Kathy Dianne Meredith Frances Jean Miller **Cynthia Elizabeth Moore Margaret Riley Okey *Cynthia Fave Parris ***Debbie Jean Pruitt Alice Marie Starkey *Carol DeeAnne Varnadoe **Wanda Jeannell Vickery Monica Vynelle Winecoff

Elementary Education

*Edith Joanna Batson Greenville *John David Bridges Greenville Margaret McCune Brown Vero Beach, Fla. *Melinda Anne Brownlow ... Omaha, Neb. *Virginia Barton Busbee Aiken Marion Chiariello Taylors Marion Chariello Taylors Carol Anne Cleland Westminster ***Sheri Leigh Costa Charleston ***Catherine Zoe Curtan St Augustine, Fla. Nancy Claire Curtis Chatham, N.J. **Cynthia Ellen Davis Scotch Plains, N.J. Judith Edwina Day Stoneybrook, N.Y. **Donna Marie Drake Greenville **Donna Marie Drake Greenville *Patricia Ann Duncan Orlando, Fla. *Susan Teresa Duncan Easley *Ronda Loralee Eledge Green *Joyce Williamson Fields Anderson *Dale Heart Forwier Greenville *Dale Heath Fowler Greenville **Sheila Marie Francis Carol Rebecca Funchess ... Clemson **Kathie Yvonne Garren Clemson *Phyllis Ann Goldman Ninety Six **Deborah Richardson Hammersla Greenville *Pamela Merck Harris . . Pickens ***Betty Lynn Holt Spartanburg *Jane Knight Hopkins Simpsonville *Elizabeth Scott Jeter ... Florence *Capitola Holliday King Johnsonville ***Sheila Taylor King Easley Sheila Angie Kroger North Augusta
 Sheila Ann Kuritz
 Martha Jeanette Land Belton

*Esther Lander Long Greenville *Carolyn Patricia MacLeish Orlando, Fla. **Wanda Jane Malone Ware Shoals **Lynn Carol Markovich Frogmore *Brenda Joyce McCuen Ware Shoals Sumter Virginia Reese McElveen *Mary Lois McGinn Charleston *Mary Lauren McNatt Annapolis, Md. *Dewana Ann McWatters Chester Stanley Mike Miller Greenville Cindy Parker Mizell Clemson Cindy Parker Mizell Clemson *Agnes Virginia Montgomery Gable *Linda Diane Moody Simpsonville *Cynthia Ann Parr Piedmont Julie Evelyn Patton Lyman Linda Darlene Peden Linda Darlene Peden Greenville **Elizabeth Ann Pinson Greenwood Greenwood Julie Elizabeth Pinson Spartanburg Lakeland, Fla. *Janet Ann Prince Robin Leigh Pritchard Orangeburg Elizabeth Joy Rheney *Melissa Anne Riordan Greer *Colette Elaine Robinson Anderson James Stephen Sexton Sandy Springs **Kathy Jean Stevens Spartanburg Patricia Darlene Timmerman Edgefield **Jackie Melissa Tollison Greenville Marilyn Monroe Turner Edgefield *Kathleen Robertson Walker Atlanta, Ga. **Agnes Elizabeth Wates Edgefield *Emmett Edwin Wicker Prosperity **Jennie Neal Wilkes Chester **Careh Gwan Wica **Jennie Neal Wilkes Chester *Sarah Gaye Winn Edgefield Suzanne Young Wood Rock Hill

LaFrance Westminster Chesterfield Greenwood ... Columbia Groopvillo Townville Abbeville Belton Rock Hill . Gaffnev Anderson Greensboro, N.C. . Anderson Cheraw

*Marsha Jan Baker *Michael Everett Barnes *Susan Elizabeth Berkland Lvnn Allen Burdette Mitzi June Ellington Louis Melvin Francisco Linda Lee Frasher Nancy Elizabeth Griffin *Harriet Ann Higgs Brenda Susan Hutt *Debra Ann James ***Dorothy Lynn Johnson Emil Henry Klatt III *Sherry Davis League *Myra Ann Massey

Secondary Education

Seneca Fasley Clinton Rock Hill LaFrance Brentwood Md Greenville Charleston Cavce Hartsville Fasley Sumter Beautort . Iva Greenville

Jennie Ann Moore Karen Margaret Moore Elizabeth Bartlett Morris Barbara Evelyn Owens *I Suzanne Johnson Poteet **Carlos Lee Raines III Bennie Fladger Richbourg III Katherine Bland Sawyer *Sally Ann Shelton *Frances Anne Simpson ***Ann DuPre Todd *Susan Helen White Fonda Williams Paul Laverne Williams *Freda June Wright

Greenville Anderson North Charleston Fasley Clemson Medford N.J. North Charleston Columbia Taylors Groopville Camden Greenville Seneca Camden Rockville, Md

BACHELOR OF SCIENCE

Adricultural Education

(Agricultural Education is jointly administered by the College of Agricultural Sciences and the College of Education.)

Dennis Philip Cox	Loris	Chris Brice Douglas, Jr	Fort Mill
James Bruce Davidson	Lyman	Donnie Ray Garrett	Pelzer

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**Joseph Glenn Alewine

*Garven Patrick Cannon

*Larry Wallace Jones

Orangeburg Clemson Charlotte N.C. Fanwood N J. Anderson Dillon Greenville Mt. Pleasant

Summerville

Liberty

Pickens

Robert Edwin Salley Donnie Rav Saxon John Charles Suratt Marta Ann Thompson David Lee Walton *Jayhue Franklin Weisner *Katherine Lee Wilkins

Neeses Anderson Wilmington, Del. Clemson Clinton

Laurens

Aiken

Hicksville, N.Y

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Baltimore, Md

COLLEGE OF ENGINEERING

LYLE CHESTER WILCOX, Dean

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. Darlington Elloree *James Carroll Tolbert *Steven Carson Young

Anderson Silver Spring, Md

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*Temple Onyekpuruibeya John Ananaba . Aba, Nigeria Donald Bruce Atwell Easley Prince Boyd Eleazer III Leesville ***Michael Frederick Grether *Rickey Donald Moore

Laurens Florence

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Richard Lawrence Almeida, Jr. L Eva Denise Ariail	Pomaria
*Larry Thomas Arms	
Frederick Carl Becker	
*Roger Dean Bryson	
**Richey McLane Davis	Westminster
*Willie Thomas Davis, Jr.	Denmark
Charles Elliott Ellis	
***Keith Thomas Gockenbach	. Robinson, III.
John David Hall	Florence
*Charles Alan Hammond	Greenwood

William Lawson Jowers, Jr. Columbia
*Alan Douglas Mills Greenville
Pamela Jean Rau Scotch Plains, N.J.
*William Thomas Rice, Jr Greenwood
**Karen Frances Riley Seneca
Julian David Stack Taylors
***George Gerald Steifle Greenwood
Warren Wade Stroman Orangeburg
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Dennis Rushton Weatherford

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***Joseph Benson Black, Jr
*Susan Carol Carter Macon, Ga.
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Daniel Laughton Chandler Lake City
Thomas Allen Corbin Avondale Estates, Ga.
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*Francis Scott Davenport III
Herbert Elden DeMart II Severna Park, Md.
*Douglas Monroe Edwards Greenwood
*John Walker Farley Columbia
**Thomas Gregory Gibbons, Jr
**Donald Eugene Gillespie Moncks Corner
John Harold Harden, Jr Manning
*Steven Michael King Spartanburg

Carl Raymond Lockwood	. Belair, Md.
**Bruce Gregory Martin	Greenville
Michael Timothy McMahan	
*Thomas McCoy Moore III	Florence
*John Alden Murden	. Charleston
Alan Julian Murph	Seneca
*Paul Merritt Patterson	Beaufort
**Lloyd Mark Pearson	Rock Hill
*Jeffrey Alan Reeves	Greenville
Richard Edward Scates, Jr.	Gaffney
Henry Norman Shepard II	Charleston
*William Richard Sloger, Jr.	Anderson
William Gregory Thomas	Rains
**James Carter Walker	Grand Rapids, Mich.

Electrical Engineering

Ronald Ashley Bouknight	New Providence, N. J.
**Wayne Walker Brown	Greenville
*Roy Allen DeBolt	Holly Hill, Fla.
**James Timothy DuBose	Greer
James Leonard Dunlap, Jr.	Hartsville
David Garland Dykes	Columbia
***Alan Oliver Gale	Charleston
*Kenneth DeWitt Gibson	Mauldin
**Joseph Edward Guy	Greenville
*Steven Anthony Harbin	Clinton
John Robert Henry	Greenville
*Joseph Stephen Holladay	North Augusta
James Manly Holtzclaw II	Greer
Stephen Darnell Hughey	Piedmont
***John Walter Jerrim	Jacksonville, Fla.
Thomas Lee Kirkpatrick	Mt. Pleasant

James Taylor Lanier	North Augusta
Sidney Lanier Livingston	Bishopville
Brian Albert Lowe, Jr.	Travelers Rest
John D. Rivard	Easley
*Lloyd Richard Rochester	Walhalla
Glenn Ray Sarratt	Rock Hill
*Wade Harrison Shaw, Jr.	Simpsonville
Michael Conway Siebert	Laurens
Robert Millen Simpson III	Columbia
Howard Monroe Smith, Jr.	Anderson
Wendell Melvin Steedly	Walterboro
George Eugene Stewart	Greenville
***Robert Lee Trapp	Hanahan
**Roy A. Vaninetti	Columbia
Randolph Lee Way	Summerton

Engineering Analysis

William Russell Highsmith Winston-Salem, N.C.

Engineering Technology

Joseph Marion Barker Oakway	Richard Wayne Raburn
Howard Earl Bickley Newberry	Harvey Dale Robertson
Jesse Randall Colvin	Steven Henry Sigmon Newington, Conn.
Bruce Maurice Doolittle	*Randall Bradley Sutherland Anderson
Kenneth Solon Kemon	*Ralph Lloyd West
George Douglas Neale	*Bruce Asa Windham West Columbia

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- Cerroll Bruce Hawkins ***.lohn Arthur Hodan Richard Arthur Mays *James Christian McCutcheon Charles Hoolund Ostling **William Cormany Pickens Robert Alan Rettew *Dana Richard Schmieding Charles Craddock Vaden, Jr. ***Charles Erwin Warner

Newberry North Augusta Atlanta Ga Beech Island Avon Park, Fla. West Columbia Greenville Greenville Columbia Greenwood

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WILLIAM HENRY DAVIS McGREGOR Dean BACHELOB OF SCIENCE

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*Judy Brooks Ainsworth William Cary Anderson Diane Andress David Courtney Bagby Roy Horton Bailey III Richard Alexander Bissett Terry James Brennan Terry Curtis Britt Melanie Ann Broadwater Kenneth Gardner Brown *James Alfred Buck Rickey Norman Bustle *Dennis Buthmann *Pamela Carothers *Ross Ambrose Cary Jenny Carol Clark Thomas Joseph Coffey Sandra Portia Dorn Michael Roy Elmore Gary William Fahrney ... *Donald Genar Ferguson Henry Vernon Fletcher, Jr. Yancy Marshall Floyd **Perry Grant Gervais Victor Dale Greene James Leak Hammond Larry Charles Head Christopher John Hightower Diane Jeter

Simpsonville Spartanburg Smyrna, Ga. Midland Mich North Augusta ... Columbia Clemson Sumter Gainesville. Fla. Anderson . Summerville Piedmont - Aiken

Benjamin Johnson Robeson Dow Alan Rogers Jack Haven Rollins, Jr. **David Christopher Rumker Jerry Randall Sargent **Benjamin Taylor Smith J. Bradford Thompson John Franklin Thompson, Jr. Glenn Eric Trofatter Kevin Roland Villiers *Stephen Paul Watts Norman Frank Williams Ann Franklin Wingrove

Recreation and Park Administration

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Paul Landers, Jr. William Lawton Linder *Philip Langdon Luton William Marcus McClain William Charlton McGinn III George Timothy McMillan Richard Lee Meyer, Jr. Willa Stevenson Moseley Mary Octavia Moses Glenn Edward Niske Thomas Michael O'Cain **Jane Leigh Purcell Gregory Lunn Reaves George McCall Saunders IV Julia Cardo Reid Stanley Harry Senn Pamela Jane Stapleton Flisabeth Jane Stern Charles Arthur Stuart, Jr. Thomas David Sutton Bruce William Thomas Susan Elaine Wagner James William Walton Steven Randall Welter George Dale Whitt Alice Adams Williams Michael Carl Yost

Cheraw Columbus, Ohio Greenville Eairfield Ohio Summerton Anderson Hightstown, N.J. East Haven, Conn. ... Cincinnati, Ohio Kershaw Pendleton Falls Church, Va

Harry Ethan Johnson Pearl City, Hawaii Greenville . Lexinaton Aiken Joanna Fort Mill Clemson Aiken . . . Seneca . . Sumter . Hopkins Orangeburg Summerville Hartsville Beaufort Joanna . Newberry Charleston Columbia Charleston St. George ... Columbia Anderson Clemson ... Easley Hodges Greenville

Wood Utilization

Glenn Eric Trofatter . East Haven, Conn.

COLLEGE OF INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE

WALLACE DABNEY TREVILLIAN, Dean

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Talmadge Dewitt Gault III	Gaffney	*Susan Elizabeth Rowell	Hampton
Fernando Javier Maynetto	Lima, Peru		

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Cheryl Diane Brock	Seneca
Dennis Dale Bull	Greenville
Cynthia Ann Chastain	Westminster
John Thomas Davis	Greenwood
*John Harold Dickinson	Bishopville
Tommy Michael Dyches	Orangeburg
**Forrest Macaulay Emerson	Rock Hill
*Randolph Blaire Epting	Lexington

*Sandra Elaine Glasscock	. Denmark
Robert Hall Hadstate	
**Nancy Ann Johnson	New Providence, N.J.
Patrick Joseph Kennedy	Canton, Ohio
*Ava Rosemary King	Easley
*Gifford Murrell Shaw	
***Edward Anderson Spitz	Hanahan
Thomas Andrew Toth	East Stroudsburg, Pa.

Administrative Management

William Richardson Alexander,	la Allen
Joseph Wayne Allbritton	
Franklin Blakely Allen	Spananburg
*Joel Stuart Atkinson Debra Kay Bailey	Columbia
Debra Kay Bailey	Spartanburg
Dewey Sampson Barnes, Jr.	Leesville
Charles Stephen Bennett	Estill
*Everett Wilson Bennett, Jr.	St. George
Frank Middleton Boland	Clinton
Cathy Sue Bray	Clemson
Jeffrey Blaine Brown	Wilton, Conn.
Michael Jimmy Crapps	Mt. Pleasant
Raymond Bartholomew Davis, J	r. Orangeburg
Raymond Bartholomew Davis, J Christopher Mark Eckart	. Greenville
Marshall Alexis Fant III	Anderson
Marshall Alexis Fant III Kenneth Miller Gaillard	. Greenville
Thomas Reeder Gary	
Carl Vernon Griffin, Jr.	Fort Mill
Carl Vernon Griffin, Jr Martin Brian Hall III	Clover
Martin Brian Hall III Richard Numa Ham Marney Lynn Hannon *Joe Sarratt Hendrick	Greer
*Joe Sarratt Hendrick	Chesterfield
Emory Guy Hendrix	Chesterfield
Frederick Augustas Hoefer II	. Columbia
Frances Thompson Holbrook	Anderson
Frederick Augustas Hoefer II . Frances Thompson Holbrook . *Ronald Henderson Hudgens .	Greenville
James Steven Hunt	Greenville
James Steven Hunt	Glen Ridge, N.J.
David Bruce Johnson	Easley
Larry Eugene Jolly	Gaffney
Jimmy Richard King	
Ashby Roy Krouse III	Augusta, Ga
Charles Richard Lamar, Jr.	Ninety Six
Tereca Dianna Land	Walhalla
Tereca Dianna Land Donald Franklin Landers Robert Dale Lasher	Greenville
Robert Dale Lasher	Falls Church, Va.
*David Hugh Leopard	Greenville
George Thomas Leslie	Clemson
*James Ruffin Lewis	Bishopville
Richard Cater Ligon	Greenville
**Wade Hampton Lindsey, Jr. Joseph David Longo	Spartanburg
Joseph David Longo	

5	
John Hugh Mahon, Jr. William Frederick Marston, Jr. *Edd Singleton McCurry II John Harper McNeely	Cochituate, Mass. Honea Path Atlanta, Ga
William Francis Melanson	. Alexandria, Va.
Richard Evan Morrison	. Stone Mountain, Ga.
Joe Miller Moses	
Fredda Elizabeth Mullenix	Anderson
Claude Wayne Neely	McConnells
Myron Millicent Newman	Lugoff
Gregory Allan Owens	Easley
Erika Lola Page	Hampton, Va.
*Walter Lenoir Patton III	Greenville
Lawrence Douglas Poston	. Greenville
Lawrence Douglas Poston	Norristown, Pa.
**Joe J. Pulliam III	Augusta, Ga.
Benjamin Franklin Reese II	Spartanburg
Marion Francis Reeves	
James Richard Rountree	Greenville
John Willis Salter III	Charleston
**Paula Marie Schaefer	Orangeburg
Charles Gregory Serra	Clearwater, Fla.
Robert George Sharpe, Jr.	Anderson
John Stevenson Sherard	Winston-Salem, N.C.
Barry Lee Sifford	Greenville
Thomas Gerald Smith, Jr.	Greenville
Margaret Jane Sumner	Rock Hill
Steve Bruce Tate, Jr.	Mauldın
*Iris Maxine Taylor	
Jessie Lynn Thompson	Knoxville, Tenn.
Austin Joseph Tothacer, Jr.	. Sullivans Island
**Hall Turner, Jr.	Camden
Dennis William Waddell	Woodruff
Michael Ernest Walker	Sandy Springs
*Kenneth Earl Waller	Beaufort
Monte Marie Weeks	. Montmorenci
Halbert Clement Weill, Jr	
Melba Lynne White	Seneca
John Rufus Whitfield	Anderson
Robert Bruce Whitfield	Greenville
Robert Bruce Whitfield Ronald Preston Winburn	Patrick

Martha Elise Wofford Anderson Terrance Franklin Wood Greenville

Anderson

	Econo	omics	
Alfred Patrick Morrison	Georgetown, Guyana	*Ernest Carl Frederick VonHarten III	Beaufort
	Financial M	anagement	
Alvin Montgomery Alexander	Greenville	**Michael John McGuigan	Abbeville
John Thomas Bigalke	Columbia	*Robert Neil McLellan, Jr	Seneca
Kenneth Watson Brock	Cheraw		Manning
*Thomas Jesse Bryson, Jr	Greenwood	*Kenneth Wayne Newman	Camden
David Michael Cauthen	Clemson	**Francis Marion Patrick	St. George
James Walter Dowis	Belton		Pocono Summit, Pa.
Roy Phillip Garner	Greenville		
•Grady Farr Gaston	Easley	*Peter Edwin Sampson	
Steven Bush Gray	Fountain Inn	Barbara Sarratt	Gaffney
Patricia Kelly Ivester	Walhalia	Janice Bice Sherman	Palestine, Tex.
Eric Paul Jala	Moneta. Va	George Tobin Stansell	Kernersville, N.C.
George Michael Johnston	North Charleston	*Douglas Gary Stow	
Robert Michael Keasler	Pickens	•	Starr
*Michael Brackett Knowles	Indianapolis, Ind.		Hamburg, N.Y.
*Thomas Philip Looper	Pickens		Fort Mill
	Industrial M	lanagement	
*John Kenneth Black	Greenville	**David Albert Godfrey	Greenville
*Barry Glenn Bouchillon	Piedmont	*David Allen Grant	Easley
*Larry Luke Dyches	Cope	Edward Stephen Mitchell III	Belvedere
Sam John Edwards, Jr.	Florence	*Craig Patterson Robinson	Lancaster
George Edgar Franks	Summerville	*Keith Omar Snelgrove	West Columbia
	Textile C	hemistry	
*Margaret Gwyn Latimer	Auburn, Ala.	John Jacob Schroder	West Union
inalgarot anyn zatinor			
	Textile	Science	
Isaac Anthony Saad	Anderson	Jon Barry Templeton	Greenwood
	Bachelor of Tex	tile Technology	
*Gordon Richard Alphonso	New Amsterdam, Guvana	Jimmy Ray Higginbotham	Anderson
*Charles Lee Anderson		Rupert Ray Johnson	
James Marion Blackwell, Jr.		Milford Edgar McDonald II	
Kenneth David Brackett	Clover	Robert Scott Montgomery	Laurens
		Thomas Anthony Murphy	
	Georgetown, Guyana	James Kenneth Pridmore	York
Thomas Herbert Coleman	Mountville	Pamela Jane Webber	Lakewood, Ohio
*Joe Hendrix Garraux	Greenville		

COLLEGE OF LIBERAL ARTS

HEADLEY MORRIS COX, Dean

BACHELOR OF ARTS

English

	-		
Dianne Adams	Columbia	*Thomas Michael Moyle	Columbia
**Robbie Lynda Alford	Georgetown	Mary Roberts Owens	York
Rachel Lucille Davis		Stephen Oneal Sanders	Moncks Corner
**Dorothy Evins Fitchett		*Alan Matthew Tewkesbury, Jr.	Aiken
***Laura Catherine Heller Sar	ndy Springs	*Susan Bryant Thomas	Columbia
Samuel Wylie Hogue III		Kathleen Ann Tomsyck	Greenville
Rebecca Lynn Irvine	Laurens	Thomas Bertrand Waring	Manning
Donna Jean Lewis	nsburg, Va.	**Patricia Louise Warren	Pendelton
Jerry Mark Lewis	Pickens	*Kathryn Colleen Wright	Noodstown, N.J.
Donna Jean Lewis	nsburg, Va.	**Patricia Louise Warren	Pendelto

*Shauna Marie Apps **Burnie William Ballard Jimmy Leon Carroll Beverley Joy Clinch *Nancy Douglas Davis *Wilbur Eugene Gray Catherine Gibson Lane

**Jill Arey **Debra Ann Bading *Dennis Buthmann Michel Marie Gimmi

*Gregory Wilkerson Anderson
*Susan Lynn Anderson
**Johnny Ray Byers
*Joseph Charde Byrnes
George Preston Callison, Jr.
**Janet Elizabeth Cantrell
Susan Maree Cockrell
Thomas Carl Compton III
Leighton Mills Cubbage
Andrew Ralph Hubbard Cuppia
June Eugenia Dannelly
**William Joseph Ellenberg II
***Cheryl Allen Forest
**Keith Richard Frederick
*Wilbur Eugene Gray
***Cynthia Anne Hall
Robin Mae Herdman

Wanda Bryson Alexander
*Catherine Faye Allen
**Elizabeth Webster Anders
*Linda Lothery Baird
**Donna Jean Barnes
Vincent Keith Barnhill
*William Jackson Beall
*Elizabeth Ann Bonner
Thomas Frederick Brawner
**Lily Belle Broome
*Janice Cynthia Bruce
Cynthia Jo Compton
Wanda Ruth Crapps
**Debra Ann Cureton
***Mary Nagel Cushman
*Everett Bruce Douglas
*Richard Eugene Edwards
Debbie Jo Harnesberger
Mary Virginia Harper
Jane Elizabeth Hoffman
Catherine Yates Hood
*Karen Jane House
*Mary Beth Huff
***Margaret Mary Johnson

Greenville Greenville River Edge, N.J. Shelby, N.C. Columbia Charleston . Edgefield Winnsboro Anderson Hendersonville, N.C. Conway . Central Aiken Chesterfield Easley Belton Greenville Arnold, Md. Greenville Greenville Cayce Orlando, Fla

History

Roswell, Ga.

Pageland

Greenville Columbia

Orangeburg

Rock Hill

Greenville

Vienna, Va Palm Harbor, Fla

David Robert Lauretti	Shelton, Conn.
*Harold Wayne Owens, Jr.	Walhalla
**Richard Grantland Rogers	E Easley
James Christopher Simpson	Anderson
Robin Dale Walker	- Union
*Margaret Susan Williams	a Taylors

Modern Languages

Gary Wayne Kazmer	Sandy Springs
**Ellen Perry Klatt	Clemson
**Francis Myers Mackie, Jr.	Summerville

Political Science

Edgefield Sumter Pickens Clemson Greenwood Easley Greenwood Anderson Sumter Hiton Head Island Ehrhardt Seneca Greenville Summerville Orangeburg ... Camden Rock Hill

> ... Whitmire Columbia

Hıram Abiff Joyner, Jr.	Charleston
*Kristie Anne Kenney	Rockville, Md.
**Charles Glover Lane	Yonges Island
Annette Marie Marr	Columbia
Joseph Doren McGee	Sidney, Ohio
James Clayton Moye III	Columbia
**Stanley Montgomery Nicholas	
Marsha Diane Pittman	Cayce
Francis Lesley Rawl, Jr.	, Columbia
**William Alva Ready III	Columbia
*Michael Edward Simmons	Laurens
**Broc Lawrence Sowers	Milton, Pa.
Robert Allen Vaughn	Greenville
*Margaret Elizabeth Waldrep	Greenville
Charles Wesley West	Greenville
Frank Stone Workman	Rock Hill
David Austin Wright	Columbia

Psychology

57	
Terrence Christopher Kroll	. Columbia
*John McCully Lesslie, Jr.	Rock Hill
Cynthia Louise Lucas	. Clarksburg, W. Va.
Malcolm Lewis Marler	Gardendale, Ala.
Martha Catherine Marshall	Greenville
David Elijah McKee, Jr.	Walhalla
***Robena Elaine Medbery	Charleston
**Sheryl Ann Myers	Mauldin
*Gloria Racine Neighbors	Rock Hill
Cornelia Neubia	Greenville
**Brenda Cantrell Owens	Anderson
*Cathy Joann Quinton	Charleston Heights
Henry Joe Rampey	Central
Vicki Lynn Roswal	Clemson
Phillip Carter Rumsey	Greer
James Dwight Rutledge	
**Alan Roy Shain	Clemson
***Leslie Rasberry Simmons	Greenville
Sallie Elizabeth Stephens	Greenville
James Dale Stewart II	Belvedere
**Dawn Elizabeth Vail	
*Teresa Jean Wamack	
Beverly Denise Williams	

Sociology

Elaine Campbell
Theresa Lou Goodman
Pamula Ann Harrison
Susan Marie Hughes
Lynn Bedford MacLauchlin
Jan Lee Morris
*Linda Kay Page

Whitmire Laurens Olar North Augusta Sanford, Fla Asheville, N.C. Greenville

*Ann Maison Rauscher ... Columbia Janet Rosalin Reed ... Hanahan Carol Ann Smith ... Greenville *Luanne Snyder ... Hartwell, Ga. Ward Ian Snyder ... Ft Lauderdale, Fla. Donna Sue Warren ... Greenville *Ann Graham Winn ... Due West

COLLEGE OF NURSING

GERALDINE LABECKI, Dean

ASSOCIATE IN ARTS

Nursing

Laura Ellen Andrews Catherine Belle Atkinson Janet Elizabeth Banks Wilma Kerr Campbell Debra Ann Chapman ***Bonald Sevier Clark Wanda Sue Cleveland Alice Hara Dib Kirsten Doerfert Demaris Lynn Drew Wanda Burriss Dunn Joyce Foy Ficken Linda Dale Garrett Kathryn Flaine Gordon Robert Max Graham Jr Charlotte Stribling Gray Karen Marie Harder *Kathy Loraine Harper Mallieveene Vaughn Harper Carol Ann Heyer Christi Lee Hill

Pamela Nesbitt Andersen Diane Barbara Armen Carolane Lee Bagnal ... *Lee Ann Baker Melanie Anne Barnette *Darlene Faith Bayse Sally Elaine Bethea Susan Jan Blackwell Terry Marie Blinn Jeanette Boone Rose Marie Bowers Eloise Hart Brodie *Phyllis Ann Brooks Carol Elaine Burley Susan Elaine Burns *Pamela Vivian Carey Janice Heath Carll *Reba Masters Cartee *Patricia Catington Carol Anderson Clark Doreen Joan Conahan Annette Lewis Cook *Helen Alice Cook *Wilda Louise Cook *Cynthia Ann Dennis Kimberly Birchett Denny Cynthia Louise Dixon Sara Ann Dodgens Judith Ann Doney Janice Kaye Edwards *Jena Lynn Elrod Myra Hodges Farley . Vicki Anne Fox Bobbie Lorraine Garrett Carol Ann Gerdon *Rebecca Carolyn Gilliland

Sumter Clemson Westminster Salem Little Mountain Hendersonville N.C. Anderson Greenville Kingsport, Tenn. Anderson Clemson Six Mile North Augusta ... Anderson ... Anderson Lake Jackson, Tex. Lancaster ... Walhalla Madison, Conn Charleston

*Anna Margaret Hubbard	Clemson
Shirley Ball James	Eastanollee, Ga
**Elizabeth Masters Lander	
Carolyn Ann Hill Larsen	. Greenville
Cheryl Ann Lee	Westminster
Karen Marie Lovelace	
Edward Lawson McCready	. Pendleton
Karen Lee Moore	Anderson
Gail Harrison Nicholson	Seneca
*Jeanne Marie Northup	Talcottville, Conn.
*Susan Carol Ouzts	Saluda
**Linda Panaccione	Greenville
Kristine Anne Seel	
Deborah Ruth Smith	Westminster
Margaret Dyar Smith	. Seneca
Susan Kay Smith	Taylors
Susannah Woods Smith	
Resa Jo Stepp	Hendersonville, N.C.
Bonnie Poole Wade	Seneca
Linda Ann Walker	Myrtle Beach
Kathryn Ruth Wooten	Columbia

BACHELOB OF SCIENCE Nursing

Lynchburg Anderson Orangeburg Easley Gréer Jamestown N.C. Lancaster Johnsonville Columbus, N.J. Sumter Bowman Florence Fountain Inn Florence Anderson Spartanburg . Columbia Johnson City, Tenn. Sumter Kinnelon, NJ. . Bethlehem, Pa. ... Lake City Greenville . North Aiken Greer Cincinnati, Ohio . . Anderson Downers Grove, III. Ninety Six Seneca . Columbia Atlanta, Ga West Pelzer Springfield, Va. Anderson

Sarah Welsh Hall Vickie Dean Hardin Rebecca Jewell Henderson Fran Jane Hogan Cheryl Lynn Holcombe *Agnes Deborah Howard ***Sherree Dianne Hughes Flien Roberta Hurst Maida Eugenia Jackson Margaret Gail Jay Patricia Anna Jenkins *Kathy Ann Johnson *Jan Lindsay Kaas Elizabeth Clinkscales Keaton *Sandra Smith King *Debra Gene Klinger Jane Marti Landreth *Marsha Simpson Lemmons . Kathleen Camille Lindenberg Carroll Joyce Martin Martha Jo Martin Verna Ruth McGrath Teresa Joan McInvaille Mary Melinda Medlin Cheryl Diane Mims Anne Courtney Moore *Virginia Anne Moore *Margaret Ann Nettles ***Marilyn Taylor Oakes Katrina Ann Owen Yvonne Elizabeth Parker **Sandra Kay Parks Catherine Eugenia Patrick Elizabeth Marie Peabody

..... Florence Green Easley Clinton . Columbia Greenville Ware Shoals Clemson Wrightsville, Ga. Charleston Sumter Conway Thomasville, Ga. Anderson Spartanburg ... Greenville Pendleton ... Townville Charleston Florence Hartsville McCormick ... Hartsville Gastonia, N.C. Greenville Van Wyck Greenville Moncks Corner Greenville Belvedere Travelers Rest Augusta, Ga. . Charleston Bethlehem, Pa.

Nursing (Continued)

*Vicki Joyce Plyler Clarkston, Ga.	*Cathy Anita Stalcup Seneca
*Robin Louise Prout Roxbury, N.Y.	**Rene Lee Swygert Anderson
Victoria Lee Purvis	**Catherine Louise Taylor Columbia
Janet Cecilia Radford	*Virginia Tobitha Thomas Atlanta, Ga.
Ann Rutledge Rankin	Margaret Brenda Wannamaker . Swansea
Carolyn Joyce Raymer Greenville	Joyce Elizabeth Ward Lake City
Patricia Ellen Rourk Williston	**Carlotta Ann Watson
***Cynthia Ann Sanders Barnwell	Lucy Gaddy Wescoat Lancaster
Martha Ann Sanders Greenville	Rita Kathryn Williams
*Teresa Geraldine Senters	Thurma Renee Wood Spartanburg
**Mary Smoak Cheraw	

COLLEGE OF SCIENCES

HENRY ELLIOTT VOGEL, Dean

BACHELOR OF ARTS

Chemistry

***John Wannamaker Holman	Anderson	Clyde Townsend Stanton	Cheraw

Ma	themati	ical	Sciences
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avid Pierson Kerford
Kim Ellen Manuel Fairfax
ny Rutherford Smith Honea Path
uzanne Brooks Staton Orlando, Fla.

BACHELOR OF SCIENCE

Biochemistry

***Gretchen Noel Barnes	Greenville	**Linda Joy Schwab	Greenville
Deborah Anne Brusini	St. Petersburg, Fla.	***Lydia Carlton Turner	Pamplico
***Cynthia Louise Griffith	Dover, Del.		

	Bot	any	
*James Milton Coker Karen Elizabeth Manyak		Sanford Hamner Newell III **Margaret Ellen Walworth	Spartanburg Anderson

Chemistry

William Douglass Bittle	Camden	**Lawrence Leviticus Sanders, Jr.	Ware Shoals
***Joe Newton Herron	. Rock Hill	Solomon Henry Simon	. Charleston

Geology				
Mary Jane Aiken *Peter Roy Manoogian		**Nancy Ruth Sowers	Atlanta, Ga.	

Mathematical	Sciences
--------------	----------

Gloria Gilreath Anderson	Rebecca Jean Huff Simpsonville
***John Robert Bane	Virginia Ruth Kissell
Barbara Ann Brehm Lloyd Harbor, N.Y.	*Scott Anthony Koefoed Summerville
*Garry Wayne Bruce Mt. Pleasant	Barry Carter Leigher Greenville
Donna Heckle Buddin	Philip DeWayne Lyles Seneca
Franklin Frederick DeHaven, Jr Charleston	**William Comer McCrary II North Charleston
Constance Susan Hall	*George Murice Mitcham Summerville
Robert Gordon Hammond Greer	*Francis Joseph Reiss Rock Hill
**Katherine Hazen Greenville	**Connie Mylinda Segars
Mary Agnes Hite	‡Dale Allan Walsh Aiken
James Maxwell Hogarth, Jr Brunson	*Nancy Annette White Troy

Medical Technology

*Katherine Lynn Anderson Tommasine Plowden Gibson Greenville Manning

*Margaret Ann Hill

Gaffney

Microbiology

*Raymond Keels Allen	Greeleyville	Edgar McKoy Huggins, Jr	Kingstree
Michael Kenneth Barrineau	Greenville	**Robert Edward Jackson, Jr.	Manning
Harvey Miller Beal III	Medford, N.J	**Henry Lewis Kearse III	Orangeburg
*Richard Dalton Bennett	Kershaw	Eric Lynn Lazzari	Kingstree
Jay Russell Bishop	Orangeburg	Christopher Michael Lock	LaGrange, Ga
*Charles Timothy Campbell	. Rock Hill	**Lindsey Davis Lupo	Greenville
*Michael Joseph Chapman	Charleston	**Susan Nilex O'Brien	Anderson
**Donna Marie Charette	Easthampton, Mass.	Robin Ann Plummer	Wayne, NJ.
Virginia Puckett Cheatham	Greenwood	Jerd Watts Poston	Pamplico
**Richard Stewart Chesser	Aiken	*Charles Travis Powell, Jr.	Bethune
**Jane Marie Cook	Williamston	*Bethany Jane Schilling	Mauldin
**Steven Carol Cox	Cary, N.C	*James Peele Shapleigh	Camden
***Robert Ben Culp III	Greenwood	Anne Marie Snipes	Central
**James Michael Davidson	Jackson	Nancy Elaine Southerlin	Taylors
*Lellan Dawes Edwards	Johnston	Jerry Stewart Stoddard, Jr	Laurens
*Walter Hill Elliott III	Summerville	*David Walker,Stroud	Rock Hill
Thomas Walter Epps	Fort Mill	James Henry Tolley, Jr.	Charleston
Steven Earl Freeman	Pickens	Thomas Ball Tupper	Summerville
Russell Tyson Garland	Columbia	Lorna Elizabeth Tuttle	Columbia
*Stephen Brian Gatiin	. Rock Hill	*Rebel Bradford Umphlett	Clemson
Michael Luke Godwin	Cheraw	*Philip Charles Wilkins	Blacksburg
Linda Jeanne Hogarth	Charleston Heights	*Stephen Ray Williams	. Rock Hill
Waiker Ambrose Holliday	Georgetown	Mark John Wolcott	Chester
Marcia Lynn Huddleston	Largo, Fla	William Edward Wood	Anderson

Pre-Professional Studies

*Elizabeth Rachel Walker . Rock Hill

Alan Mark Babb *George Steven Bailes Anderson Randall Robin Bohsen Ipswich, Mass. **Stuart Edwin Burnett, Jr. *Cheryl Anita Caldwell Sumter Abbeville **William Leonard Culp, Jr Rock Hill Beaufort John Stephen Demosthenes *Bruce Edward Dunn Clemson **Kenneth Christopher Evans Hartsville _____Lane Julius Pendergrass Gamble, Jr. *Brenda Kay Harrison *George Tillman Hughes Fountain Inn **Russell Charles Hurst, Jr Sumter *Edmond Rhodes Jordan Anderson

Zoology

*With honor

**With high honor

***With highest honor

#With departmental honors

Aiken *Barbara Claire Joseph Charleston nderson *Linda Jeanne Meincke Albuquerque, N.M. h, Mass. *Stuart Cameron Owens Aiken Dack *Stuart Cameron Owens ****Laura Pinner Peak Barry Steven Poretskin Toms River N. J. Mitzee Carter Pritchard Clinton **Harriet Crim Reavis Sycamore David Monroe Southerland Anderson *Carl Granberry Speer Metarrie, La. *Danny Lee Sponaugle Summerville Por et Carte Strole Tulsa, Okla. David Seth Steele Tulsa, Okla. David Seth Steele Tulsa, Okla. **Thomas Edwin Tucker Greenville *Franklin Kilcoyne Wilson Columbia

MASTERS' AND EDUCATION SPECIALIST DEGREES CONFERRED MAY 6, 1977

COLLEGE OF AGRICULTURAL SCIENCES

MASTER OF AGRICULTURE

MASTER OF A	GRICULTURE
William Gomez Camacho Cali, Colombia Doyle Wesley Gibson Saluda Linda Ruth Kuisma Wang Clemson	Dennis Ansel WileyBradley Wyatt Edmond Windham St. George
MASTER OF NUTRI	ITIONAL SCIENCE
Paula Marie Bradham	Sumter
MASTER OF	FSCIENCE
Agricultural	Economics
William Dempsey Blackmon IIIRidgeland Larry James BoylestonPendleton	Nancy Jean Pettigrew
E-to-	
Entom	•••
Vicki Munger Ferguson Seneca	William Carter Kea
Hortico	ulture
Carl Kurt Hanson Cranford, N.J. Sandra Lee Berry Lowe Houston, Tex.	Donald Neal Ross Taylors
Plant Pa	thology
Ernest Grey Lawrence, Jr	
Poultry	Science
Duncan McGregor Huntley, J	r Ruby
Wildlife	Biology
Reginal Mark Harrell	Lawrence Monroe Luckett

COLLEGE OF ARCHITECTURE

MASTER OF ARCHITECTURE

Raymond Hilbert Anderson, Jr. North Charleston	Kenneth John Pflieger
Richard Kris Barthelmess	Thomas McGehee Phifer
Kenneth Haulbrook Brown, Jr.	Charles Martin Swit Massapequa, N.Y.
Douglas Foster Clark Isle of Palms	Carl Alan Tucker Greenville
John Royce Edwards Greenville	Thomas W. Wurtz Dallas, Tex.
Lee Welles Mitchell Clemson	

MASTER OF CITY AND REGIONAL PLANNING

Thomas Edward Bowles	Columbia
Judith Ann Davis	St. Petersburg, Fla.
Christopher Heller Fales	Columbia, Mo.
Joel Parrish Ford	Pawley's Island
Sherry Yvonne Fortenbern	y Sullivan's Island

Steven Jay Kangisser	Cleveland, Ohio
Daniel Charles McFarla	ne Central
Harold Stephen Snyder	Horse Shoe, N.C.
James Scott Ziegler	Mt. Pleasant

MASTER OF FINE ARTS

William Thomas Caldwell Cleveland	William Belvin Turnbull
Robert C. M. Doster Lancaster	Sherrill Altman Whetsell
Connie Mack Floyd Loris	Susan Baker Wooten Pendleton

COLLEGE OF EDUCATION

EDUCATION SPECIALIST

Educational Administration

Central

Toy Tompie Sizemore, Jr. Greenville

MASTER OF EDUCATION

Administration and Supervision

Greenville Anderson . Oakway Seneca Greensboro, N.C.

Clarence Julius Pinson	Greenwood
Larry Wesley Raulerson .	Okeechobee, Fla
Jane Uldrick Rhodes	Donalds
Frank Judd Tapp	

Elementary Education

lva Greenwood Pickens Laurens Greenville Beaufort Clemson Salem Walhalla Anderson Laurens

Charron Timms Perkins
Susan Ford Reed Anderson
Pamela Jean Reeves Taylors
Carol Schulman Rubin
Barbra Almeter Smith Greenville
Gayle Douglass Smith Pickens
Colleen Piirto Stewart Greenville
Jerry Carroll Traynham
Jimmie Lou Rogers Vaughn Greenville
Mary Gay Smith Walfield Belton
Sarah Deborah Weathers
Cherilyn Joyce Wyatt West Union

Personnel Services

Walhalla Greenville Georgetown Greer Travelers Rest Anderson ... Clinton Enoree Anderson Clinton Belton Greenville Clinton Columbia Clemson Ninety Six Simpsonville

alla Many Ber

Mary Bernadette Mulvaney Martin	
Hannah Campbell Meadors	
Cathy Fave Phillips	
Curtis A. Pitts	,
Rosemary Bridwell Plumblee	Greenville
David Robert Price	Hanahan
Sheron Roper Price	Anderson
David Arnold Russell	Greenville
Deborah Louise Scattergood	Vero Beach, Fla.
Richard Calvin Todd	Laurens
Videra Koogler Varnadore	Greenville
Catherine Gilfillan Webber	Greenville
Sheila Newton West	Greenville
Mary Kathleen Wiggins	Clemson
Marty Harrison Williams	Pendleton

Reading

Easley	Alice Janssen Jones	Greenville
Anderson	Vickie McIlwain McClain	Donalds
. Liberty	Fredda Lowe McWhorter	Honea Path
Clemson	Brenda Rigsby Payne	Taylors
Greenville	Marthabelle Brunson Rabon	Easley
Anderson	Jimmie Sue Steveson	Greenville

Secondary Education

Spartanburg	Iris Patterson Thompson	Clemson
. Charleston	Barbara Darby Wheatley	Pelzer
. Clemson		

Master of Industrial Education

William Gettys Carter	
Mary Joyce Kelley .	

James Lloyd Lucas III

Clemson Travelers Rest William Christopher Mulligan

Bellmore, N.Y.

Sara Ann Lusk

Rebecca Pearson Beaudoin Larry Eugene Green Louis Corley Holleman Pauline G Langston Don Kelly Ledbetter, Jr

Betty Threlkeld Brickle Janet Dugger Bryson Ruby Nell Mansell Byrd Sherry Estes Coggins . Martha Davidson Cooper Cynthia Gramling Fulmer Linda Woodrum Haynes . Nancy Kinard Horton Ruth Sawyer Jordan . Eugenia Pence Lee . William Lee Lowe Mary Louise McGill ...

Doris Mattison Bigby Andrea Sedran Blades Karin Margaret Burnitt Jimmy Arnold Cannada Vivian McCoy Choplin Judy Dixon Cothran Martha Elizabeth Edwards Judy Gray Farr Sue Ann Glenn Martha DuBose Green Carolyn Bryant Hall Frank Moultrie Hamilton, Jr. Miles Wyman Holmes, Jr. William Johnston Jennings David Craig Johnston Joseph Francis Kerenick Diane Adams Kirven

Susan Mulz Bullard Jean Terry Dyar Sheryl Wade Evatt Mary Louise Garren Beverly Good Hawkins Jannie Clinkscales Hill

Ona Sites Glenn . . Mary Kennerty King

COLLEGE OF ENGINEERING

	Master of Er		
	Burgess Medley Allen, Jr	Greenwood	
	MASTER OF	SCIENCE	
	Bioengin	eering	
Amın Salem Bredan Deborah Lee Lewis	Tripoli, Libya Florence	Kenneth Raymond St John	E Montpelier, Vt
	Ceramic En	gineering	
	Thomas Earl Smith	Madison, Tenn.	
	Civil Engi	neering	
Roger Dale Dyar	. Seneca	Gary John Matthews	Columbia
Eduardo Isaza	Medellin, Colombia	Cary born mathews	
	Electrical Er	ngineering	
Sarvendra Prakash Agarwal	Meerut, India	James Harvey Hobson, Jr.	Clemson
Athanasios Demetrios Aridgides David Blanchard Bullard	Salonica, Greece . North Augusta	Robert Judson Wood	Greenville
	Environmental Syst	ems Engineering	
John William Owenby Dean Franklin Rich	Columbia Norris	David Michael Welch	Society Hill
	Mechanical E	ngineering	
DeVon Reveil Belcher	Blue Ridge	Donald Kenny Todd	Taylors
Thomas Edward Fewell		David Andrew Westbury	St. Matthews
Rennie Middleton Singletary III Kwun-lon Ting	Cross Yun-lin, Taiwan	Joseph Chen-Hsiung Yang	Kashsuing, Taiwan
	Systems En	gineering	
	Charles Michael Melton	Laurens	
	Water Resource	s Engineering	
S. David Myers	Pittsburgh, Pa	Paden Eskew Woodruff III	Pickens
COLLE	GE OF FOREST AND	RECREATION RESOURCE	S
	MASTER OF	FORESTRY	
Philip Peter Gornicki Mark Alan Helmken	. Glen Head, N.Y. Mountain Lakes, N.J.	Joseph Mark Stephens James Yan Wong	Spartanburg Washington, D. C.
	MASTER OF RECREATION A	ND PARK ADMINISTRATION	
Lynne Rayle Beeson	Walterboro	Thomas Hallman Fearrington, Jr.	Columbia
James Paul Drummond	Woodruff	Jeffrey Phillip McNeill	
	MASTER OF	SCIENCE	

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F			

Michael Joseph Beese	Avenel, N.J.	Bruce Graeme Lockaby	Westminster
Henry Eugene Kodama	Moncks Corner	Seamon Barry Rhea	Aberdeen, Miss.

COLLEGE OF INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE

MASTER OF ARTS

Feenomice

Teresa Stallings Cannon Richard Thomas Christoph John Willard Fort

Blacksburg

Columbia Robert Philip Franks Clemson Chalmers Winston VanDeusen

Iva Clemson

MASTER OF SCIENCE

Management

Shizuoka-Ken, Japan Yutaka Kaneko

Textile Science

Robert Clifford Brannon Spartanburg

COLLEGE OF LIBERAL ARTS

MASTER OF ARTS

English

Nancy VanArnam Swanson

Seneca

COLLEGE OF NURSING

MASTER OF SCIENCE

Nursing

Becky Fields Campbell Anderson

COLLEGE OF SCIENCES

MASTER OF SCIENCE Chemistry

Edward Jones

Mathematical Sciences

William Lawrence Bridges Norma Gail Brownlee Angela Sanford Cribb Clemson Jean Louise Hannegan Camden Karen Margaret Hetrick Chargrin Falls, Ohio Thomas Edward Kennelly

North Miami Beach, Fla

Lexington, N.C. John Fitzpatrick Kirby Lexington, N.C. John Hizpatrick Nidy Boiling Springs, N.C. James Edward Scurlock, Jr. Clemson Karen Lynne Stephens Camden Wesley Mitcheal Stephens Chargrin Falls, Ohio Della Marie Stephenson North Miami Beach, Fla William Earle Wilson

Charlotte, N C Green Sumiton, Ala. Marietta, Ga. Atlanta, Ga Vero Beach, Fla Hampton

Microbiology

Sally Jo Booth Christopher Steven Hickey Anderson James Douglas Kohl Seneca

Schiller Park, III. David Nathan Mellard Kathleen Ann Stralka

Summerville Oxon Hill, Md.

Zoology

Charles Harris Peacock

Macon, Ga

Orangeburg

DOCTORS' DEGREES CONFERRED MAY 6, 1977

COLLEGE OF AGRICULTURAL SCIENCES

DOCTOR OF PHILOSOPHY

Applied Economics

William David Mulkey B. T. M., Auburn University; M. A., Clemson University Dissertation: Interregional Input-Output Matrices from Secondary Data

Animal Physiology

William Rogers Boone
Clemson
B. S., University of Georgia, M. S., Clemson University
Dissertation: Development of Boyne and Oyne Embryos with Special Emphasis on **In Vitro** Culture Techniques

Plant Physiology

John Smith Boswell, Jr B. A., University of South Florida; M. S., Clemson University Dissertation: Zoosporogenesis in **Lagenidium giganteum,** a Fungal Parasite of Mosquito Larvae, in Response to Nutritional Supplements

COLLEGE OF ENGINEERING

DOCTOR OF PHILOSOPHY

Engineering

 David Monroe Bell
 Hartsville

 B. S., M. S., Clemson University
 Dissertation: Digital Signal Processing for Textile Irregularity Analysis (Field of Specialization: Electrical Engineering)

 Vishwa Nath Gupta
 Kanpur, U. P., India

 B. Tech., Indian Institute of Technology, M. S., Clemson University
 Kanpur, U. P., India

 Dissertation: A Speaker Independent Isolated Word Recognition System Using Linear Prediction (Field of Specialization: Electrical Engineering)
 West Union

 Richard Bruce Schuessler
 West Union
 S. M. S., University of Missouri

 Dissertation: The Influence of Anatomical Variations on Voltage in the 12 Lead Electrocardiogram (Field of Specialization: Bioengineering)

COLLEGE OF SCIENCES

DOCTOR OF PHILOSOPHY

Chemistry

Philip Gordon Harris B. S., Muskingum College Dissertation: Synthesis of Diterpene Acids Orangeburg

Weogufka, Ala

CLEMSON-FURMAN UNIVERSITIES MASTERS' DEGREES CONFERRED MAY 1, 1977

BUSINESS ADMINISTRATION

*Darrell David Annis Taylors, S.C.
Steven William Butler
*Arch Ronald de Castrique New York, N.Y.
William Barry Chisholm (M.S.) Greenville, S.C.
William Lloyd Crosby Greenville, S.C.
Sammy Earl Crouch
Romley Ray Easter
Wayne Babb Elmore Williamston, S.C.
Christopher Jay Faber Alpharetta, Ga.
Alan Ray Franklin Clemson, S.C.
Gladys Loraine Hardegree Bartlesville, Ok.
Thomas Howell Harris Greenville, S.C.
Robert Hoy Harrison, Jr Greenville, S.C.
Walter Cottingham Henry (M.A.) Greenville, S.C.
Allen John Hopkins (Ph.D.)
*Robert Eugene Howard Greenville, S.C.
*Dan Edward Hunt Laurinburg, N.C.
Ravendra Jain Greenville, S.C.
Catherine Rose Jaran Greenville, S.C.
*Richard Gresham Kinard Wichita Falls, Tx.
Charles Ellsworth Krohn Greenville, S.C.
Charles Ray Lawrence Simpsonville, S.C.
Ronald Lee Lindsay Greenville, S.C.
Norman Iain McDonald Greenville, S.C.
James Gardner Meek, Jr Greenville, S.C.
John Paul Norman Chamblee, Ga.
William Thomas Parkman, Jr Greenville, S.C.
Rene Pieters Clemson, S.C.
James Ronald Reed Decatur, Ga.
James Edmond Riley Greenville, S.C.
*Donna Lynn Rivett (Summa Cum Laude) St. Ann, Mo.
Robert Jay Schulz Greenville, S.C.
Ernest Donald Shieder Mauldin, S.C.
*James Harland Shuppert (M.S.) Cincinnati, Ohio
Heath Lee Strawn, Jr Greenville, S.C.
Paul William Stringer Laurens, S.C.
William Alfred Tuck Greenville, S.C.
Hubert Claude Wade Greenville, S.C.
Thomas Frederick Webster Mauldin, S.C.

*In absentia

() Highest graduate degree obtained other than the MBA

BACHELORS' DEGREES CONFERRED AUGUST 6, 1977

COLLEGE OF AGRICULTURAL SCIENCES

LUTHER PERDEE ANDERSON Dean

BACHELOR OF SCIENCE

Agricultural Economics

Herbert Roy Koon, Jr. _____ North Charleston

Animal Industries

 Meredith Virginia Bradford ______ Columbia
 t**Robert Ray Kennedy, Jr. _____ Allendale

 Thomas Clay Chappell ______ Leesville
 John William Ulmer ______ Lodge
 **Rebecca Van Houten Elvington ____ Nichols

Economic Biology

Robert Wayne Carneal _____ Sumter

Food Science

William Charles McDaniel _____ Lake City

Plant Sciences

James	Michael	Beaver	 Hightstown,	N. J.	
Michae	I William	Foster	 Sparta	nburg	

Belinda Hill Hawkins _____ Clemson *Christopher Merrill Tilghman _____ North Myrtle Beach

Pre-Professional Studies

**Walter Boyd Gregg, Jr. ____ Charleston **Henry Lawrence Wienges, Jr. ___ St. Matthews **Boyd Hobson Parr _____ Newberry

tWith departmental honors — Agricultural Sciences

COLLEGE OF ARCHITECTURE

HARLAN EWART McCLURE, Dean

BACHELOB OF ARTS

Pre-Architecture

Preston Brooks Holmes _____ Trenton Robert David McCall _____ Aiken

BACHELOR OF SCIENCE

Building Construction

*Brad Hanson Boyer _____ Bemus Point, N.Y. Frank Joseph Graziano ____ North Bergen, N. J. William Elton Fellers _____ Columbia

Pre-Architecture

*Gregorius Joseph Juhadi _____ Singapore Chris Ware McCallister ____ Bernardsville, N. J. Chet George Lawson _____ Greenville Charles Ansley Yates _____ Sumter

BACHELOR OF ARCHITECTURE

Grant Davidson Baker _____ Clemson

COLLEGE OF EDUCATION

HAROLD FOCHONE LANDRITH, Dean

BACHELOR OF ARTS

Early Childhood Education

Myra Ann Ables ______ Westminster Carol Elizabeth Gray _____ Easley Cynthia Anne Castleberry _____ Chamblee, Ga.

Elementary Education

Donna Frances Anderson Piedmont
***Elizabeth Gibson Christopher Bennettsville
Jane Reid Fuller Greenville
*Annette Tucker Jackson Pendleton
Amy Katherine Johnson Asheville, N. C.
Debra Gail Looney Taylors

Angela Marie Michael Greenv	ville
*Dixie Hudson Truitt Bryan, Te	xas
Jan Hunt Weeks Towny	ville
***Kathy Smith Williams Eas	sley
DeAnna Carole Yarbrough Dun	can

Secondary Education

Eleanor Angela Askey **Karen Dianne Hays	
***Haia Konover	Givatayim, Israel
*Anita Lynn Layton	Newberry
Sally Love	Belton
James Alvin Martin	Abbeville
Rafael Jesus Parrado	

Timothy Ray Sheriff	Seneca
Regina Mary Smith	Summerville
Sara Elizabeth Smith	_ Winnsboro
Lee Ann Thomas	Simpsonville
Daniel James West	Clemson
Dixie Lucy Wilson	Walhalla
Alan Michael Wind	Taylors

BACHELOR OF SCIENCE

Agricultural Education

(Agricultural Education is jointly administered by the College of Agricultural Sciences and the College of Education.) James Gary Jeffries _____ Charleston, W. Va. *Tempie Corrinda Thompson _____ Conway

Industrial Education

***John Walton Mann Chapi	in Richard	O'Neil Perry	Clifton
Edwin Cecil Morehead Westminste	er *James I	Herman Sprouse	, Jr Converse

COLLEGE OF ENGINEERING

LYLE CHESTER WILCOX, Dean

BACHELOR OF SCIENCE

Ceramic Engineering

Jeffrey Lang Garrett _____ Woodruff

Chemical Engineering

Samuel David Hendrix, Jr Lexington	*Kimberly Jayne Wasson Greenville
Annis Lee Jenkins Laurens	**Chun-Chau Wong Kowloon, Hong Kong
Mark William Ward Aiken	

Civil Engineering

John David Collins	Columbia
William Hartwell Cook, Jr	_ Lakeland, Fla.
Henry Clay Duffie	Saluda
***Allen Harvey Heinly	Royersford, Pa.

Marcel Gonzalez Manent Barcelona, Spain
Stephen Wayne Parks Spartanburg
Henry Rudolf Payne Goose Creek
Michael Anthony Wilson Columbia

Electrical Engineering

James M	lartin Armfield	Newberry
Cleve Ma	ax Brown S	partanburg
*Randall	Johnson Emanuel	Lancaster

*Eleas Frank Lawandales, Jr. _____ Charleston Richard Randal Troop _____ Shalimar, Fla. Richard David Alexander Wilson ____ Greenville

Engineering Technology

Steven Sutton Alley Clemson	Robert Van Mott Reston, Va.
Thomas Lee Dabbs, Jr Hickory Tavern	Gregory Bryan Smith Seneca
George Michael Hornick Seneca	Wade Melvin Watson Pickens

Mechanical Engineering

incentancer a	_ngmeening
William Thomson Clark Hilton Head Island	Girishkumar Babulal Kinariwala Greenville
Edward Steven Crawley Summerville	Michael Irvin Thomas Hampton
*Walton Lane Ector, Jr Charleston	

COLLEGE OF FOREST AND RECREATION RESOURCES

WILLIAM HENRY DAVIS McGREGOR, Dean

BACHELOR OF SCIENCE Forest Management

Stephen Wayne Ackerman	Charleston
William Pierre Burdette	Greenville
Ronald Wesley Byrd	Darlington
John Albert Dickinson	Mullins
Neal John Dunlap Trav	velers Rest
Carol Lawton Maner	Estill

*Franklin Alexander McLeod III Sumter
Harry Strohecker Morrison III Estill
**Gary Brian Seithel Charleston
James Michael Spivey New Ellenton
David Glenn Williams Greenwood

Recreation and Park Administration

	neoreactor and
Tony Lawrence Able	Greenwood
Timothy Eugene Bryant	Liberty
*Lee Ann Clark	Saline, Mich.
*Ricky Lynn Davis	Greenville
*James Alvin Fuzy	Ft. Wayne, Ind.
Charles McFall Gilstrap	Greenville
Stanley Phillips Hunnicutt	Pendleton
Ronald Bird Jameson	Clemson
Joseph Brent Jennings	Pickens
Robert Bruce Jones	Batesburg

William Ashley Jordan Greenville	•
Scott Alan Morris Scotch Plains, N. J.	
*Harold Joyce Price, Jr Columbia	4
**Randall Dewayne Quintrell Covington, Ga.	
*William Bruce Roper Gainesville, Ga	
*Terrill Eugenia Sizemore Clemson	1
James Perry Stroman Orangeburg	
Stephen Warner Tucker Charlotte, N. C.	
*David Alexander Williamson Aiker	1

Wood Utilization

COLLEGE OF INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE

WALLACE DABNEY TREVILLIAN, Dean

BACHELOR OF ARTS

Economics

William Francis Depew _____ Baltimore, Md.

Sam Mitchell Slade, Jr. _____ Edgefield

BACHELOR OF SCIENCE

Accounting

*Peggy James Crowe Easley	*Sherry Marlene Owens Greenville
James Mell Doolittle Clover	Robert Sheldon Paschal III Columbia
*Margaret Cynthia McGrady Greenville	Michael Roy Rhymes Clemson
Gregorie Webb Nowell Bichland	

Administrative Management

Jill Marilyn Adams	Wilmington, Del.
Blake Garret Banta	Rumson, N. J.
Marie Louise Bethea	Springfield
Charles McElroy Buchanan	Anderson
David Elbert Burress III	Walterboro
William Hassell Burton III	Spartanburg
John Oliver Childers, Jr	Gaffney
David Tilman Cline	Greenville
Richard Michael Clonan	Colonia, N. J.
Vastine Gardner Crouch, Jr	Ridge Spring
Sharon Elizabeth DeLoach	Hampton
Paul Bland Edwards	Gaffney
Franklin Clayton Gentry	Anderson
Robert Lee Gilmer, Jr	Anderson
*Cynthia Diane Glazener	Anderson
Wilson Greene III	Sumter
Jack Travis Harmon, Jr	Greenville
John Calhoun Higgins III	Charlotte, N. C.
Vernard Dean Holden, Jr	Columbia

Michael Lotz Jackson	Summerville
Oren Randolph Judy	Spartanburg
Kim Nottingham Keith	Spartanburg
Margaret Ann Lesslie	Spartanburg
Robert Herman Livingston	Florence
Richard Franklin Love	Lancaster
Richard Carroll Osteen	Anderson
Jesse Karl Osterhoudt	Orangeburg
Alfred Lee Padgett II	Spartanburg
Beverly Jean Pepple	Greenville
Linda Ann Pringle	Greenville
Robert Jackson Rampey	Easley
Paul Thomas Rideout	Alken
John Milton Smeak, Jr	Greenville
Michael Grover Smith	Easley
Daniel Clarence Steiner	Pittsburgh, Pa.
James Kenneth West	Anderson
Daryl Michael Witte	Charleston Heights
Daniel Earle Youngblood	Pickens

Economics			
William Derrick Temple Florence	Max Edwin Whatley Greenville		
Financial Ma	anagement		
Roger Walton Bryant Batesburg	Virginia Carol Murray Cayce		
Charles Robert Davis, Jr Miami, Fla.	James Lawrence Todd Greenwood		
William Edwin Ellis, Jr Columbia	Jesse Ernest Wright III Chester		
Industrial Management			
David Russell Conley Columbia	Stephen Russell Joye Columbia		
James Steven Hatfield Anderson	William David LaGrone Johnston		
Textile Chemistry			
David Delos Hildreth Ithaca, N. Y.	*John Russell Perkins Hickory, N. C.		
	-		

Textile Science Robert Edward Smith _____ Florence

Bachelor of Textile Technology Richard Brooks Castles _____ Winnsboro George Emmett Young _____ Asheville, N. C.

COLLEGE OF LIBERAL ARTS

HEADLEY MORRIS COX. Dean

BACHELOR OF ARTS

English Dean Erol Black _____ Seneca **Linda Louise Southerland ____ Myrtle Beach Susan Lynn Smalley _____ LaGrange, Ga.

History

Theresa Hart Kraft _____ Jonesboro, Ga.

Modern Languages

Anne Elizabeth Baxter _____ Seneca ***Patricia Mierisch Reed _____ Greenville ***Lisa Ames Marsh _____ Charleston

Political Science

*James Whitfield Gilchrist, Jr Edgefield	Dennis Michael Moser Easley
Donald Clark McDonald Lawrenceville, N. J.	*Gary Dean Pitts Hickory Tavern
Ray Crosby Miller Clemson	

Psychology

Thomas Reese Alexander	Iva
Michael Meadors Bull Baller	ntine
***Carol Wilson Houston Ea	asley
*Melanie Ann Lehmann Cler	nson
*Dorothy Holmes Parker Su	mter

*David Richard Price	Greenville
*Connie Grace Taylor	_ Laurens
Freater Patricia Thomason	Greenville
James Anthony Thrailkill	Cheraw

Sociology

Kathryn Ann Alexander Walhalla	Edward Wylie Gregory, Jr Chester
*Linda Paulette Bowie Pickens	Elizabeth Dunbar Grist York
*Barbara Gail Fox Hendersonville, N. C.	Lena Rivers McCutchen Bishopville

COLLEGE OF SCIENCES

HENRY FLUOTT VOGEL, Dean

BACHELOR OF ARTS

Mathematical Sciences

Roy Edward Bartlette, Jr. ___ Rockingham, N. C.

BACHELOR OF SCIENCE

Chemistry

Richard Alan Kagel _____ Greenville John Pease Moore III _____ Mt. Pleasant Jack Fontaine McKenna _____ Arlington, Va.

Mathematical Sciences

*Charles Michael Jordan _____ Marion Arthur Boland Lindler III _____ Leesburg, Ga.

Medical Technology

*Nancy Ann Adams Clinton,	Md. *Peggy Ann	Sullivan	Greenville
**Melissa Lynn Dobbins Oranget	urg *Richard Ala	n Taylor W	/are Shoals
*Rose Anna Gunter Sur	nter		

James Michael Boggs Central
**Andrew William Butchko, Jr Sharon, Pa.
James Sparrow Dickson Marietta, Ga.
Joseph Allen Johnson Charleston

Margaret Catherine Quinn Lancaster	
Don Albert Smith Williston	
Chester Stanley Spell Savannah, Ga.	
Andre Gilmore Stanley Gaffney	

Physics

*John Huntley Belk, Jr. _____ Aiken

Pre-Professional Studies ***William Norris Boulware _____ Belton ***Milan C. Schmidt _____ Charleston ***Marc Lewis Clark _____ Charleston ***Sonja Eva Singletary _____ Coward *James Stanley Ulmer _____ Greenville *Timothy Dale Youell _____ Seaford, Del. **George Reid Dusenberry III ----- Burlington, N. C.

**William Jay Horne II _____ Greenwood

Donald Breck Carmichael _____ Spartanburg

iy .		
*John Levis LeF	Roy, Jr	Hartwell, Ga.
Richard Gregory	Simpson	Iva

* With honor

** With high honor

*** With highest honor

Microbiology

Zoology Susan Marie Alewine _____ Anderson

MASTERS' AND EDUCATION SPECIALIST DEGREES **CONFERRED AUGUST 6, 1977**

COLLEGE OF AGRICULTURAL SCIENCES

MASTER OF AGRICULTURE

James Cleveland Carey, Jr. _____ Clemson George Leon Watkins III _____ Anderson

MASTER OF NUTRITIONAL SCIENCE

 Doris Susan Anderson
 ______ Toccoa, Ga.
 Wilmot Salters McCollough III
 _____ Salters

 Joye Willcox Cain
 ______ Marion
 Cynthia Anne Muntzing
 _____ Clarksburg, W. Va.

 Elbert Otis DeVore III
 Honea Path
 William Aaron Newton
 Sumter

Curtis Cecil Gentry Clemson	Edwin Cochran Quattlebaum Woodstown, N. J.
Mary Elizabeth Gilreath Travelers Rest	

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COLLEGE OF ARCHITECTURE

MASTER OF ARCHITECTURE

Robert Earl Epps _____ North Charleston

MASTER OF FINE ARTS

Beverly A. Jamieson _____ Pendleton

COLLEGE OF EDUCATION

EDUCATION SPECIALIST

Educational Administration

David Luther Coleman Easley	Luther Eugene Marlar Simpsonville
Robert Arlynn Lytes Lexington	William Henry Thomas Stewart Spartanburg
Selma Rush Macy Greenwood	William Wesley Williams II Nashville, Tenn.

MASTER OF AGRICULTURAL EDUCATION

(Agricultural Education is jointly administered by the College of

Agricultural Sciences and the College of Education.)

Edgar Bolt Johnson, Jr Easley	Lee Terrell Mathis, Jr Edgefield
Jason Mack Lynch, Jr Anderson	Ronnie Alton Williams Seneca

MASTER OF EDUCATION

Administration and Supervision

William Robert Craig Pickens	Jean Ash Kirkpatrick Greenwood
Edwin Dekle Crawford Abbeville	Kathryn McConnell Lee Greenwood
Thomas Kirkpatrick Gaither, Jr Fort Mill	Jean Lee Robinson Greenwood
Posie Harris, Jr Greenville	Linda McLeskey Rogers Anderson
Phillip David Hopkins Pelzer	Roger Allen Wolfe Easley
Rita Elizabeth Davis Hopkins Pelzer	Mary Lee Wyndham Walterboro
Corrie Ann Jolly Gaffney	

MASTER OF	SCIENCE
Animal S	Science
nillip Irvin Osborne Greensboro, N. C.	William Russell Thomson Lockhart
Entom	ology
urtis Cecil Gentry Clemson	Edwin Cochran Quattlebaum Woodstown, N. J.
ary Elizabeth Gilreath Travelers Rest	
Nutri	tion
cott E. Mills Orange Park, Fla.	James Adam Smith Honea Path
Wildlife	Biology
erry Lynn Grimes Seneca	Dillard Nick Roark Greenville

Dorothy Cox Ashmore	O se se ville
Alice Voyles Black	
Portia Elalne Blackmon	
Margie Anderson Blighton	
Lois Egner Bomar	
Linda Kay Broadwater	
Madelaine Thompson Brownlee	
Martha Ann Buzhardt	
Kathra Mote Carter	
Ellen Ann Chamness	
Jane Genoble Conrath	
Jamie Hefner Corrigan	
Jean Elizabeth Craig	Easley
Deborah Jean Crawford	
Valerie Gail Crisp	Franklin, N. C.
Joyce Thomas Davis	Pendleton
Margaret Garrison Davis	Anderson
Susan Carson Dooley	Starkville, Miss.
Nancy Katherine DuBois	Clinton
Jo Ann DuBose	New Zion
Carolyn Mahaffey Duncan	Seneca
Bonnie Lee Farmer	
Jimmie Jones Farr	
Anne Bradford Fogarty	
Judith Anne Forrester	
Theresa Virginia Frank	
Susan Garrett Gilstrap	
Rebecca Hunnicutt Graham	
Ann Brown Harrell	
Susan Carol Harrison	
Deborah Sue Hawkins	
Carol Ann Henry	
Doris Davis Hill	
Elaine Austin Horton	
Norma Lynne Hudson	
Connie Faye Johnson	
Anne Derrick Kea	
Elizabeth Johns Kelley	⊾asley

Elementary Education

ducation	
Sally Clary Lee	Anderson
Burma Robinson Loner	Hodges
Ginger Lynn Malone	Clinton
Julia Catherine Mathis	Greenville
Jane Harrington McCall	
Irine Thomason McClinton	
Susan Ann McCullough	
Ivanell Louise McGaha	
Jimmie Haynie McGaw	
Mary Augusta McInvaill	
Harriet Black McKee	Clinton
Frances Elizabeth Moody	
Marion Lorene Newman	
Kathy Hooper Oglesby	
Jean Gleason Palmer	
Cloris Sorrow Partain	
Candice Woodall Poindexter	
Linda Gail Porter	Greenville
Brenda Hinton Reece	
Lynn Moore Rodelsperger	
Kathryn Harris Rogers	
Kim Mann Ross	
Arleatha Smith Sartain	Easley
Kristen Shealy	
Kathryn Collins Smith	
Vickie Dianne Smith	
Yvonne Lynn Stiefel	_ Fountain Inn
Ann Reid Taylor	
Lucy McJunkin Thomas	
Margaret Ann Golden Thomason .	
Thelma Thompson Thompson	
Marjorie Thomason Trotter	
Marian Vinson Turner	Williamston
Susan Brown Turner	
Frieda Barr Wald	
Judy Mae Watson	
Kathy Bouknight Weir	
Sandra Young Willard	- Ware Shoals

Personnel Services

Rosemary Jones Ahrens	Cowpens
Stephan Mark Bagwell	
Patricia Dukes Barrett	Easley
Candice Louise Bates	Hilton Head Island
Kirk Alan Brague	Orlando, Fla.
Deborah Lee Brewer	Long Creek
Sharon Bourne Brooks	Seneca
David Allen Burdette	Laurens
Marsha McCleskey Carey	
Lou Ann Corley	
Ethelyn McMillan Crank	Charlotte, N. C.
Karen Kuna Crawford	Greenville
Vickie Elaine Dayhood	
Linwood Cox Floyd	Clinton
Shirley Leach Haley	Sumter
John Douglass Harrison	Greenwood
Robert John Hoffman	
Phyllis Anne Ivester	
Georgianne Easter Jarrard	
Lynn McCoy Jones	
Frances Sharon Compton Lir	ndsay Due West

CIVICCO.	
Marion Dowis Mandrell	Anderson
Delane Herndon McJunkin	Walhalla
Virginia Rogers McMurray	Clinton
F. Linda Morten	Florence
Charles Alton Parsons	Pickens
Robin Kaye Patterson	Pickens
George David Pitner	Florence
Johnny Hugh Purser	Pendleton
Pamela Lynne Reese	Taylors
James Howard Rushton	Greenville
Kenneth Perry Smith	Greenville
Marcella B. Southerland	Anderson
Janet Walter Sparks	Clemson
Nancy Cothran Thompson	Laurens
Cynthia Faye Timms	Anderson
Hugh Alvin Weeks	
Talley DeMarris West	
Darcella Gretramane White _	Sumter
Mary Hawthorne Williams	Due West
Karen Hawkins Young	Simpsonville

Reading

Julie Lynn Blackwell Greenville	Betty Black Herlong Edgefield
Judith Roberts Clarke Williamston	Deborah Hamilton Howell Greenville
Brenda Dodson Cone Walnut Cove, N. C.	Phinalia Blackston Hunter Easley
Gwendolyn Billups Earls Williamston	Thelma Grant Wright Greenwood

Secondary Education

Regenia Suellen Broome Ashley Belton
Carl Samuel Bingham Manning
Mary Brailsford Greenville
Ada Catherine Craig Pickens
Marilynn Ruth Good Lockhart
Lynne Rickard Hardy Anderson
Linda Ann Lakatos Hawley Erie, Pa.
Beverly Saxton Jerrim Winter Park, Fla.
Chester Robertson King Due West
Beverly Love Little Clemson

ucation	
David Alan Mills	Greenville
Harriet Smith Palmer	Anderson
Harry Edington Pohl, Jr	Anderson
Rebecca Lynn Sewell To	occoa, Ga.
Jane Greer Stone	Greenville
Brenda Clarke Terrell	Laurens
Claudia Wingate Timmons	Taylors
Virginia Bell Vanstory	Greenville
Debra Ann Walters F	Reevesville

Master of Industrial Education

Thomas Patton Brennan Huntington, N.Y.
William Carroll Etheredge West Columbia
Jesbert Galento Gregory Sumter
Joseph Franklin Hayes Six Mile
Donald Clinton Holland Greenville

Kenneth Emil Luschinski Bel	rwyn, 111.
Stephen Duane Marlowe	Florence
Michael Rudolph Simmons	Clemson
Rebecca Jane Wilson	Lowrys

COLLEGE OF ENGINEERING

MASTER OF ENGINEERING

Chemical Engineering

James Dennis Rushton _____ Greenville John Michael Smart _____ Stockholm, N.J.

Electrical Engineering Guy Haywood White III _____ Columbia

Environmental Systems Engineering

William Stephen Cawood Augusta, Ga.	Ephriam Mikell Seabrook III Mt. Pleasant
Nelson Larue Hardwick Galivants Ferry	Paul Alan Warzel New Providence, N. J.
Raymond Rodney Kimmitt Liberty	William Richard Westfall Charleston
Marion Chapman Osteen Anderson	Sammy Charles White Hot Springs, Ark.

MASTER OF SCIENCE

Bioengineering

Richard Daniel Mayer _____ Rockaway, N. J. Naser Nur Salman _____ Syracuse, N. Y. Thomas John Parchinski __ Scotch Plains, N. J.

Ceramic Engineering

Donald Hollis Miller _____ North Augusta

Chemical Engineering

Charles Gaylord Sandell ____ North Miami, Fla.

Civii Engineering

James Berry Broyles _____ Columbia Gon-Yen Shen _____ Taipei, Taiwan Bruce Alvis Hines _____ Spindale, N. C. Julian Antonio Tafur ____ Guayaquil, Ecuador

Electrical Engineering

Albert Donnald Darby, Jr Greenwood	Gautam Harshadray Thaker Kansas City, Mo.
Shao-Bing Robin Lo Taipei, Taiwan	Shenghao Tsai Taipei, Taiwan

Engineering Mechanics

Bekir Bulent Algan _____ izmir, Turkey

Environmental Systems Engineering William Louis Lee _____ Columbia

 Mechanical Engineering

 Imtiaz UI Haque
 Lahore, Pakistan
 James Maner Tuten III ___ Winston-Salem, N. C.

Water Resources Engineering Harvey James Kinder _____ Kingstree

COLLEGE OF FOREST AND RECREATION RESOURCES

MASTER OF FORESTRY

Bruce Craddock Jaynes _____ Augusta, Ga.

MASTER OF RECREATION AND PARK ADMINISTRATION James Waymond Culp _____ Mountain Rest

MASTER OF SCIENCE

Forestry

Frank David McKinney _____ Liberty

COLLEGE OF INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE

MASTER OF ARTS

Economics

Thomas Rayfield Gulledge, Jr. _____ Fort Mill John Herman Schnibben III _____ Olanta

MASTER OF SCIENCE

Management

Robert Augustus Davis _____ Pendleton Marion Ralph Griffin, Jr. _____ Spartanburg

Textile Science

Joseph Israel _____ Brooklyn, N.Y. Harry Wilkes Poole _____ Gaffney

COLLEGE OF LIBERAL ARTS

MASTER OF ARTS

English

Sarah Rives Barnhill Clemson	Alice Nimmons Parke
Rosemary Riepenhoff Cooke Ottawa, Ohio	Elizabeth Ellen Reed
Susan Jean Crowson Rock Hill	Raoul Lawrence Smit
Michael Benjamin Hudnall, Jr Newberry	Laura Speed Simmon
Randolph Dunbar Jones Jackson Camden	Jessee Karen William
Robert Neil Lineberger, Jr Alexis, N. C.	

Alice Nimmons Parker Selleca	
Elizabeth Ellen Reed Fayetteville, Ark.	
Raoul Lawrence Smith Walterboro	
Laura Speed Simmons Suits Spartanburg	
Jessee Karen Williams Marion, Va.	

COLLEGE OF NURSING

MASTER OF SCIENCE

Nursing

Rose Marie Arblaster _____ Central

COLLEGE OF SCIENCES

MASTER OF SCIENCE

Biochemistry

Richard Morris Snead _____ Frederick, Md.

Botany

James Benjamin Grace _____ Atlanta, Ga.

Mathematical Sciences

Jacque White Davison _____ Pendleton Charles Judson Van Blaricom _____ Clemson

Microbiology

Deborah Kimmitt Gravely _____ Liberty James Robert Paterek _____ Taylors

Physics

Frank Hunter Stout _____ Johnson City, Tenn.

Zoology

Gregory Roger Bright __ West Terre Haute, Ind. Tina Renee White _____ Augusta, Ga.

DOCTORS' DEGREES CONFERRED AUGUST 6, 1977

ARNOLD EDWARD SCHWARTZ, Dean, Graduate School

COLLEGE OF AGRICULTURAL SCIENCES

DOCTOR OF PHILOSPOHY

Animal Physiology

Leo Stephen Frawley _____ Hingham, Mass. B.S., Belmont Abbey College; M.S., Clemson University

Dissertation: The Nature and Control of Gonadotropin Release in the Juvenile Female Rat

COLLEGE OF ENGINEERING

DOCTOR OF PHILOSOPHY

Engineering

Jerry Brantley Davis B.S., M.S., University of Georgia	Elberton, Ga.
Dissertation: Simulation of Heat and Moisture Movements during Drying of a Profile (Field of Specialization: Agricultural Engineering)	Two-Dimensional Soil
Edward Aloysius Duffy B.S., Philadelphia College of Textile and Science; M.S., Clemson University	Philadelphia, Pa.
Dissertation: Investigation of Magnetic Water Treatment Devices (Field of Sp Engineering)	ecialization: Materials
Hwei-Hwung Shaw T.D. in Civil Engineering, Taiwan Provincial Taipei Institute of Technology University	

Dissertation: Elastic-Plastic Analysis of a Rolling Disk by Finite Elements (Field of Specialization: Civil Engineering)

COLLEGE OF INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE

DOCTOR OF PHILOSOPHY

Engineering Management

Tsong Ming Lin ______ Taipei, Taiwan B.S., Ming-Chi Institute of Technology; M.B.A., Eastern New Mexico University

Dissertation: A Microeconometric Study of a Firm in Taiwan

Management Science

 Amitava Mitra
 Clemson

 B. of Tech., Indian Institute of Technology; M.S., University of Kentucky

 Dissertation: A Comparison of Some Biased Estimators in Regression Analysis

Frederick Charles Newruck, Jr. _____ Norristown, Pa. B.S., Bob Jones University; M.S., Clemson University

Dissertation: Discrete Bottleneck Facility Location Problems with Capacitated Facilities

COLLEGE OF SCIENCES

DOCTOR OF PHILOSOPHY

Chemistry

Jan Byron Wooten	Burlington,	Ν.	c.
B.S., North Carolina State University			

Dissertation: The Investigation of Molecular Reorientation and the Determination of Deuteron Quadrupole Coupling Constants by Deuteron Magnetic Resonance Spectroscopy

Mathematical Sciences _____ North Rose, N. Y. James Alan Bate _____ B.S., Bob Jones University; M.S., Clemson University Dissertation: The Ring of Quotients of R(S) Harland Edward Hodges Hickory, N. C. B.S., M.A., Appalachian State University Dissertation: A Characterizing Model for Discrete Simulations and Its Application to a Malor Railway System William Frederick Lyle III ___ Clemson _____ B.S., Davidson College; M.S., Clemson University Dissertation: Two Linear Algebra Problems from Algebraic Coding Theory Magdi Aziz Matar ----- Cairo, Egypt B.S., M.S., East Tennessee State University Dissertation: A Comparison of Programming Theories and Languages for Discrete Simulation

Physics

Daniel Wayne Welch _____ Lafayette, La. B.S., University of Southwestern Louisiana; M.S., Clemson University Dissertation: News Theorems

BACHELORS' DEGREES CONFERRED DECEMBER 22, 1977

COLLEGE OF AGRICULTURAL SCIENCES

LUTHER PERDEE ANDERSON, Dean

BACHELOR OF SCIENCE

Agricultural Economics

Michael Wade Banks _____ Chester Frank Benjamin Rogers III _____ Bennettsville Ansel Shelley Lovell Gresham

Agricultural Mechanization and Business

Samuel Grady Gilliam, Jr Abbeville	Lucius Omerle Porth, Jr Lexington
Robert David Mackney Westbury, N. Y.	*Stuart Bruce Watson Batesburg

Animal Industries

Constance Amspacher Pickens
David Rogerson Williams Baird Darlington
Melanie Ann Gangler Tucker, Ga.
Edward Archie Hawkins Travelers Rest
Thomas Caldwell Henderson, Jr.
Asheville, N.C.
Michael Wayne Herndon Rock Hill
*Janet Holimon Hogsed Easley
Hugh Alan Kimrey Cheraw

Edward Thomas Legare	Charleston
George William Moore	Anderson
Royal Wilson Munnerlyn	Georgetown
*Elizabeth Rhodes	Ehrhardt
**Eric Dickson Rutter	Summerville
Howard Eugene Smith	Summerville
*Cheryl Lynn Strong	Seneca
Berkeley Bryan Wilson, Jr	Columbia
*Pamela Jean Wilson Cha	arlotte, N.C.

Community and Rural Development

Glenn Allen Sutton, Jr. _____ Fort Pierce, Fla. **Melissa Louise Taylor _____ Lexington

Economic Biology

Barbara Julia Caughman Orange	burg
*Richard Stefan Guzy Princeton,	N. J.
John Joseph Koorey Massapequa Park,	N. Y.

Gina De	all Long]		Sparl	lanbu	ırg
James I	Patrick	Parkma	an		Salu	da
*Marsha	a Marie	Ward		Matthews	, N.	C.

Food Science

*Kristl Ruth Kahler _____ Zanesville, Ohio

Plant Sciences

Marc LaVerne Cribb Hemingway	Richard Lawrence McCord Manning
Margaret Anne Cruise Orangeburg	Jo Ann Riddle Gastonia, N. C.
Kellyanne Drews Charleston	Michael Strange Stoner Greenville
Mary Frances Floyd Columbia	Mary Jacqueline Summers Sumter
David Campbell Gibson Gaffney	Michael Francis Toner Hopewell, Va.
James Edwin Huey Columbia	Steven Charles Toole Greenville
George Vincent Hyams Silver Spring, Md.	Larry David Waldrop Anderson
Michael Wayne Jordan Galivants Ferry	Timothy Karl Wilson Clemson
Lafayette Eugene Kennerly Springfleld	

Pre-Professional Studies

***Susan Brown Lockaby _____ Hemingway Stephen Ross Powell _____ Florence

COLLEGE OF ARCHITECTURE

HARLAN EWART McCLURE, Dean

BACHELOR OF ARTS

Pre-Architecture

David Abbott Creech _____ Spartanburg Brett Allnutt Sunderland _____ Atlanta, Ga. Robert Stone Johnson _____ Lincroft, N. J.

BACHELOR CF SCIENCE

Building Construction

Rick James Hanson Seneca	*William David Looney, Jr Athens, Ga.
Peter Michael Hrynyshyn West Islip, N. Y.	*Edward Leiand Reynolds Trenton
Maurice Theodore Jones, Jr Aiken	Edward Dabney Trevillian Clemson
Robert Buford Landers, Jr Greenville	

John	Edmond	Bell,	Jr.		Newport	News,	Va.	
John	Weslev	Fendle	ev.	Jr		Ander	son	

BACHELOR OF ARCHITECTURE

Charles Douglass Coleman _____ Greenville

COLLEGE OF EDUCATION

HAROLD FOCHONE LANDRITH, Dean

BACHELOR OF ARTS

Early Childhood Education

Dianne Gambrell Beasley Honea Path	**Teresa Lynn Morris Barnwell
Davette Sherryl Dawson Marion	*Susan Leah Mullikin Anderson
*Patricia Catherine Duggan Massapequa, N.Y.	***Mary Murray Stretton Simpsonville
**Cindy Ann Hollis Fort Mill	Margaret Kay Tharp Charlotte, N. C.
Mary Pruitt Malphrus Greenville	Victoria Gayle Walukewicz Inman

Elementary Education

**Dianne Bair Adair	Orangeburg
*Kathryn Elaine Avant	Georgetown
*San Dee Banks	Greenville
**Susan Tracy Bolt	Seneca
***Patsy Anne Brown	Anderson
Kathryn Lynn Bryson	Greenville
Linda Sue Byars	Camden
Margaret Ann Cullum	Monetta
**Patricia Jean DeLoach	Darlington
**Joy Barnett Ellenburg	Easley
**Brenda Joyce Fulmer	
Sarah Edna Gilchrist	Brunswick, Ga.
*Debra Robinson Gillespie	_ Jacksonville, Fla.
**Betty Jayne Hite	Leesville
**Patricia Christmas Hobbs .	Darlington

**Mary Edith Jenkins	Westminster
**Lee Anne Spearing Miller	Syracuse, N.Y.
**Susan Carol Moyer	Miami, Fla.
Nancy Ellison Poston	Greenwood
*Lita Maureen Raffini	Anderson
**Joni-Dee Thompson Ross	North Augusta
*Melanie Jeanette Salman	Syracuse, N.Y.
*Paula Jean Seymour	Easley
*Paula Jean Seymour Margaret Louise Shoolbred	
	Spartanburg
Margaret Louise Shoolbred	Spartanburg Williamston
Margaret Louise Shoolbred *Steven Guyton Stone	Spartanburg Williamston Clinton
Margaret Louise Shoolbred *Steven Guyton Stone *Carol R. Tilghman	Spartanburg Williamston Clinton Clemson

Secondary Education

Georgia Kathryn Brabham Columbia	Samuel Elbridge Latham, Jr Iva
Sarah Annette Brockwell Pacolet	Thomas Anthony O'Dare Belmont, N.C.
*Betti Ann Clark Pickens	Paula Margaret Patterson Pendleton
David Michael Doolittle Greer	Gena Elizabeth Reyns Columbia
Jane Ursula Kossler Charleston	*Janice Elaine Shirley Honea Path
Emily Kathleen Lark Anderson	

ames Hanson	Seneca	*William
Michael Hrynyshyn We	st Islip, N.Y.	*Edward
e Theodore Jones, Jr	Aiken	Edward
Buford Landers, Jr.	Greenville	

Pre-Architecture John Robert Gass _____ Cottonport, Tenn. Robert Mitchell Hogue _____ W. Columbia

BACHELOR OF SCIENCE

Agricultural Education

(Agricultural Education is jointly administered by the College of

Agricultural Sciences and the College of Education.)

*James Hoyt Maret, Jr. _____ Townville Ronald David Presley _____ Easley

Industrial Education

Richard Leon Bollinger Warsaw, N.Y.	*Linda Freeman Munt Clemson
Leon Hope York	Lawton Edwin Murray Moncks Corner
Gary Michael Kesack Bethlehem, Pa. **Barry Sanford McCaskill Columbia	*John Marvin Shaffer Greenwood

Science Teaching

Charles Arthur Baldwin Or	rangeburg	***Angela Paris	McClain	 Iva
*Donna Kay Blackwell Sp	partanburg			

COLLEGE OF ENGINEERING

LYLE CHESTER WILCOX, Dean

BACHELOR OF SCIENCE

Ceramic Engineering

Ricardo Antonio Maduro _____ Panama, R. P.

Chemical Engineering Robert Frank Bolubasz _____ Elizabeth, Pa.

Civil Engineering

*John Michael Altman Seneca	James Garfield Mashburn Aiken
Walter Earl Anthony, Jr Taylors	Bryant McLyndon Mauldin, Jr Anderson
Scott Thomas Bailey Columbia	John Charles McLean Rock Hill
Eugene Reece Batten Saluda	John McKenna Milton, Jr Aberdeen, Md.
Stradford Grey Folkes, Jr Virginia Beach, Va.	John Brandon Pachol Doylestown, Pa.
Edwin Cole Greagan Charlotte, N. C.	***Guillermo Aurelio Rodriguez
Richard Dale Gurney North Augusta	Quito, Ecuador
Edward Dean Higginbotham, Jr Iva	Gary Scott Sessler Medfield, Mass.
Spencer Neal Irick Orangeburg	Michael Patrick Tylee Charleston Heights
James Patrick Kelley Haddonfield, N. J.	*Fateh Naim Wattar Beirut, Lebanon
Kevin Joseph Kreis Baltimore, Md.	*Steven Dale Weathers Laurens

Electrical Engineering

*Rhonda Toni Austin	Greenville
Kenneth Allen Banks	
Gary Tilden Brandon	
Gary muen branuon	Ciovei
Dennis Alan Brannon	Tryon, N. C.
Donald Jerome Burdette	Ware Shoals
Brent Walker Carter	Greenwood
William Frank Caston	Columbia
**Mason Leroy Compton	Sumter
John Malcolm Garber	Camden
***Virginia Saylor Gilbert	Florence
Charles Frederick Kittel	

Barrett Swayne Lawrimore, Jr Charleston
Michael Wayne Mathews Greenville
*Gary Michael Miller Sykesville, Md.
Julian Hampden Morgan III Spartanburg
James Joseph Ordog North Charleston
*Marion Eugene Owens Charleston Heights
Neiling Herman Schroeder Columbia
John Parker Simpson Simpsonville
David Frank Thurston
Upper Saddle River, N. J.
*Leah Beth Wright Sumter

Engineering Analysis

*Frederick Stuart Brundick _____ Abington, Md.

Engineering Technology

Renato Clavijo-Penaranda La Paz, Bolivia	Roy Llewellyn Farrelly Richardson, Texas
Robert Henry Crosby Charleston	**Cariton Eugene Furr Pacolet
Richard Alan Day Easley	Don Keith Robbins, Jr Taylors
Mark Steven Draeger Greenwood	*William Milton Sibley Rock Hill
Albert Marion Dunn Anderson	Samuel Legrande Wilson Mt. Pleasant

Mechanical Engineering

*Brenton Hugh Abbott Louisville, Ky.	Johnnie Richard Maffett Saluda
Donaid Leonard Appel Mt. Pleasant	*James Howard Shirer, Jr Elloree
Thomas Stanley Craft Orangeburg	*Daniel Wayne Simpson Greenville
William Whitaker Gallman Spartanburg	**Jimmy Lee Stokes Columbia
Mack Coy Jackson III Dillon	Stanley Thomas Taylor Rock Hill
**Marshall Gregory Looper Six Mile	Thanh Dinh Van Saigon, Vietnam

COLLEGE OF FOREST AND RECREATION RESOURCES

WILLIAM HENRY DAVIS McGREGOR, Dean

BACHELOR OF SCIENCE

Forest Management

Timothy Daniel Astriab Milford, Conn.
Edward Ronald Austin Orlando, Fla.
*Marvin Hurder Colson Columbia
Silas Knight Cox, Jr Walhalla
Matthew McGiffin Crawford Raleigh, N. C.
Marc Takeshi Epting Batesburg

Lonnie Charles Gillespie Seneca
James Lewis Meeks Greenville
*Cari Lawrence Rathz St. Charles, Mo.
David Charles Ross North Augusta
Kevin Edward Schaack Greenville
George Jacob Yeremian, Jr Greenwood

Recreation and Park Administration

Terrence Emerson Ard	Latta
Charles Bradley Ashley, Jr	Greensboro, N. C.
Henry Edward Brown, Jr	Columbia
Michael Wayne Brown	Greenwood
Richard Scott Cleveland	Greenville
Ian Alexander Davidson, Jr	Rock Hill
Henry Neal Doughty	Sullivan's Island
**Peter Francis Dufresne	Montclair, N. J.
Carl Eugene Golden, Jr.	Columbia
David Allison Grant	Chester
Robert Arthur Heaton	Greenville
Susan Scott Henry	Pottstown, Pa.
Rodney Allen Kinnett	Greenville
*George William Mathis	West Union

James Arthur Potter William Dale Robinson	
Kenneth Barry Shields	Landrum
Timothy Joseph Stough	Levittown, Pa.
Kenneth Alan Tinsman	Barrington, N. J.
John Arthur Tribble	Anderson
Richard Lee Tyndall	Clemson
Richard Arthur Verenes	Aiken
Alice Nell Vernon	Piedmont
William Andrew Westmoreland,	Jr Lancaster
David Allen Williams	Dallas, Ga.
**Donaid Lee Wood	Winnsboro
Steven Lynn Wright	Birmingham, Ala.
David Oliver Yeargin	Greer

Wood Utilization

Charles Bernard	Goehring	Clemson	Ma
Frederick William	m Horn V	Columbia	Da

Marvin	Wayne	Nance		Myrtle	Beach
David	Thomas	Snipes	_	На	rtsville

COLLEGE OF INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE

WALLACE DABNEY TREVILLIAN, Dean

BACHELOR OF ARTS

Economics

*Susan Janelle LaRocca _____ Tampa, Fla.

BACHELOR OF SCIENCE

Accounting

George William Christian, Jr Simpsonville	*David Keith Ramey Laurens
David Howard Heinbuch Oakland, N. J.	Karen Lee Reynolds Dalzell
*Richard Homer Jordan Marion	Herbert Samuel Root III Deland, Fla.

Administrative Management

	Administrati
Howard Bradley Adams	Westminster
Avery Ronald Adkins	Rock Hill
William Walter Berry	Batesburg
Dennis Leon Brewer	Easley
*Charles Richmond Buchanan	Greenville
Timothy Lewis Buchanan	Greenville
Larry Alfred Buddin	Rock Hill
William McKendree Caughman	Leesville
Quinton Lee Chapman	Beaufort
George Anthony Cheros	Greenville
Christopher Paul Clifford	Miami, Fla.
Keith Edwin Dacus	Ocala, Fla.
David Alvin Gambrell	Anderson
Kenneth Edward Goletz	Greenwood
Joseph Daniel Hammett	Greenwood
Carlton Ray Hammond	Heath Springs
Robert Edmund Hammond, Jr.	Atlanta, Ga.
Hugh Stanley Hill, Jr	Lugoff
Thomas Brammer Ivester	Greenville
Ormond Watson Johnson III	Jacksonville, Fla.
Robert Newell Johnson, Jr	Manning
James Walten Kelly III	Anderson
Stuart Barrett Kelly	New York, N.Y.
William Sythes Keppel N	lassapequa, N.Y.
Joseph Hart Kessler	Greenville

anagement	
Robert Wayne King	Westminster
Cecelia Webb Lang	
Susan Elizabeth Laurens	Union
Carlisle Flornoy Lewis, Jr	Sumter
Ted Farley Mann	Greenville
Patti Chandler Martin	
Stephen Mattison	Anderson
James Wilton May II	Rock Hill
Linda Gail McCrory	Cayce
*Dennis Wayne McKenna	Beaufort
Thomas William Moran	Charleston
*Charles Lane Morgan	Pendleton
Henry Calvin Morrow	Columbia
Kathy Lynn Nave	Greenwood
Robert Sterling Reid	Falmouth, Va.
Donald Rowland Robinson	
Bryan Lee Roper	Greenville
Michael Themas Rose	Moorestown, N. J.
Wilson Lee Strom, Jr	Edgefield
John Kenneth Sturman	Pittsburgh, Pa.
*Jan Marie Watkins	Leesville
Matthew Jay Watkins	Clemson
Donald Bruce Webber	Simpsonville
Thomas Harper Williams	Lancaster

Economics

**Scott Bearce Hilborn Chapin	
Jeffery Roy Palmer Cedar Mountain, N. C.	
John Samuel Peden Fountain Inn	

**Eva	Lois	Pittard		 Simpsonville
William	n Lee	Walker,	Jr.	 Greenville

Financial Management

Frank Boyce Boatwright III Ridge Spring
Patricia Anne Dodgen York
*Willis Jennings Duncan IV Conway
James Michael Ellis Anderson
Mark John Evans Bridgeton, N. J.
Harry Daniel Foster Spartanburg
Edward Calhoun Gambrell, Jr Anderson

*William Leslie Gibson Clo	emson
James Michael Lang Gree	enville
**Janet Rene Lea And	ierson
John Roscoe Onufer Char	leston
Heber Nathaniel Padget, Jr Gainesvill	e, Ga.
Randolph Vernon Simpson Sparta	nburg
Keith Lee Tener Col	umbia

Industrial Management

	muustiid
Gary Lynn Beard	Greenville
**Mackie Mills Bedenbaugh	Lexington
Richard Phelos Crocker Johnson	City, Tenn.

Michael	Paul	DeKo	ning	 _ Seneca
Ray Wils	son F	owler,	Jr.	 Anderson

BACHELOR OF TEXTILE TECHNOLOGY

 Sylvester Clinton Lee
 Anderson
 Brian John Schleifer
 Chevy Chase, Md.

 James Glenn McCants, Jr.
 Shelby, N. C.
 Daniel Earle Stokes
 Greenville

 **Robert Gary Romanstine III
 Greenville
 Greenville
 Greenville

COLLEGE OF LIBERAL ARTS

HEADLEY MORRIS COX, Dean

BACHELOR OF ARTS

English

*Patricia Lynn Dennis Greenville	Charles Francis McDonald, Jr Mt. Pleasant
Elizabeth Ann Doyle Maitland, Fla.	Margaret Macdonald Myers Clinton
Henry Jacob Field, Jr Seneca	William Alexander Robinson III Easley
Pamela Diane Holloway McCormick	*Joseph Leon Savitz III Abbeville
Lorenz Ditmar Huff, Jr Clemson	Marshall Beattie Wood Clemson

History

Paul Joseph Burke Buffalo, N.Y.	Spencer Shackelford Leavitt Spencer, Va.
Robert Edward Holder Columbia	Cristina Nelson Chicago, III.

Modern Languages

*Lois Andrea Brown Bethesda, Md.	*Cynthia Sue Schirmer Charleston
*Laura Ellen Dacus Greenville	***Susan Joyce Taylor Atlanta, Ga.

Political Science				
John Malcolm Bessent Baltimore, Md.	Victor Eugene McFadden, Jr Taylors			
Jerry Davis DuBose Clemson	Bobby Joe Taylor, Jr Cades			
Mary Joy Jameson Ridgeland				

Psychology				
Richard Raymond Byrd Camden	*Nancy Guerard LeMacks Charleston			
Larry Arlington Hudson Easley	*Ralph Norman McKnight, Jr Easley			
Cynthia Susan Kirkland Clemson	David Brian Padgett Camden			

Sociology

Sandra Celeste Garrison Demorest, Ga.	Cecelia Ellis Ro
*Mary Louise Jamison Charlotte, N. C.	Mindy Rochelle
Laura Wald Mathis West Union	

Cecelia	a Ellis	Rob	ertson		 Gr	eenville
Mindy	Roche	lle	Wittenb	erg	 	Sumter

COLLEGE OF SCIENCES HENRY ELLIOTT VOGEL, Dean

BACHELOR OF ARTS

Geology

Clyde Edgar Watson ____ Georgetown, Guyana

Mathematical Sciences

**Marla Elizabeth Redden _____ Greenville

BACHELOR OF SCIENCE

Botany

Sarah Jean Slade Edgefield

Geology *Harvey Bradshaw Hubbard _____ Columbia

Mathematical Sciences

John Bernice Fisher, Jr Asheville, N. C.	**Andrea Lynn Snow Greer
*Bobby Royce McCall Mountain Rest	*Mary Olivia Stoudenmire Orangeburg
*Stanley Eugene Scott Winston-Salem, N. C.	*Lynda Patricia Ward Mullins

Microbiology

Billy Waddell Best, Jr Washington, D. C.
**Andrew Earl Floyd, Jr Kingstree
James Keith Griffin Pageland
Carl David Lane Clemson
Amos Monte McCall Easley
Nancy Lee McCaskill Bishopville

Sarah Lee Naples Keystone Heights, Fla.
Michael Eugene Pipkin Moncks Corner
*James Booth Smith, Jr Sumter
William Cleveland Thomas, Jr Greenville
David Michael Tillman North Charleston
David Edward Wells Miami, Fla.

Pre-Medicine James Ronald Huffman _____ Greenville

Pre-Professional Studies

***David Warren Gillespie Orangeburg	*Harcld Chalmers Poston, Jr Lake City
*John Edward Moss, Jr Blacksburg	***John Paul Schumacher Walhaila
William Ted Nimmons Seneca	*Leland Crumpton Stoddard, Jr Greenwood

Zoology

Robert Alan Byrd Charleston	*William Kistler Michener Moore
Gary Fowler Crow Laurens	William John Radler Greenville
Janet Lynne Humphries Gaffney **William Bamberger Karesh Charleston	Alvin Dixon Stokes Camden

*With honor

**With high honor

***With highest honor

MASTERS' AND EDUCATION SPECIALIST DEGREES **CONFERRED DECEMBER 22, 1977**

ARNOLD EDWARD SCHWARTZ, Dean, Graduate School

COLLEGE OF AGRICULTURAL SCIENCES

MASTER OF AGRICULTURE

	Syracuse, N.Y.	Chevis Raymond Sligh Charles Joe Stancil		
	MASTER OF NUTRI	FIONAL SCIENCE		
Carolyn Martin Harris	Westminster	Karen Keith	Pickens	
Miriam Kelley Hendricks	Easley	Helen Poole Rosemond	Seneca	
MASTER OF SCIENCE				
Agricultural Economics				
Gloria Brcmell Tinubu	Plantersville	William Edward Twilley, Jr.	Clearwater	
Agronomy				
Marshall Lee Garland	Hartsville	Garriet Wade Smith	Rock Hill	
Leslie Fredrick Morgan	Easley			
Animal Science				

Mary Eliza Reid _____ Ft. Motte

Entomology

Sharron Hogan Barnett _____ Anderson William Michael Hood _____ Williamston

Nutrition

Laurel Louise Prestridge _____ Houston, Texas

Wildlife Biology

Gary Richard Hepp Cincinnati, Ohio David King Woodward Plainville, Mass. John William McCord _____ Manning

COLLEGE OF ARCHITECTURE

MASTER OF ARCHITECTURE

Henry Darrell Carpenter Lincolnton, N. C.	Randolph Sims Key Florence
Charles Cecil Cash, Jr Shepherdsville, Ky.	William Charles Means Charlotte, N. C.
Rodrigo E. delCanto-Bartlett Valpraiso, Chile	James Michael Patz Aurora, Ohio
Charles Roberts Francis New Bern, N. C.	Richard Bruce Shulby Wilmington, Del.
Jeffrey L. Gallaher Newark, Del.	David Marion Young Camden
Michael Patrick Keeshen N. Hollywood, Cal.	Zachary John Zapack Ft. Lauderdale, Fla.

MASTER OF CITY AND REGIONAL PLANNING

Richard Preston Black _____ Anderson Leonard Malvern Newcomb _____ Phoebus, Va. Robert McPherson Burdette _____ Simpsonville Georgia Ann Callahan _____ Millville, N. J.

Joel Roy Washington _____ Anderson

MASTER OF FINE ARTS

Guy Carlton Allison III _____ Anderson Greg Alan Sadlo _____ St. Louis, Mo.

COLLEGE OF EDUCATION

EDUCATION SPECIALIST

Educational Administration

Frank Elford Cook _____ Duncan Edward Gerald Smith _____ Greenville

MASTER OF AGRICULTURAL EDUCATION

(Agricultural Education is jointly administered by the College of Agricultural Sciences and the College of Education.)

Howard Mitchell Corbett _____ Wagener

John Wesley Turpin _____ McCormick

MASTER OF EDUCATION

Administration and Supervision

Robert Steven Bishop	Clemson
Katherina Woodard Bolden	_ Greenwood
William Luther Dunn	Greenville
Rebecca Barbrey Hamor	Piedmont
Emilie Foster Haskin	Greenwood
Harry Wayne Hawkins	Seneca
Lucille Myrick Hinson	Simpsonville
James Edward Howard	Whitmire

Cheryl Myers Lee	Clemson
Charlotte Baldridge McCoy	Walhalla
David Frank Means G	reenwood
Lcuie Alpheus Rowland, Jr I	Pendleton
Michael Eugene Sams	Anderson
Fred Daniel Strouth, Jr	_ Liberty
James Harold Williams (Greenville
Willie James Williams G	reenwood

Elementary Education

	Lionioni
Claudia Hunter Bowers	Greenville
Emily Susan Bryan	Ninety Six
Mary Jeanne Cooper	Greenville
Mary Trotter Davis Edinburgh,	Scotland, U. K.
Bonnie Manning Gallogly	Calhoun Falls
Betty Cook Garrison	Greenville
Janis Hall Goodson	_ Marion, N. C.
Hilda Shore Hambright	Greenville
Nancy Marie Harbin	Greenville
Jean Bouknight Harrell	Greenville
Cynthia Speck Hester	Greenville
Marie Grace Hughes	Greenville
Pamela Durham Jetton	Brevard, N. C.
Billie Kathryn Keeter	_ Shelby, N. C.
Judy Clary Lemmons	Gaffney
Susan Dianne Lollis	Easley
Ann Beacham Martin	Anderson
Michael Terry Martin	Seneca

Pernice Corley Adams _____ Orangeburg Ruth Lockaby Anderson _____ Travelers Rest Grace Elise Bennett _____ Greenville Brenda Bramlett Brady _____ Toccoa, Ga. Patricia Gail Byars _____ Greenville Ann Charlene Coleman _____ Greenville Martha Annette Craig _____ Pickens Patricia Keady Dunlop _____ Seneca Leonia Penson Gray _____ Greenville Mary Ella Hodges _____ Charlotte, N. C.

Ruth Elaine McDonald	Greenville
Melody Jennings McRee	Anderson
Michelle Leggett Medford	Seneca
Fredia Newton Nolan	Greenville
Elizabeth Jeannine Ramsey	Greenville
Brenda Bradey Reid	Greenville
Diane Clair Salley	Orangeburg
Alice Elizabeth Shirley	Honea Path
Linda Smith Simpson	Liberty
Deborah Joan Smith	Pickens
Rosalind Marie Stewart	Pelzer
Lois Henson Stokes	Greer
Karen Brown Suarez	Seneca
Carolyn Rowland Treadwell	West Union
Gayle Ellis Wiley	Anderson
Susan McNeill Wolfe	Easley
Fritzella Wright	Abbeville
Edna Ford Zander	Simpsonville

Personnel Services

Susan Truett Hovermale	Manning
Steva Gault Kiser	Anderson
Anita Nichels Long	_ Greenwood
Bobby Wayne Owen	Greenville
Martha Huggins Phillips	Cowpens
Linda Latimer Russell	Belton
James Andrew Smith	Duncan
Joy Shuler Smith	Clemson
Nancy Wallis Wardlaw	Central
Frances Marie Welfare	Orangeburg

Reading

Sue Todd Babb	_ Greenwood
Jo-Anne Quackenbush Beam	Anderson
Janet Bowman	Anderson
Jane Callison Caraway	Greenville
Dianne Lee England	Seneca
Karen Faile Hedgepeth	Chester
Deborah Samille Jones	Westminster
Jo Ann Edwards Jones	Clemson

Julie Young Keadle	Clinton
Katie Galvin Montjoy Gr	eenville
Beverly Moore Nations	Seneca
Roger Keith Simpson	Seneca
Phyllis Owen Spearman	Easley
Vickie Marie Waldrop Spar	tanburg
Diane Doolittle Woodward	_ Greer

Student Register 473

ary Education
Brenda Moore Webb Greenwood
Barbara Ann Whitmire Clemson

MASTER OF INDUSTRIAL EDUCATION

Ralph Edward Farr _____ Union Ellen Veatch Spainhour _____ Anderson

COLLEGE OF ENGINEERING

MASTER OF ENGINEERING

Chemical Engineering

Clarence Ray Solomon, Jr. _____ Anderson

Civil Engineering

Joe Marshall Barron	Athens, Ga.	Lloyd Ross Cato, Jr Travelers Re	st
Cyril B. Busbee, Jr.	Greenville	Benjamin Hansford Whetstone, Jr.	
		West Calumb	

West Columbia

Electrical Engineering

David Lee Garrison _____ Moncks Corner Thomas Winborne Mikkelsen _____ Columbia Willie Franklin Mann, Jr. _____ Winnsboro

Environmental Systems Engineering

George Kennedy Milam _____ Sandy Springs Carl Dane Nelson _____ Montgomery, Ala.

MASTER OF SCIENCE

Agricultural Engineering

(Agricultural Engineering is jointly administered by the College of of Agricultural Sciences and the College of Engineering.) Robert Theo Harris, Jr. _____ Westminster

Bioengineering

Aubrey Doyle Gantt, Jr. _____ Williston

Civil Engineering

David Cooper Jennings _____ Spartanburg John Michael McTamney III ____ Trenton, N. J.

Electrical Engineering

Randall Sek-Tim Lau Hong K	long	Sanjay K. Parikh	Charleston
Lymuel McRae (Clio	Ronald Lusk Watt	Columbus, Ga.

Environmental Systems Engineering

Timothy Michael Krause _____ Allentown, Pa. David Ross Oliphant _____ Oak Ridge, Tenn.

Mechanical Engineering

Gregory George Baer Stafford Springs, Conn.	Yen-Li Shen Mechanicsburg, Pa.
Yan-Min Kuo	Feng-Yuan George Su Kaohsiung, Taiwan
Edward Ralph Russell Lexington Park, Md.	Bangalore S. Venkateshwara Bangalore, India

Systems Engineering

Jon Craig Hovermale _____ Sumter

COLLEGE OF FOREST AND RECREATION RESOURCES

MASTER OF FORESTRY

James Douglas Benson _____ Seneca Leonard Thomas Henderson _____ Newberry

MASTER OF RECREATION AND PARK ADMINISTRATION

 Kenneth John Bulik
 Kenosha, Wis.
 Robert Johnson Moseley II
 Clemson

 Paula Jane Howard
 Greenville
 Anne Marie Sinclair
 Columbia

COLLEGE OF INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE

MASTER OF ARTS

Economics

Pamela Carole Marett _____ Seneca

MASTER OF SCIENCE

Management

Charlotte Anne Abbott Westminster
Robert Jack Clements Easley
Michael John Hirsch Myrtle Beach
Arnold Lynn Jones Greenwood

Patrick Belton O'Dell _____ Laurens Joseph Jackson Turner, Jr. ____ Clemson Harry Virunurm _____ Bridgetown, N. J.

Textile Science

Mark Steven Lee _____ Spartanburg

COLLEGE OF LIBERAL ARTS

MASTER OF ARTS

English

Myra Ann Armistead _____ Clemson Nancy Izbicki Deshefy _____ Taftville, Conn. Janis Melton Ashley _____ Williamston

History

John Wayne Martin _____ Woodbridge, N. J. David Ottis McGuire _____ Greenville

COLLEGE OF NURSING

MASTER OF SCIENCE

Nursing

Lynne Anderson Hall _____ Clemson

COLLEGE OF SCIENCES

MASTER OF SCIENCE

Biochemistry

Briscoe Baldwin Brown III __ Newport News, Va. James Henderson Walker III __ Sandy Springs Jerry Lee Stonemetz _____ Shinglehouse, Pa.

Botany

David Patrick Muchleisen _____ Clemson

Chemistry

William Robert Heatley, Jr. ____ Charleston Lamar Willard Reynolds, Jr. ___ Gainesville, Ga. Charles Greene James _____ Charlotte, N. C.

Microbiology

Larry Allan Berglind _____ West Hartford, Conn.

Physics

Dana Gilbert Walbridge _____ Easton, Md.

Zoology Mary Jean Evinger _____ Chicago, III.

DOCTORS' DEGREES CONFERRED DECEMBER 22, 1977

ARNOLD EDWARD SCHWARTZ, Dean, Graduate School

COLLEGE OF AGRICULTURAL SCIENCES

DOCTOR OF PHILOSOPHY

Applied Economics

Tommy Mack Jones Linden, Ala, B.S., Auburn University: M.B.A., Georgia Southern Dissertation: A Productivity and Profitability Analysis of the South Carolina Double Rig Shrimp Fishery: A Case Study of a Specialized One Year Class Fishery. Entomology

Wayne Allan Gardner Mebane, N. C. B.S., M.A., East Carolina University Dissertation: Physiopathological Studies of Beauveria Bassiana in Noctuid Hosts Palatka, Fla. James Felix Price B.S., M.S., University of Florida

Dissertation: Arthropod Predators of the Soil Surface in Soybeans: Seasonal History, Feeding Behavior, and Response to Insecticides and Tillage Practices

COLLEGE OF ENGINEERING

DOCTOR OF PHILOSOPHY

Engineering

Idaho Falls, Idaho Dennis Norman Bingham _____ _____ B.S., M.E., Brigham Young University Dissertation: A Mechanical Characterization of the Canine Anterior Cruciate Ligament (Field of Specialization: Bioengineering)

_____ Memphis, Tenn. Andrew Gilbert Jordan B.S., University of Georgia: M.S., Clemson University

Dissertation: The Effects of Post-Harvest Storage and Handling Methods on Mechanical Properties of Penaeus Shrimp (Field of Specialization: Agricultural Engineering)

COLLEGE OF INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE

DOCTOR OF PHILOSOPHY Management Science

George Thomas Mertens ___ _____ Arkadelphia, Ark. B.S.E., Henderson State College; M.S., Clemson University

Dissertation: A Programming Theory for Continuous Discrete Hybrid Simulation

Textile and Polymer Science

__ Enugu, Anambra, Nigeria Steve-Nnaedozie Amuijogu ___ B.S., Government Textile & Textile Engineering School Munchberg/Bavaria; M.S., Southeastern Mass. University

Dissertation: Effect of Tris (2, 3 Dibromopropyl) Phosphate on the Lightfastness of Disperse Yellow

Virginus Okeawalam Iheyinwa ____ ____ Awo-Omamma, Nigeria B.S., Government Textile & Textile Engineering School Munchberg/Bavaria; M.S., Southeastern Mass. University

Dissertation: A Study of the Relationship between Structure and Flammability Retardation of Brominated Aromatic Compounds on Poly(Ethylene Terephthalate)

COLLEGE OF SCIENCES

DOCTOR OF PHILOSOPHY

Chemistry

_____ Tazewell, Va. William Daniel Saunders _____ B.A., University of North Carolina

Dissertation: Synthesis and Structural Determination of some Bi-, and Tricyclic Sesquiterpenes

DEGREES AWARDED BY MAJOR COURSES, 1976-77

Major Course	Associate	Bachelors'	Masters'	Specialist	Doctors'
College of Agricultural Sciences Agricultural Economics Agricultural Mechanization and Business Agriculture Agronomy Animal Industries Animal Physiology Animal Science Applied Economics Dairy Science Economic Biology Entomology Food Science Horticulture Nutrition Nutrition Nutrition Nutrition Science Plant Pathology Plant Sciences Poultry Science Preprofessional Studies Wildlife Biology	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	$\begin{array}{c} 9\\ 12\\ 0\\ 0\\ 0\\ 36\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\$	5015200300060548300308	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	$\begin{array}{c} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 $
Total	0	135	62	0	7
College of Architecture Architecture Building Construction City and Regional Planning Fine Arts Prearchitecture Total	0 0 0 0 0		$ \begin{array}{r} 15\\0\\11\\7\\0\\33\end{array} $	0 0 0 0 0	0 0 0 0 0
College of Education Administration and Supervision	0 0 0 0 0 0 0 0 0 0 0	$\begin{array}{c} 0 \\ 10 \\ 43 \\ 0 \\ 115 \\ 33 \\ 0 \\ 0 \\ 11 \\ 60 \end{array}$	$34 \\ 10 \\ 0 \\ 125 \\ 14 \\ 89 \\ 34 \\ 0 \\ 30$	$ \begin{array}{c} 0 \\ 0 \\ 0 \\ 12 \\ 0 \\ $	0 0 0 0 0 0 0 0 0 0 0
Total	0	272	336	12	0
College of Engineering Agricultural Engineering Bioengineering Ceramic Engineering Chemical Engineering Electrical Engineering Engineering Mechanics Engineering Mechanics Engineering Mechanics Engineering Mechanics Engineering Mechanics Engineering Mechanics Environmental Systems Engineering Materials Engineering Mechanical Engineering Mechanical Engineering Water Resources Engineering	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	$5 \\ 0 \\ 8 \\ 28 \\ 566 \\ 48 \\ 0 \\ 28 \\ 0 \\ 28 \\ 0 \\ 0 \\ 36 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ $	$\begin{array}{c} 0\\ 8\\ 3\\ 9\\ 10\\ 16\\ 0\\ 1\\ 0\\ 9\\ 0\\ 11\\ 4\\ 4 \end{array}$	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	$ \begin{array}{c} 1\\ 1\\ 0\\ 0\\ 0\\ 0\\ 0\\ 1\\ 1\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\$
Total	0	211	77	0	8

478 Student Register

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Major Course	iat	olor	'rs'	alis	rs'
Major Course	Associate	Bachelors'	Masters'	Specialist	Doctors
	As	Ba	Ma	$_{\rm Sp}$	Do
Called of Forest and Proportion Provide					
College of Forest and Recreation Resources Forest Management	0	46	0	0	0
Forestry	0	0	12	0	0
Recreation and Park Administration	0	$106 \\ 4$	8 0	0	0
(T_++_1)	0	156	20	0	0
			20		
College of Industrial Management and Textile Science	ce	0.0	0	0	0
Accounting Administrative Management	0	$\frac{36}{169}$	0	0	0
Business Administration	ŏ	0	39	ŏ	ŏ
Economics	0	18	8	0	0
Engineering Management	0	0	0	0	3
Financial Management	0	55	0	0	0
Industrial Management	0	$15 \\ 0$	0 8	0	$\begin{array}{c} 0\\ 0\end{array}$
Management	ŏ	0	0	0	2
Textile Chemistry	ŏ	š	ŏ	ŏ	$\frac{2}{0}$
Textile and Polymer Science	0	0	0	0	1
Textile Science	0	6	3	0	0
Textile Technology	0	18	0	0	0
Total	0	322	58	0	6
College of Liberal Arts					
Bachelor of Arts	0	0	0	0	0
English	0	27^{-}	14	Õ	Ŏ
History	0	19	0	0	0
Modern Languages	0	11	0	0	0
Political Science	0	51	0	0	0
Psychology	0	$\frac{68}{24}$	0	0	0
Total	0	200	14	0	0
				······	
College of Nursing Nursing	42	93	3	0	0
	42	93	3	0	0
Total	42	93	3	0	0
College of Sciences		_			
Biochemistry	0	5	4	0	0
Botany	0	5	1	0	0
Chemistry	0	$10 \\ 4$	1 0	0	6 0
Mathematical Sciences	0	43	19	0	4
Medical Technology	0	-45	0	0	0
Microbiology	ŏ	66	11	0	Ő
Physics	0	1	1	Ő	1
Premedicine	0	0	0	0	0
Preprofessional Studies	0	15	0	0	0
Zoology	0	43	5	0	0
Total	0	200	42	0	11
Total Degrees Awarded 1976-77	42	1,695	645	12	32
Grand Total Degrees Awarded 1976-77 — 2,426					

TOTAL DEGREES AWARDED BY MAJOR COURSES, 1896-1977

Major Course	
ASSOCIATE	
Nursing	273
BACHELORS'	
A	145
Accounting Administrative Management Agricultural Chemistry Agricultural Economics Agricultural Education Agricultural Engineering Agricultural Mechanization and Business	608
Agricultural Economics	$\frac{102}{451}$
Agricultural Education	585
Agricultural Engineering	506
Agricultural Mechanization and Business	18
	244
Agriculture and Animal Industry	80
Agriculture and Animal Industry Agriculture and Chemistry Agronomy	69 828
Animal Industries	63
Animal Science	913
Applied Mathematics	34
Architectural Engineering	$\frac{118}{707}$
Arts and Sciences	707 2,542 3
Bachelor of Science	3
Biochemistry	6
Botany	301
Building Construction	276
Ceramic Engineering	316
Chemical Engineering	633 474
Chemistry Engineering	414
Chemistry and Geology	11
Civil Engineering	$1,803 \\ 427$
Dairy Science	427
Economic Biology	25
Economics	- 47
Agronomy Agronomy Animal Industries Animal Science Applied Mathematics Architectural Engineering Architecture Architecture Arts and Sciences Bachelor of Science Biochemistry Biology Botany Botany Botany Chemistry Chemical Engineering Chemistry Engineering Chemistry Engineering Chemistry Engineering Chemistry Engineering Dairy Science Early Childhood Education Economics Economics Education Electrical Engineering Elementary Education Electrical Engineering Elementary Education	242
Electrical Engineering Elementary Education Engineering Analysis Engineering Industrial Education Engineering Technology English Entomology Financial Management Food Science Forest Management Forestry General Science Geology History Horticulture Industrial Education	2,178
Engineering Analysis	38
Engineering Industrial Education	70
Engineering Technology	128 93
Entomology	169
Financial Management	169 195
Food Science	53 132
Forestry	132 288
General Science	
Geology	53
History	53 47 563 699 138 1,519
Industrial Education Industrial Engineering Industrial Management Industrial Physics Mathematical Sciences Mathematics	699
Industrial Engineering	138
Industrial Management	1,519
Mathematical Sciences	
Mathematics	75 229 489
Mechanical and Electrical Engineering	489
Mathematics Mechanical and Electrical Engineering Mechanical Engineering Medical Technology	1,826
Metanuigical Engineering	20
Microbiology	206
Modern Languages	$\frac{34}{267}$
Physics	-267 -138
Plant Sciences	82
Modern Languages Physics Plant Sciences Political Science Poultry Science Prearchitecture	141
Poultry Science	59
Prearchitecture	326
Premedicine Preprofessional Studies Psychology Recreation and Park Administration	$755 \\ 121$
Psychology	204
Becreation and Park Administration	732

Science Teaching Secondary Education	$167 \\ 693 \\ 67$
Soils	9
Soils Textile Chemistry Textile Engineering Textile Ladoretical Education	358
Tortilo Engincoring	1,060
Textile Industrial Education Textile Management Textile Manufacturing Textile Science	85 306
Textile Manufacturing	1,045
rextile Science	67
Textile Technology	39
Veterinary Science Vocational Agricultural Education Weaving and Design Wood Utilization Zoology	$\frac{35}{16}$
Vocational Agricultural Education	729
Weaving and Design	42
Wood Utilization	7
Zoology	260
Double Majors	
Agricultural Chemistry and Arts and Sciences Agricultural Chemistry and General Science	1
Agricultural Chemistry and	
General Science	1
	1
Agricultural Economics and	1
Vocational Agricultural Education .	1
Animal Husbandry Agricultural Economics and Vocational Agricultural Education . Agricultural Engineering and	2
Civil Engineering	2
Electrical Engineering and	1
Agricultural Engineering and	
Mechanical Engineering	1
Agronomy and Agricultural Education	1
Agricultural Engineering and Electrical Engineering and Mechanical Engineering and Agronomy and Agricultural Education Agronomy and Vocational Agricultural Education	4
Annual Husbanday and	
Agricultural Education	3
Animal Husbandry and	1
Ceramic Engineering Animal Husbandry and Dairy Animal Husbandry and Industrial Management	2
Animal Husbandry and	
	1
Animal Husbandry and Vocational Agricultural Education	5
Architectural Engineering and	0
Vocational Agricultural Education . Architectural Engineering and Architecture, five-year	1
Architecture and Architectural	11
Engineering Architecture and Civil Engineering	1
Architecture, four-year, and	-
Engineering Architecture and Civil Engineering Architecture, four-year, and Architecture, four-year Architecture, four-year, and Mechanical Engineering	18
Architecture, four-year, and	1
Arts and Sciences and Agricultural	1
Economics	1
Economics Chemical Engineering and Chemistry	0
and Chemistry-Engineering Chemical Engineering and	3
	1
Chemistry and Agricultural Chemistry	1
Chemistry and Chemical Engineering	1
Chemistry and Chemistry-Engineering	1
Chemistry-Engineering Chemistry and Agricultural Chemistry Chemistry and Chemical Engineering Chemistry and General Science Chemistry and Industrial Physics	1
Civil Engineering and Architecture	ĩ
Civil Engineering and Architecture Civil Engineering and Chemistry and Geology	
Chemistry and Geology	2
Civil Engineering and	1
Electrical Engineering Civil Engineering and	1
Industrial Physics	1
Civil Engineering and	
Mechanical Engineering	1
Electrical Engineering and Applied Mathematics	1
Electrical Engineering and	1
Industrial Physics	1

Electrical Engineering and	1.77
Mechanical Engineering Electrical Engineering and	17
Textile Engineering	1
Entomology and Architecture, five-year	1
Entomology and Premedicine	ī
General Science and Gerannic	1
General Science and Education	î
General Science and Electrical	1
Horticulture and Agronomy Horticulture and Architectural Engineering	i
Horticulture and Architectural	1
Industrial Education and Architecture Industrial Education and Architecture Industrial Education and	ī
Industrial Education and Architecture	1
Electrical Engineering	1
Electrical Engineering Industrial Education and Forestry Industrial Engineering and	1
Industrial Engineering and Mechanical Engineering	1
Mechanical Engineering and	
Textile Engineering Poultry and Vocational Agricultural Education Premedicine and Arts and Sciences. Premedicine and Textile Chemistry.	4
Education Education	1
Premedicine and Arts and Sciences.	1
Textile Chemistry and	2
Civil Engineering	1
Textile Chemistry and Textile Manufacturing	1
Textile Engineering and	-
Civil Engineering	1
and Electrical Engineering	1
Textile Engineering and Textile Industrial Education	1
Textile Engineering and	1
Textile Manufacturing	1
Textile Engineering and Weaving and Designing	1
Textile Manufacturing and	
Mechanical Engineering	1
MASTERS'	
Agricultural Economics	$101 \\ 164$
Agricultural Engineering	46
Agriculture	73 40
Animal Science	40
Architecture	95
Biochemistry	6 12
Bioengineering	39
Botany Business Administration Ceramic Engineering Chemical Engineering Chemistry	$14 \\ 158$
Ceramic Engineering	84
Chemical Engineering	$75 \\ 115$
City and Regional Planning	55
Civil Engineering	96 23
Dairy Science	23 29
Education	1,325
Administration and Supervision Elementary Education	$ \begin{array}{r} 131 \\ 413 \end{array} $
Elementary Education	250

	D 1'	
17	Reading Secondary Education	$\frac{149}{90}$
11	Education Specialist Electrical Engineering Engineering Engineering Mechanics	48
1	Electrical Engineering	90
-	Engineering	79
1	Engineering Mechanics	$\frac{15}{95}$
1	English Entomology	91
1	Environmental Systems Engineering.	90
1	Environmental Systems Engineering. Fine Arts Forestry	12
1	Forestry	$\frac{34}{19}$
1	History	89
-	Horticulture Industrial Education	145
1	Industrial Management	36
1 1	Management Materials Engineering Mathematical Sciences Mathematics Mathematics	75
1	Materials Engineering	$\frac{8}{49}$
1	Mathematical Sciences	170
1	Mechanical Engineering	102
-	Microbiology	48
1	Nuclear Science	3 3
4	Mechanical Engineering Microbiology Nuclear Science Nursing Nutrition Nutritional Science	17
	Nutritional Science	17
1	Physics Plant Pathology	84
1 2	Plant Pathology	$23 \\ 2$
2	Poultry Science	24
1	Plant Physiology Poultry Science Recreation and Park Administration Systems Engineering Textile Chemistry Textile Leduction Education	42
	Systems Engineering	16
1	Textile Industrial Education	$61 \\ 1$
1	Textile Science	35
T	Textile Industrial Education Textile Science Textiles	1
1	Water Resources Engineering Wildlife Biology	50
	Zoology	24 97
1	20010gy	01
1	DOCTORS'	
-	Agricultural Economics	17
1	Agricultural Engineering	,5
	Agronomy Animal Physiology	15 18
1	Applied Economics	3
	Applied Economics Bioengineering	9
101		27
164	Chemical Physics	$\frac{3}{81}$
46	Civil Engineering	7
$\frac{73}{40}$	Chemical Physics Chemistry Civil Engineering Electrical Engineering	20
40	Engineering Management Engineering Mechanics Entomology Environmental Systems Engineering	22 8
95	Engineering Mechanics	38
6	Environmental Systems Engineering	16
$\frac{12}{39}$	Management Science	3
14	Materials Engineering	3
158	Materials Engineering Mathematical Sciences Mathematics	6 36
84	Mechanical Engineering	12
$75 \\ 115$	Nutrition	_8
55	Physics	$\frac{58}{10}$
96	Plant Physiology	10
23	Systems Engineering	5
29	Textile and Polymer Science	5
$325 \\ 131$	Mathematics Mechanical Engineering Nutrition Physics Plant Pathology Plant Physiology Systems Engineering Textile and Polymer Science Water Resources Engineering Zoology	$1 \\ 17$
413	Zoology	17
250	Total Degrees Awarded	37,399

ENROLLMENT BY COURSES AND ACADEMIC CLASSIFICATION

Fall Semester, 1977-78

Major Course	Freshmen	Sophomores	Juniors	Seniors	Postgraduates	Masters'	Ph.D.s'	Unclassified	Total
College of Agricultural Sciences Nondegree Agricultural Economics Agricultural Engineering Agricultural Mechanization and Business. Agricultural Mechanization and Business. Agriculture Animal and Food Industries Animal Industries Animal Physiology Animal Science Community and Rural Development Dairy Science Economic Biology Economic Zoology Entomology Food Science Horticulture Nutrition Plant Pathology Plant Physiology Plant Science Poulty Science Preveterinary Wildlife Biology	$\begin{array}{c} 0 \\ 9 \\ 16 \\ 14 \\ 1 \\ 21 \\ 0 \\ 3 \\ 0 \\ 26 \\ 5 \\ 3 \\ 16 \\ 10 \\ 0 \\ 6 \\ 39 \\ 0 \\ 0 \\ 0 \\ 2 \\ 2 \\ 42 \\ 0 \end{array}$	$\begin{array}{c} 0\\ 14\\ 16\\ 1\\ 23\\ 0\\ 0\\ 26\\ 1\\ 5\\ 6\\ 17\\ 2\\ 7\\ 59\\ 0\\ 0\\ 0\\ 1\\ 4\\ 7\\ 0\end{array}$	$\begin{array}{c} 0\\ 15\\ 16\\ 20\\ 0\\ 12\\ 0\\ 0\\ 39\\ 7\\ 4\\ 2\\ 18\\ 5\\ 8\\ 68\\ 0\\ 1\\ 0\\ 0\\ 7\\ 1\\ 0\end{array}$	$\begin{array}{c} 0\\ 9\\ 18\\ 15\\ 1\\ 18\\ 0\\ 0\\ 30\\ 2\\ 6\\ 1\\ 22\\ 2\\ 5\\ 62\\ 0\\ 1\\ 0\\ 1\\ 5\\ 0\\ 0\end{array}$	$\begin{array}{c} 0 \\ 1 \\ 1 \\ 0 \\ 2 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0$	$11 \\ 10 \\ 36 \\ 0 \\ 17 \\ 11 \\ 155 \\ 0 \\ 22 \\ 1 \\ 23 \\ 4 \\ 0 \\ 0 \\ 7 \\ 0 \\ 19 \\ 19 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 $	$\begin{array}{c} 0 \\ 9 \\ 5 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0$		$11 \\ 67 \\ 75 \\ 97 \\ 11 \\ 3 \\ 8 \\ 136 \\ 15 \\ 23 \\ 25 \\ 68 \\ 42 \\ 27 \\ 251 \\ 29 \\ 14 \\ 9 \\ 9 \\ 4 \\ 25 \\ 500 \\ 19 \\ 19 \\ 19 \\ 19 \\ 10 \\ 19 \\ 10 \\ 10$
Total	215	205	223	198	7	176	61	0	1,085
College of Architecture Nondegree	$ \begin{array}{c} 0 \\ 1 \\ 12 \\ 0 \\ 9 \\ 68 \\ 0 \end{array} $	$ \begin{array}{c} 0 \\ 5 \\ 14 \\ 0 \\ 20 \\ 35 \\ 0 \end{array} $	$\begin{array}{c} 0\\ 0\\ 23\\ 0\\ 25\\ 36\\ 0\end{array}$	$ \begin{array}{c} 0 \\ 2 \\ 2 \\ 2 \\ 0 \\ 2 \\ 2 \\ 0 \\ 2 \\ 2 \\ 0 \\ 2 \\ 2 \\ 0 \\ 2 \\ 2 \\ 0 \\ 2 \\ 2 \\ 2 \\ 0 \\ 2 \\ 2 \\ 2 \\ 0 \\ 2 \\ 2 \\ 2 \\ 0 \\ 2 \\ 2 \\ 0 \\ 2 \\ 2 \\ 2 \\ 0 \\ 2 \\ 2 \\ 2 \\ 0 \\ 2 \\ 2 \\ 2 \\ 0 \\ 2 \\ $	$ \begin{array}{c} 0 \\ 2 \\ 1 \\ 0 \\ 2 \\ 1 \\ 0 \end{array} $	$\begin{array}{c}2\\71\\0\\31\\0\\9\end{array}$	0 0 0 0 0 0 0		2 82 75 31 82 192 9
Total	90	74	84	105	6	113	0	1	473
College of Education Nondegree Administration and Supervision Agricultural Education Education Education Elementary Education Industrial Education Education for Industry Industrial Arts Education Vocational Technical Education Personnel Services Reading Science Teaching Biological Sciences Chemistry Earth Sciences Mathematical Sciences Physical Sciences Secondary Education Economics English	$1 \\ 0 \\ 13 \\ 50 \\ 2 \\ 88 \\ 13 \\ 4 \\ 7 \\ 3 \\ 0 \\ 0 \\ 1 \\ 7 \\ 1 \\ 0 \\ 4 \\ 0 \\ 6 \\ 0 \\ 13 \\ 0 \\ 13 \\ 0 \\ 0 \\ 13 \\ 0 \\ 0 \\ 13 \\ 0 \\ 0 \\ 0 \\ 13 \\ 0 \\ 0 \\ 0 \\ 13 \\ 0 \\ 0 \\ 0 \\ 0 \\ 13 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ $	$\begin{array}{c} 0 \\ 0 \\ 13 \\ 40 \\ 2 \\ 66 \\ 11 \\ 7 \\ 6 \\ 4 \\ 0 \\ 0 \\ 1 \\ 2 \\ 1 \\ 0 \\ 5 \\ 1 \\ 4 \\ 0 \\ 8 \end{array}$	$\begin{array}{c} 0 \\ 0 \\ 12 \\ 45 \\ 1 \\ 98 \\ 15 \\ 3 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 1 \\ 6 \\ 0 \\ 2 \\ 10 \\ 6 \\ 0 \\ 6 \end{array}$	$\begin{array}{c} 0 \\ 0 \\ 10 \\ 46 \\ 0 \\ 96 \\ 34 \\ 2 \\ 4 \\ 0 \\ 1 \\ 2 \\ 0 \\ 1 \\ 7 \\ 0 \\ 1 \\ 7 \\ 0 \\ 4 \\ 0 \\ 9 \end{array}$	$\begin{array}{c} 0 \\ 0 \\ 1 \\ 0 \\ 1 \\ 0 \\ 1 \\ 0 \\ 0 \\ 0 \\$	$\begin{array}{c} 207\\ 59\\ 11\\ 0\\ 0\\ 151\\ 19\\ 0\\ 0\\ 0\\ 105\\ 52\\ 0\\ 0\\ 0\\ 0\\ 1\\ 0\\ 0\\ 19 \end{array}$	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	$\begin{array}{c} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 $	$\begin{array}{c} 208\\ 59\\ 60\\ 181\\ 6\\ 500\\ 93\\ 16\\ 17\\ 7\\ 106\\ 52\\ 4\\ 4\\ 17\\ 22\\ 4\\ 4\\ 16\\ 4\\ 266\\ 0\\ 55\end{array}$

Major Course	Freshmen	Sophomores	Juniors	Seniors	Postgraduates	Masters*	Ph.D.s'	Unclassified	Total
History Mathematical Sciences French German Spanish Natural Sciences Political Science Psychology Sociology		$7 \\ 3 \\ 0 \\ 1 \\ 0 \\ 1 \\ 2 \\ 2 \\ 0$		$ \begin{array}{c} 15 \\ 5 \\ 0 \\ 0 \\ 1 \\ 6 \\ 1 \\ 6 \\ 1 \end{array} $	$ \begin{array}{c} 0 \\ $		0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	$42 \\ 31 \\ 3 \\ 1 \\ 6 \\ 29 \\ 5 \\ 19 \\ 3$
Total	241	187	237	252	6	648	0	1	1,572
College of Engineering Nondegree Bioengineering Ceramic Engineering Chemical Engineering I Civil Engineering I Electrical Engineering Engineering Engineering Engineering Mechanics Engineering Mechanics Environmental Systems Engineering Materials Engineering Materials Engineering Materials Engineering Materials Engineering Water Resources Engineering	$ \begin{array}{c} 0 \\ 0 \\ 21 \\ 16 \\ 15 \\ 323 \\ 8 \\ 0 \\ 82 \\ 1 \\ 0 \\ 42 \\ 0 \\ 0 \\ \end{array} $	$\begin{array}{c} 0 \\ 0 \\ 19 \\ 82 \\ 84 \\ 91 \\ 9 \\ 5 \\ 0 \\ 40 \\ 0 \\ 72 \\ 0 \\ 0 \\ 0 \\ \end{array}$	$\begin{array}{c} 0 \\ 0 \\ 16 \\ 45 \\ 80 \\ 77 \\ 2 \\ 7 \\ 0 \\ 47 \\ 0 \\ 61 \\ 0 \\ 0 \end{array}$	$egin{array}{c} 0 \\ 0 \\ 7 \\ 39 \\ 62 \\ 86 \\ 1 \\ 12 \\ 0 \\ 33 \\ 0 \\ 54 \\ 0 \\ 0 \end{array}$	$ \begin{array}{c} 0 \\ 0 \\ 0 \\ 0 \\ 3 \\ 5 \\ 0 \\ 0 \\ 3 \\ 1 \\ 0 \\ 3 \\ 0 \\ 1 \end{array} $	$10 \\ 18 \\ 6 \\ 14 \\ 18 \\ 36 \\ 0 \\ 1 \\ 0 \\ 23 \\ 2 \\ 31 \\ 10 \\ 3$	$\begin{array}{c} 0 \\ 0 \\ 0 \\ 5 \\ 2 \\ 7 \\ 0 \\ 0 \\ 1 \\ 0 \\ 8 \\ 0 \\ 0 \\ 3 \\ 0 \end{array}$		$10\\18\\69\\301\\364\\438\\32\\2\\205\\33\\2\\363\\13\\4$
Total	644	402	335	294	16	172	26	0	1,889
College of Forest and Recreation Resources Nondegree Forest Management Recreation and Park Administration1 Wood Utilization	0 73 02 2	$\begin{array}{c} 0\\ 42\\ 106\\ 4\end{array}$	$\begin{smallmatrix}&&0\\&55\\107\\&&3\end{smallmatrix}$	$\begin{smallmatrix}&&0\\&66\\115\\&&6\end{smallmatrix}$	$0\\ 4\\ 2\\ 0$	$\begin{smallmatrix}&2\\21\\38\\0\end{smallmatrix}$	0 0 0 0	0 0 0 0	$\begin{array}{r}2\\261\\470\\15\end{array}$
Total1	77	152	165	187	6	61	0	0	748
Administrative Management 1 Economics (B.A.) 1 Economics (B.S.) 1 Engineering Management 1 Financial Management 1 Industrial Management 1 Management 1 Management 1 Textile and Polymer Science 1 Textile Colence 1		$\begin{array}{c} 0 \\ 64 \\ 196 \\ 11 \\ 27 \\ 0 \\ 62 \\ 34 \\ 0 \\ 0 \\ 0 \\ 5 \\ 3 \\ 13 \end{array}$	$\begin{smallmatrix} & 0 \\ & 63 \\ 224 \\ & 9 \\ 21 \\ & 0 \\ 63 \\ 37 \\ & 0 \\ 0 \\ & 0 \\ 0 \\ 5 \\ 1 \\ 21 \end{smallmatrix}$	$\begin{array}{c} 0 \\ 59 \\ 186 \\ 6 \\ 16 \\ 0 \\ 56 \\ 27 \\ 0 \\ 0 \\ 0 \\ 4 \\ 0 \\ 23 \end{array}$	$\begin{array}{c} 0 \\ 4 \\ 2 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0$	$11 \\ 0 \\ 0 \\ 12 \\ 1 \\ 0 \\ 25 \\ 0 \\ 1 \\ 10 \\ 7 \\ 0$	$\begin{array}{c} 0 \\ 0 \\ 0 \\ 0 \\ 11 \\ 0 \\ 2 \\ 9 \\ 10 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ \end{array}$	$\begin{array}{c} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 $	$11 \\ 278 \\ 805 \\ 54 \\ 101 \\ 12 \\ 289 \\ 137 \\ 27 \\ 9 \\ 11 \\ 41 \\ 15 \\ 72 \\ 15 \\ 72 \\ 11 \\ 15 \\ 72 \\ 11 \\ 15 \\ 72 \\ 11 \\ 15 \\ 72 \\ 11 \\ 15 \\ 72 \\ 11 \\ 11 \\ 15 \\ 72 \\ 11 \\ 11 \\ 11 \\ 11 \\ 11 \\ 11 \\ 11$
Total	18	415	444	377	6	69	32	1	1,862
French	0 52 6 27 58 55 60	$1 \\ 36 \\ 6 \\ 0 \\ 19 \\ 4 \\ 40 \\ 53$	$0\\43\\7\\0\\29\\2\\45\\57$	$\begin{array}{c} 0\\ 33\\ 6\\ 1\\ 20\\ 2\\ 46\\ 40 \end{array}$	$ \begin{array}{c} 0 \\ 1 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 3 \end{array} $		0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	$7 \\ 199 \\ 25 \\ 1 \\ 106 \\ 66 \\ 186 \\ 213$

482 Student Register

Major Course	Freshmen	Sophomores	Juniors	Seniors	Postgraduates	Masters'	Ph.D.s'	Unclassified	Total
Sociology		$^{16}_{5}$	31 7	$\frac{24}{10}$	$1 \\ 0$	0	0 0	0 0	88 27
Total	279	180	221	182	5	51	0	0	918
College of Nursing Nondegree Nursing (A.A.) Nursing (B.S.)		0 44 81	$0 \\ 15 \\ 74$	0 1 91	0 3 2	1 0 18	0 0 0	0 1 0	1 103 389 402 102
Total	162	125	89	92	5	19	0	1	493
College of Sciences Nondegree Biochemistry Botany Chemistry (B.A.) Chemistry (B.S.) Geology (B.A.) Geology (B.A.) Geology (B.S.) Mathematical Sciences (B.A.) Mathematical Sciences (B.S.) Medical Technology Microbiology Physics (B.A.) Physics (B.A.) Physics (B.S.) Predentistry Predentistry Premedicine Premedicine Prephysical Therapy Zoology Total	$ \begin{array}{c} 11\\ 3\\ 20\\ 3\\ 6\\ 9\\ 62\\ 34\\ 40\\ 0\\ 13\\ 15\\ 2\\ 86\\ 20\\ 32 \end{array} $	$\begin{array}{c} 0 \\ 11 \\ 6 \\ 2 \\ 11 \\ 2 \\ 32 \\ 15 \\ 45 \\ 1 \\ 9 \\ 0 \\ 0 \\ 9 \\ 9 \\ 9 \\ 6 \\ 47 \\ 210 \end{array}$	$\begin{array}{c} 0 \\ 10 \\ 6 \\ 1 \\ 100 \\ 42 \\ 100 \\ 390 \\ 144 \\ 490 \\ 77 \\ 0 \\ 0 \\ 7 \\ 0 \\ 0 \\ 44 \\ 1 \\ 34 \\ 194 \end{array}$	$ \begin{array}{c} 0\\ 2\\ 7\\ 3\\ 6\\ 2\\ 6\\ 7\\ 30\\ 3\\ 51\\ 1\\ 3\\ 0\\ 0\\ 0\\ 1\\ 1\\ 9\\ 171 \end{array} $	$\begin{array}{c} 0 \\ 0 \\ 0 \\ 0 \\ 1 \\ 0 \\ 0 \\ 1 \\ 1 \\ 1 \\$	$\begin{array}{c} 12\\ 20\\ 14\\ 0\\ 18\\ 0\\ 0\\ 48\\ 0\\ 25\\ 0\\ 13\\ 0\\ 1\\ 0\\ 0\\ 31\\ 182\\ \end{array}$	$\begin{smallmatrix} 0 & 6 \\ 0 & 0 \\ 14 & 0 \\ 0 & 0 \\ 0 & 0 \\ 17 & 0 \\ 0 & 0 \\ 14 & 0 \\ 0 & 0 \\ 13 \\ \hline 64 \\ \end{smallmatrix}$	$\begin{array}{c} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 $	$\begin{array}{c} 12\\ 72\\ 44\\ 9\\ 80\\ 11\\ 17\\ 29\\ 230\\ 67\\ 211\\ 1\\ 2\\ 20\\ 15\\ 4\\ 41\\ 41\\ 223\\ 1,257\\ 1,257\end{array}$
Nondegree	0	0	0	0	45	0	0	40	85
Total	0	0	0	0	45	0	0	40	85
Graduate—Master's Graduate—Ph.D. Postgraduate Nondegree	· · · · ·			· · · · · ·		· · · · · ·	••••		1,491 183 109 42
Total									1,825
Campus Total		· · · • • ·						• • • •	10,382
Clemson-Furman M.B.A.	••••							•••	159 733
Grand Total			••••	••••	• • • •		• • • •	• • •	11,274

ENROLLMENT BY COUNTY AND STATE

Fall Semester, 1977-78

Abbeville 69 Alabama 24 Massachusetts 28 Aiken 255 Alaska 1 Michigan 13 Anderson 851 Arizona 3 Mississippi 8 Barnberg 29 Arkansas 2 Missouri 5 Barnwell 32 Austalia 1 Montana 1 Beaufort 71 Barabados 1 Netbraska 1 Beaufort 71 Barnkell 10 New Hampshire 2 Calhoun 29 Galifornia 10 New Hampshire 2 Cherokee 61 Colombia 2 New Mexico 1 Cherokee 61 Colombia 2 Niue 29 Clarendon 39 Cuba 2 Niue 10 Colleton 31 Delaware 24 North <carolina< td=""> 356 Darlington 120 District of Columbia 3 North Dakota 1 Dillon 43 Egypt 1 Pakistan 2</carolina<>	County		State or Country		
Allendale 15 Argentina 1 Minscota 3 Anderson 851 Arizona 3 Mississispi 8 Barnwell 32 Australia 1 Montana 1 Beaufort 71 Barbados 1 Nebraska 1 Berkeley 99 Bolivia 1 Nebraska 1 Berkeley 99 Bolivia 1 Netherlands 1 Calhoun 29 California 10 New Hampshire 2 Charleston 453 Canada 4 New Jersey 277 Cherokee 61 Colombia 2 New Mexico 1 Chester 50 Colorado 6 New York 150 Clarendon 31 Delaware 24 North Carolina 356 Darlington 120 District of Columbia 1 Ohio 70 Dorchester 108 Ecuador 2 Oklahoma 4 Edgefield 43 Dominican Republic 1 Ohio	Abbeville	69	Alabama	24	Massachusetts
Allendale 15 Argentina 1 Minesota 3 Anderson 851 Arizona 3 Mississippi 8 Bamberg 29 Arkansas 2 Mississippi 8 Barnwell 32 Australia 1 Montana 1 Beaufort 71 Barbados 1 Nebraska 1 Berkeley 99 Bolivia 1 Netherlands 1 Calhoun 29 California 10 New Hampshire 2 Cherokee 61 Colorado 6 New York 150 Cherokee 61 Colorado 6 New York 150 Cherokee 60 Colorado 6 New York 150 Cherokee 61 Colorado 6 New York 150 Cherokee 10 District of Columbia 3 North Dakota 1 Dorchester 108 Ecuador 2 New York 156 Darlington 120 District of Columbia 3 North Dakota<	Aiken	255	Alaska	1	Michigan 13
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	Allendale	15	Argentina	1	
Barnwell 32 Australia 1 Montana 1 Beaufort 71 Barbados 1 Nebraska 1 Berkeley 99 Bolivia 1 Nebraska 1 Calhoun 29 California 10 New Hampshire 2 Charleston 453 Canada 4 New Yersey 277 Cherokee 61 Colombia 2 New Mexico 1 Chesterfield 71 Connecticut 49 Nigeria 29 Clarendon 39 Cuba 2 Niue 1 Colleton 31 Delaware 24 North Carolina 356 Darlington 120 District of Columbia 3 North Dakota 1 Dillon 43 Dominican Republic 1 Ohio 70 Dorchester 108 Ecuador 2 Oklahoma 4 Edeorgetown 49 Georgia 312 Perusylvania 132 Greenvood 208 Ghana 1 Puerto Rico <td>Anderson</td> <td>851</td> <td>Arizona</td> <td>3</td> <td></td>	Anderson	851	Arizona	3	
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CODE FOR STUDENT ROSTER

The first column of numbers indicates student status as follows: 1-new high school student, 2-new transfer student, 3-former student returning-undergraduate, 4-con-tinuing student-undergraduate, 5-new graduate student, 6-continuing graduate student, 7-former student returning-graduate. Asterisk preceding student's classification represents part-time student.

Abbreviations refer to the student's major as follows:

ACCT	Accounting	LIB ART	Liberal Arts
AD MGT	Administrative Management	MAT E	Materials Engineering
ADM SPV	Administration and Supervision	MATH BA	Mathematical Sciences (B.A.)
AG E	Agricultural Engineering	MATH BS	Mathematical Sciences
AG EC	Agricultural Economics	ME	Mechanical Engineering
AG ED	Agricultural Education	MED T	Medical Technology
AG MECH	Agricultural Mechanization	MGT	Management
	and Business	MGT SC	Management Science
AG ND	Agriculture (Nondegree)	MICRO	Microbiology
AGRIC	Agriculture	NON DEG	Nondegree
AGRON	Agronomy	NURS AA	Nursing (A.A.)
AN IND AN PH	Animal Industries	NURS BS	Nursing (B.S.)
AN SC	Animal Physiology Animal Science	NURS ND NUTR	Nursing (Nondegree) Nutrition
ARCH	Architecture	P ARCH	Prearchitecture (B.A.)
ARCH ND	Architecture (Nondegree)	P ARCH	Prearchitecture (B.A.)
BC	Building Construction	P DENT	Predentistry
BIO CH	Biochemistry	PER S	Personnel Services
BIOENGR	Bioengineering	PM CORE	Premedicine Core
BOT	Botany	P MED	Premedicine
CE	Civil Engineering	P PHARM	Prepharmacy
CH BA	Chemistry (B.A.)	PHYS BA	Physics (B.A.)
CH BS	Chemistry	PHYS BS	Physics
CHE	Chemical Engineering	P PHY T	Prephysical Therapy
CRD	Community and Rural Development	PL PATH	Plant Pathology
CRE	Ceramic Engineering	PL PH	Plant Physiology
CRP	City and Regional Planning	PL SC	Plant Sciences
DY SC	Dairy Science	PO SC	Political Science
EA	Engineering Analysis	PS	Poultry Science
E CH ED	Early Childhood Education	PSYCH	Psychology
ECON	Economics (B.A.)	P VET	Preveterinary Medicine
ECON	Economics	READING	Reading
EC BIOL	Economic Biology	RPA	Recreation and Park Administration
EC ZOOL	Economic Zoology	SCS ND	Sciences (Nondegree)
EE	Electrical Engineering	SC T	Science Teaching
EDUC	Education	SC T BS	Biological Sciences
EDUC ND	Education (Nondegree)	SC T CH	Chemistry
EL ED	Elementary Education	SC T ES	Earth Science
EM	Engineering Mechanics	SC T MA	Mathematical Sciences
E MGT	Engineering Management	SC T PH	Physical Sciences
ENGL	English	S ED	Secondary Education
ENGR	Engineering	S ED EC	Economics
ENGR ND ENT	Engineering (Nondegree) Entomology	S ED EN S ED FR	English French
ESE		S ED FR S ED GE	German
ET	Environmental Systems Engineering Engineering Technology	S ED HI	History
FD SC	Food Science	S ED MA	Mathematical Sciences
FIN MGT	Financial Management	S ED NS	Natural Sciences
FOR	Forest Management	S ED PO	Political Science
FR	French	S ED PS	Psychology
F&RR ND	Forest and Recreation Resources	S ED SO	Sociology
	(Nondegree)	S ED SP	Spanish
GEOL BA	Geology (B.A.)	SOC	Sociology
GEOL BS	Geology	SPAN	Spanish
GER	German	SYS ENG	Systems Engineering
HIST	History	TC	Textile Chemistry
HORT	Horticulture	TEXT	Textile Technology
IM	Industrial Management	TPS	Textile and Polymer Science
IMTS ND	Industrial Management and	TS	Textile Science
	Textile Science (Nondegree)	VIS ST	Visual Studies
IN ED	Industrial Education	WB	Wildlife Biology
IN ED A	Industrial Arts	WD UTIL	Wood Utilization
IN ED I	Education for Industry	WRE	Water Resources Engineering
IN ED V	Vocational-Technical Education	ZOOL	Zoology
LA ND	Liberal Arts (Nondegree)		

Digits following abbreviations refer to the student's class as follows:

01	First Semester Freshman	08	Second Semester Senior
02	Second Semester Freshman	09	First Semester Fifth Year
03	First Semester Sophomore	10	Second Semester Fifth Year
04	Second Semester Sophomore	11	Graduate StudentMaster's
05	First Semester Junior	12	Postgraduate
06	Second Semester Junior	13	Nondegree
07	First Semester Senior	14	Graduate StudentDoctor's

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PORT SNOW	MASTERS	446	ACCI
PORTER DEB		74	EL ED
PORTER JEN	INIFER L	46	ENGL ED
PORTER POL POSTON NAN	LY ANATA	44	NURS BS
POWELL ALE	ES ARTHUR	44	ACCT
POWELL MIC	HAEL DAVID	56	EDUC-ND
POWERS KYL	E ASHLORD	44	INEU
PRATT STEV	EN W	44	S LI B BS A A A A A A A A A A A A A A A A A
PRESLEY RU PRESLEY ST	EVE CARROL	44	AGEU
PRESTRIDGE PREWITT JA	NICE C	6	LNGL
PRICE COKE	D RICHARD	44	PSYCH
PRICE JAME	S FELSX	56	ENT
PRICE REBE	CCA I	44	PSYCH ADM MGT
PRICHARD S PRIDGEN RU	TEVEN M BERT W JR	64	ENT
PRINCE FRA PRINGLE LI	NK T JR NDA ANN	44	ADM MGT
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QUEEN GARL	ROBERT C	7	EDUC-ND
QUINTRELL	RANDALL D	444	
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