The Division of Continuing Education at Knoxville, is the administrative unit of UTK that extends academic courses, educational services, and other programs to the non-traditional student. While most people who participate in the programs are adults, persons of all ages and academic levels can be counted among the people who enroll in the credit and non-credit offerings of the Division.

Programs and courses are based upon student needs and desires, whether for self-motivated learning; for leisure and recreational programs; or for professional promotion, certification, licensure, relicensure, or mid-career changes. The Division provides these educational opportunities through program coordination and development of the four departments: Conferences, Non-Credit Programs, University Evening School, and Workshops and Off-Campus Credit Programs. Specific programs and services of each department are described on the following pages.

**Conferences**

Director: W. L. Whelan, Ed.D.
Assistant Director: S. R. Martin, B.A.
Coordinators: J. H. Gillespie, M.S.; M. R. Davis, M.S.

It has become evident that learning can take place for an extended period of time in a variety of modes, settings, and circumstances other than in the traditional classroom. To bring this fact to its reality, The University of Tennessee, Knoxville continuing education conference program has been designed and staffed to bring together under University auspices groups of participants and qualified resource persons to share new learning and ideas, to develop new insights, to address current problems, or to impart new skills and techniques. This thrust can embrace virtually all disciplines, professions, vocations, and avocations.

The Department of Conferences is staffed and equipped to advise, assist, and provide administrative support in the delivery of a successful conference or workshop. Acting in these roles, the department can follow through with an initial tentative budget; secure appropriate setting; devise an attractive format; arrange for auxiliary services such as lodging, meal, and banquet events; extra excursions and tours; and complete registration procedures; design, print, and mail the conference brochure; and handle registration fee collection and payment of honoraria and other conference expenses.

Depending on the time of year, the academic calendar of the University, and the desires of the conference sponsor, the program and participants may be housed in campus facilities or off-campus commercial settings. Among the unique advantages offered by the Department of Conferences programs are that programs are designed to meet specific needs of the greatest practical value to the participants; the knowledge and expertise of the UT faculty and staff can be matched with the specific needs of the participants; the programs encourage informal contacts and interaction among colleagues with similar interests with the resource persons; program fees are kept reasonable by using University facilities and services whenever possible; an experienced Conference staff is available to plan, coordinate, and facilitate delivery of programs of virtually any size or duration; by using conference services, the activity initiator is free to concentrate fully on program content; programs can be conducted "inhouse" on the campus, anywhere in the state of Tennessee, or wherever an appropriate meeting site can be arranged; Continuing Education Units (CEU's) may be awarded to program participants if the program is designed to satisfy the criteria necessary for CEU credit. Additional information may be obtained from the Department of Conferences, 2019 Terrace; telephone 974-5261.

**Non-Credit Programs**

Coordinator: K. J. Reagan, M.S. Tennessee.

The Department of Non-Credit Programs offers experiences to meet the personal and professional needs of individuals and groups on campus, in Knoxville, and in surrounding communities. Non-credit courses are administered by the department, often in cooperation with other academic and service units of the University and/or non-university agencies. General interest courses in areas such as personal and professional development, business, aviation, dance, health and fitness, art, foreign languages, real estate, music, photography, etc., are offered in addition to remedial and in-service training programs. Ongoing programs of special interest include the English Language Institute for native speakers of other languages and the Smoky Mountain Field School, offering specialized study in emphasizing outdoor exploration in the National Park.

Continuing Education Units (CEU's) are awarded to students satisfactorily completing courses described in the non-credit quarterly schedule. A CEU is defined by the Southern Association of Colleges and Schools as "ten contact hours of participation in an organized continuing education experience under responsible sponsorship, capable direction, and qualified instruction." A permanent record of CEU's is maintained by the department. A letter of completion of all CEU's earned at The University of Tennessee, Knoxville, may be obtained upon written request.

Recent statewide legislation gives Tennessee citizens who are 60 years of age or older; or those who are totally disabled, the opportunity to audit courses at UTK free of charge according to available space. Legal verification of either of these conditions is required for enrollment. Additional information may be obtained at 2016 Lake Avenue.
University Evening School

Director:

Associate Director:
J. C. Sekula, Ph.D. Tennessee.

Assistant Director:

Assistant Professors:

Instructor:
A. J. MaceCabe, M.S. SUNY at Albany.

The University Evening School, with the cooperation of academic colleges and departments, administers credit classes and supports activities for those attending in the late afternoon and evening. Programs and services are offered enabling working adults to pursue their educational interests and goals.

Undergraduate Degree Programs

The following degrees are available for evening students:

- College of Business Administration Bachelor of Science in Business Administration with a major in Accounting, General Business, Economics, Management, or Office Administration; College of Liberal Arts Bachelor of Arts with a major in Anthropology, Economics, History, Mathematics, Political Science, Psychology, or Sociology.

Graduate Degree Programs

Some departments within the Colleges of Business Administration, Education, and Engineering offer all courses required for an advanced degree during the evening. For a specific major, consult the appropriate department. In the College of Business Administration, all courses required for the MBA degree with a concentration in management are offered during the evening.

Nursing Education Program

The Nursing Education Program is conducted through contractual agreement with three area Knoxville hospitals. The diploma courses are provided by the University Evening School in support of this program.

Special Mini-Term Programs

The University Evening School offers two special Mini-Term courses during the month of September and one during the month of December. Students may enroll in one course during the ten-day Mini-Term period. Courses and instructors listed for the Mini-Term are carefully selected to reflect a broad academic base of individualized offerings suited to an intensive program of study. Courses cover traditional material and information included in regular quarterly offerings; however, many are supplemented with films, lectures, research projects, and specialized areas of study. Thus, each offering will afford students an opportunity to immerse themselves in the discipline selected.

Student Services

A comprehensive program of services is provided by the Evening School for the adult part-time student.

REGISTRATION

- Quarterly registration by mail or on campus is offered as a convenience for former Evening School students.

ADVISING

An advising-counseling program is available for the benefit of all evening students who need assistance with academic and/or personal matters. This program can accommodate students during regular daytime hours (8:30 - 5:30) and in the evenings by appointment. In addition, advisers from the various colleges are on hand for academic consultation during evening preregistration days. A full-time veteran adviser assists evening students who receive educational benefits under the G.I. Bill with their academic planning.

FINANCIAL AID

- Evening School student who encounter difficulty in pursuing academic goals because of financial restrictions may be eligible for assistance through the Evening School Scholarship Fund. In addition, interested students may obtain applications for the Basic Educational Opportunity Grant Program in the Evening School Office.

Elderly and Disabled Persons

Recent statewide legislation gives Tennessee citizens who are 60 years of age or older, or those who are totally disabled, the opportunity to attend courses at the University at no charge on an audit, space available basis. Legal verification of either of these conditions is required for enrollment. Students who are 65 or over, or are totally disabled and who desire to receive UT credit for their courses, may pay a reduced charge of $5 per credit hour to a maximum of $50 for a fulltime load. Registration for day and evening classes is handled by the Evening School.

For additional information concerning any of these programs or services please contact the University Evening School, 451 Communications & University Extension Building.

Workshops and Off-Campus Programs

Director:

Assistant Director:
J. R. Rosemond, M.S. Tennessee.

This department conducts undergraduate and graduate courses in many locations away from the Knoxville Campus. The courses are scheduled in response to requests and identifiable needs of adult part-time students who live some distance from the UTK campus and who take part or all their courses at off-campus locations. All course offerings and instructors are approved by the appropriate academic department heads and the credit awarded is resident credit. The majority of the colleges and their academic departments cooperate in the off-campus program.

Credit workshops are another phase of continuing education designed to meet the student's changing needs. They are coordinated through the various academic units of the University and provide students the opportunity to participate in short periods of intensive study. As a result, students may earn college credit within a shorter time frame than the traditional quarter system.

Workshops also offer flexibility of timing, location, and content. Summer workshops are particularly popular with teachers and school administrators. Although most workshops are held on the UTK campus, geography is not a limiting factor.

The department provides students services at the off-campus sites by conducting registration and scheduling counseling/advising at the locations where classes and workshops meet.
College of Education

William H. Coffield, Dean
C. Glennon Rowell, Associate Dean for
Instructional Programs
Thomas W. George, Acting Assistant Dean for
Support Services

Teacher education is historically a major function of The University of Tennessee. Beginning in 1903, when the first courses for teachers were offered, the University has increasingly fulfilled its responsibility to provide schools with competent teachers and service personnel and to improve the teaching profession by continually upgrading its membership. The College of Education was established in 1926, and all teacher preparation programs at The University of Tennessee are now coordinated within its seven departments and its School of Health, Physical Education, and Recreation.

The College of Education holds membership in the American Association of Colleges for Teacher Education. All certification and degree programs through the doctoral level are fully accredited by the National Council for Accreditation of Teacher Education, the Southern Association of Colleges and Schools, and the Tennessee State Department of Education.

The faculty of the College of Education is committed to performing three major functions: (1) to provide professional preparation for teachers, administrators, and school service personnel at undergraduate and graduate levels; (2) to collaborate with school personnel, educational agencies, professional groups, and others interested in the evaluation and improvement of educational opportunities, programs, and services; and (3) to promote and conduct experimental and research studies in education.

The teacher preparation programs represent utilization of University-wide resources and cooperation of all appropriate units. Certain requirements are of basic importance: A broad cultural background in the arts and sciences (general education), mastery of professional knowledge and skills, and thorough preparation of specific teaching fields. Through a carefully planned program of combined academic and direct experiences, the prospective teacher acquires a depth and breadth of knowledge and understanding superior to that of the typical college graduate—superior in cultural and citizenship appreciation as well as in professional and scholarly accomplishment.

The Claxton Education Building contains many modern and functional facilities for the professional training of teachers. Classrooms, laboratories, seminar rooms, faculty and administrative offices, the instructional materials center, the Bureau of Educational Research and Service, the School Planning Laboratory, and facilities for special activities such as observation and experimentation are located in this air-conditioned building.

Teacher Placement Service

The College of Education, cooperating with the University Placement Service, assists qualified students and alumni in securing positions. School and college administrators are cordially invited to make full use of these services in their efforts to employ competent personnel.

General Information

Admission to the College

Application for association with the College of Education may be made at any time. Freshmen are required to have at least 16 units of high school credits.

For transfer into the College of Education after completion of the freshman year, a minimum grade average of 2.0 (C) is required.

Course Load—Permission for more than 19 hours in a quarter must be obtained from the Assistant Dean for Support Services. A normal course load in the college is 16-19 hours.

Admission to Teacher Education

Students desiring certification to teach must gain admittance into Teacher Education before enrolling in various required upper division Education courses. Applicants are encouraged to (1) begin the multiphase admission process during their first quarter of full-time attendance and (2) complete the process of approximately the 60th quarter hour.

Applicants must complete the following requirements: (recommended sequence for completion):

1. Basic Skills Tests. The State Board of Education requires all applicants to pass tests of reading comprehension, mathematics computation, and language. Applicants with a minimum ACT composite score of 17 are exempt from this requirement. (Transfer students having a minimum ACT composite score of 765 of 17 or a combined score score of 765 (Verbal/Quantitative) on the SAT or CEEB must supply the Assistant Dean's Office with an official record of their score(s).)

Students, except for Junior-Senior transfer students, are encouraged to take the basic skills tests during their second quarter of full-time attendance, using time during their first quarter of attendance for test preparation. (Details on preparation are available through the Assistant Dean's Office.)

2. Socio-Emotional Evaluation. Applicants are required to undergo a socio-emotional (personality) evaluation. Students whose scores on selected scales represent extreme variations from established norms will be required to undergo further evaluation. Students, except for Junior-Senior transfer students, should take the personality test during their third quarter of full-time attendance.

3. Field Experience. Applicants to Teacher Education must provide evidence of having successfully completed a field experience in a public school setting. (Refer to program area curriculum for specific required experiences.) Students, except for Junior-Senior transfer students, should complete the field experience requirement during their fourth quarter of full-time attendance.

4. Speech and Hearing Evaluations. Applicants are required to undergo speech and hearing evaluations.

Students, except for Junior-Senior transfer students, should undergo the Speech and Hearing Evaluations during their fourth quarter of full-time attendance. Applicants to Teacher Education are required to have a minimum of 2.2 UTK grade point average. Furthermore, transfer students must, also, have a minimum of 2.2 cumulative...
grade point average. (No applicant's grade point average will be considered until the completion of at least 60 quarter hours.) Applicants to Teacher Education will be reviewed by the Admissions and Retentions Committee. Any applicant who has established a record of misconduct will be reviewed by the College's Admission and Retention Committee.

Graduate students, except for those previously admitted to the College's Teacher Education Program, must gain admittance to Teacher Education before receiving the College's recommendation for certification. Students interested in complete details on admission to Teacher Education should contact the Assistant Dean for Support Services, 212 Claxton Education Building.

Admission to Student Teaching

Application for all student teaching programs must be filed no later than the quarter preceding the academic year preceding the actual experience. For example, if a student plans to student teach during the 1983-84 academic year, application must be made by January 1, 1983. Applications for student teaching may be completed on approximately four occasions each quarter. A schedule of the application meetings is available in the Office of the Director of Student Teaching, 212 Claxton Education Building.

Making application for student teaching is not contingent upon admission to the Teacher Education Program. Students should apply for student teaching during the time (regardless of their status in the process of admission to the Teacher Education Program) following are the general prerequisites to student teaching. Student teaching prerequisites for specific program areas (art, elementary, P.E., etc.) are available in the student teaching office or from the academic advisor.

1. Full admission to the Teacher Education Program no later than the quarter preceding student teaching.
2. Completion of the professional core courses (Education 3010, 3020, 3030 and Educational Psychology 2430 or 3810).
3. Completion of field experiences required in the program curriculum.
4. Completion of the special methods courses at The University of Tennessee.
5. Completion of the Pre-Student Teaching Seminar and the September Experience.
6. Senior standing and a minimum grade point average of 2.2 on work completed at The University of Tennessee, and a cumulative grade point average of 2.2.

In addition, any record established by the student in the Office of Student Conduct will be reviewed by the Admissions and Retentions Committee.

The 15-quarter hour student teaching experience is evaluated on a satisfactory/No Credit basis and the hours are included in the University policy requiring a 2.0 in the last 45 hours worked at the University. The most important criterion in placing student teachers in the public schools is the value of the experience for preparing for teaching. The University cannot guarantee the geographic locale desired by the student though effort will be made to follow the student's wishes. Student teaching centers are maintained in East Tennessee communities, some of which are at a considerable distance from Knoxville. Married students will be placed as near their homes as possible in order to preserve family life.

Substitutions

It is sometimes necessary and advisable for students to substitute other courses for those required in a particular curriculum. This is particularly true of students who transfer to The University of Tennessee College of Education from another college or university. The general test of whether a substitution would be appropriate is "does the course you wish to substitute meet the spirit of the course requirement?" That is "is the content similar or perhaps more appropriate to your needs?"

To initiate a substitution request the student should visit with the adviser first. If they agree that the substitution is an appropriate one, the substitution request form should be forwarded to the Office of the Assistant Dean for Support Services, 212 Claxton Education Building. Approved petitions are forwarded to the Dean of Admissions for further approval, and for filing in the Records Office. Courses taken at junior or community colleges may be substituted for lower division (0000/2000 level) courses or may be used as electives. These courses may not be substituted for upper division (3000/4000 level) courses.

Recommendation for Certification

The application for a professional teacher's certificate should be completed early in the final year of student teaching. Application forms may be obtained in the Registrar's Office, 215 Student Services Building, and 212 Claxton Education Building.

Tennessee state regulations stipulate that the applicant for the professional certificate must be recommended by the teacher-training institution. The dean of the College of Education is the official designated to recommend University of Tennessee graduates for teacher certification. To receive this recommendation, the applicant must have fulfilled the following requirements:

1. A minimum cumulative grade point average of 3.0.
2. Satisfactory performance of the student teaching experience.
3. A minimum grade point average of 2.0 in the teaching field(s).
4. Completion of a methods course in each area of endorsement.
5. Fulfillment of all special recommendations of the Admissions and Retentions Committee.
6. Successful completion of at least one quarter hour course dealing with the learning and behavioral characteristics of handicapped students.

NOTE: Students are advised to consult the Graduate Catalog for the curricula listed under Roman numerals I, II, and III only, a student may include a maximum of 30 hours in non-directed electives taken on a Satisfactory/No Credit basis in the total hours required for graduation. S/NC may not be used in required courses or controlled electives, except where the course is offered on an S/NC basis (such as student teaching and field experiences). An area of concentration will be considered as non-directed electives except where specific courses or controlled electives are required. NOTE: Students are advised to consult the University's degree requirements as stated in the front section of this catalog as well as the requirements for the college or department.

Satisfactory/No Credit Courses

For the curricula listed under Roman numerals I, II, and III only, a student may include a maximum of 30 hours in non-directed electives taken on a Satisfactory/No Credit basis in the total hours required for graduation. S/NC may not be used in required courses or controlled electives, except where the course is offered on an S/NC basis (such as student teaching and field experiences). An area of concentration will be considered as non-directed electives except where specific courses or controlled electives are required. NOTE: Students are advised to consult the University's degree requirements as stated in the front section of this catalog as well as the requirements for the college or department.

I. Curricula for Elementary Teachers

A. Grade 1 through Grade 8 (certification for grades 1-8)

Graduate Programs

The College of Education, through the Graduate School, offers the following leading to the Master of Science degree, the Master of Education degree, the Master of Arts in College Teaching degree, the Master of Public Health degree, the Specialist in Education (advanced graduate) degree, the Doctor of Education, and the Doctor of Philosophy degrees. For further information, see the Graduate Catalog.

Undergraduate Curricula

The College offers courses of study leading to the Bachelor of Science in Education and to eligibility for teacher certification in Tennessee and in those states which grant reciprocity privileges to graduates of institutions accredited by the National Council for Accreditation of Teacher Education (NCATE). A core of studies provides the foundation for specialization in all teacher education curricula. In addition, approved concentrations must be completed in subject fields specifically related to the public school curriculum. A choice is to be made among programs leading to recommendation for certification at one of three levels: elementary, (kindergarten-9), secondary (grades 7-12), or special subjects in grades 1-12.

Courses in library science are available to students who are interested in beginning positions in any library or in preparation for further graduate study in professional librarianship. The minimum requirements for full-time librarianship in any size school in Tennessee can be met through completion of the basic library science courses (3510, 3520, 3530, 4140, 4150, 4270, 4350, 4790). Endorsement as a librarian requires 27 quarter hours in library science. At the undergraduate level, only a minor of library science is available. Students in the college will select an appropriate curriculum from those outlined under the (undergraduate curriculum) section. Students interested in this program should consult with a member of the faculty of the Graduate School of Library and Information Science.

Students should work closely with faculty advisors in planning programs of study. The chosen curriculum must be followed as outlined to assure graduation and certification, and any proposed substitution for a required course should be filed for approval before the end of the junior year.

Satisfactory/No Credit Courses

For the curricula listed under Roman numerals I, II, and III only, a student may include a maximum of 30 hours in non-directed electives taken on a Satisfactory/No Credit basis in the total hours required for graduation. S/NC may not be used in required courses or controlled electives, except where the course is offered on an S/NC basis (such as student teaching and field experiences). An area of concentration will be considered as non-directed electives except where specific courses or controlled electives are required.

NOTE: Students are advised to consult the University's degree requirements as stated in the front section of this catalog as well as the requirements for the college or department.

I. Curricula for Elementary Teachers

A. Grade 1 through Grade 8 (certification for grades 1-8)

NOTE: Students are advised to consult the University's degree requirements as stated in the front section of this catalog as well as the requirements for the college or department.
**Health and Physical Education (18 hours)**

P.E. 3450 (3); School Health 3610 (3); Psychology 2500 (4); P.E. and health electives (8 hours) must include minimum of 3 hours in each area.

**Humanities (12 hours)**

Literature 8 hours; the remaining four hours must be chosen from foreign language (above introductory level), philosophy, religious studies, Art 1815 or 1825, or Music 1210 or 1220, or Art 1415 or 1420.

**Mathematics (9 hours)**

Mathematics 2110, 2120, 2130.

**Natural Science (20 hours)**

8 or 12 hours in biological science. Recommended series are Biology 1210, 1220 (1230 or Botany 1110, 1120). 8 or 12 hours in physical science. Recommended series are Physics 1410, 1420 (1430), or Geology 1410-20-30 or Astronomy 2110, 2120 (2130), or Chemistry 1110, 1120 (1130).

**Social Studies (18-20 hours)**

History (4 hours)—it is recommended that the history course be taken at the sophomore level. Electives (6-14 hours) from anthropology, economics, geography, human services, political science, and sociology. Minimum of 3 areas are required.

**CORE PROFESSIONAL COURSES**

- **9 hours**
  - Educ. C & I 3010, 3020, 3030.

**ELEMENTARY EDUCATION COURSES**

- **36 hours**

**SPECIALIZED COURSES**

- **21 hours**
  - Educational Psychology 2430; Art Education 2100, 2110; Music Education 2100, 3110; Educ. C & I 3510; Special Education 3533.

**AREAS OF CONCENTRATION**

- **15-16 hours**
  - One or more areas of specialization are to be chosen from:
    - **Art** requirements plus 15-16 hours from art, IDH, art education.
    - **Black Studies** courses from at least 3 different fields must be included. See Black Studies for specific course possibilities.
    - **Child Studies** Requirements plus 15-16 hours from child development, psychology, educational psychology.
    - **Humanities** Requirements plus 15-16 hours.
    - **Language Arts** Requirements plus 15-16 hours in English, Speech, Journalism.

**Library and Information Science**

Requirements plus 15-16 hours. If certification is desired in library services, the student must complete 24 hours in Library and Information Science 3520-30, 4140, 4150, 4270, 4330, 4750.

**Mathematics Requirements** plus 15 hours.

- **MidSchool Courses (15-16 hours)**
  - to include Educ. C & I 5570; Ed. Psychology 3810; Educ. C & I 3520 or 4280; Educ. C & I 3462 or 3653, or 3654 or 3657 or 3658 (a second methods course); Educ. C & I 4350 or 4351 or 4562; lab experience in middle school.

- **Music Requirements** plus 15-16 hours.

- **Science Requirements** plus 15-16 hours.

- **Special Education** 15 hours (if certification is desired in special education, additional hours are required, including one additional quarter of student teaching).

**Social Studies (18 hours)**

Recommended are Biology 1210, 1220 (1230 or Botany 1110, 1120). 8 or 12 hours in physical science. Recommended series are Physics 1410, 1420 (1430), or Geology 1410-20-30 or Astronomy 2110, 2120 (2130), or Chemistry 1110, 1120 (1130).

**Social Studies (18 hours)**

History (4 hours—it is recommended that the history course be taken at the sophomore level). Electives (6-14 hours) from anthropology, economics, geography, human services, political science, and sociology. Minimum of 3 areas are required.

**CORE PROFESSIONAL COURSES**

- **9 hours**
  - Educ. C & I 3010, 3020, 3030.

**ELEMENTARY EDUCATION COURSES**

- **36 hours**

**SPECIALIZED COURSES**

- **21 hours**
  - Educational Psychology 2430; Art Education 2100, 2110; Music Education 2100, 3110; Educ. C & I 3510; Special Education 3533.

**EARLY CHILDHOOD EDUCATION**

- **15 hours**
  - Educ. C & I 4451*, 4452*; CFS 3210 or Educational Psychology/Psychology 3560.

**ELECTIVES**

- **14-18 hours**

**TOTAL MINIMUM REQUIRED**

- **191 hours**

*Requires admission to Teaching Education Program.

B. Kindergarten through Grade 8 (cerification for Kindergarten - Grade 8)

**GENERAL EDUCATION**

- **89 hours**
  - Communications (12 hours)
    - English 1010 or 1011; 1020; 1031 or 1032 or 1033; Speech 2021 or 2311.

**SPECIALIZED COURSES**

- **21 hours**
  - Educational Psychology 2430; Art Education 2100, 2110; Music Education 2100, 3110; Educ. C & I 3510; Special Education 3533.

**AREAS OF CONCENTRATION**

- **15-16 hours**
  - One or more areas of specialization are to be chosen from:
    - **Art** requirements plus 15-16 hours from art, IDH, art education.
    - **Black Studies** courses from at least 3 different fields must be included. See Black Studies for specific course possibilities.
    - **Child Studies** Requirements plus 15-16 hours from child development, psychology, educational psychology.
    - **Humanities** Requirements plus 15-16 hours.
    - **Language Arts** Requirements plus 15-16 hours in English, Speech, Journalism.

**Library and Information Science**

Requirements plus 15-16 hours. If certification is desired in library service, the student must complete 24 hours in Library and Information Science 3520-30, 4140, 4150, 4270, 4330, 4750.

**Mathematics Requirements** plus 15 hours.

- **MidSchool Courses (15-16 hours)**
  - to include Educ. C & I 5570; Ed. Psychology 3810; Educ. C & I 3520 or 4280; Educ. C & I 3462 or 3653, or 3654 or 3657 or 3658 (a second methods course); Educ. C & I 4350 or 4351 or 4562; lab experience in middle school.

- **Music Requirements** plus 15-16 hours.

- **Science Requirements** plus 15-16 hours.

- **Special Education** 15 hours (if certification is desired in special education, additional hours are required, including one additional quarter of student teaching).

**Social Studies (18 hours)**

Recommended are Biology 1210, 1220 (1230 or Botany 1110, 1120). 8 or 12 hours in physical science. Recommended series are Physics 1410, 1420 (1430), or Geology 1410-20-30 or Astronomy 2110, 2120 (2130), or Chemistry 1110, 1120 (1130).

**Social Studies (18 hours)**

History (4 hours—it is recommended that the history course be taken at the sophomore level). Electives (14-16 hours) from anthropology, economics, geography, human services, political science, sociology. Minimum of 3 areas are required.

**CORE PROFESSIONAL COURSES**

- **9 hours**
  - Educ. C & I 3010, 3020, 3030.

**ELEMENTARY EDUCATION COURSES**

- **39 hours**

**SPECIALIZED COURSES**

- **21 hours**
  - Educational Psychology 2430, Art Education 2100, 2110, Music Education 2100, 3110, Educ. C & I 3510, Special Education 3333.
Mathematics (4 hours).
Natural Science (12 hours)
A biological science, a physical science, or a combination of the two.
Psychology (4 hours)
Programs available.
Program majors leading to graduation and certification for high school teaching range from the broad fields, comprehensive major, to the subject major and minor combination programs.
Endorsement: Mathematics
2. Mathematics major with a minor (72 hours)
Endorsements: Mathematics, General Science
3. Mathematics and Related Sciences (72 hours)
C. Mathematics Education
1. Area Majors in Mathematics
a. Mathematics and Physical Sciences (75 hours)
1 Mathematics (27 hours)
must include at least a one-year sequence in calculus or analytic geometry and calculus and at least 12 quarter hours in courses numbered 3050 or above with at least one course in algebra and one in geometry.
(2) Physics—12 hours in each of the following: Chemistry, Psychology, Physics.
3 Electives—12 additional hours in physical sciences and/or mathematics.
2. Mathematics major with a minor (72 hours)
Endorsement: Mathematics
B. Foreign Language Education
1. Foreign Language Area
2. Foreign Language Major and Minor
a. 45 quarter hours (9 less quarter hours if based upon 2 entrance credits from high school) and one language with no less than 27 quarter hours of upper-division courses.
b. 27 quarter hours in another subject.
C. Mathematics Education
1. Area Majors in Mathematics
a. Mathematics and Physical Sciences (75 hours)
2 Mathematics (27 hours)
must include at least a one-year sequence in calculus or analytic geometry and calculus and at least 12 quarter hours in courses numbered 3050 or above with at least one course in algebra and one in geometry.
(2) Physics—12 hours in each of the following: Chemistry, Psychology, Physics.
3 Electives—12 additional hours in physical sciences and/or mathematics.
2. Mathematics major with a minor (72 hours)
Endorsement: Mathematics
b. Mathematics and Related Sciences (72 hours)
A. English Language
1. English with a Minor
a. 45 quarter hours in English, including three in English language (3330, 3340, 4430, 4440, 4450). Nine of the 45 hours may be in speech, provided the student is not minoring in speech.
b. 27 hours in some other subject which constitutes a minor. (If students who elect to minor in a foreign language do not have two entrance credits in a foreign language from high school, they must take 36 hours in a foreign language.)
c. Students enrolled in this program must take two foreign methods courses.
2. Foreign Language Major and Minor
a. 45 quarter hours (9 less quarter hours if based upon 2 entrance credits from high school) and one language with no less than 27 quarter hours of upper-division courses.
b. 27 quarter hours in another language with no less than 18 quarter hours of upper-division courses.
c. 9 hours of general and applied linguistics.
Certification includes economics, geography, history, political science and sociology.

a. 28 quarter hours in history, including 1510-20 and 2510-20, and 12 hours in World and/or American history.

b. 8 quarter hours in each of the following: geography, political science, and sociology.

c. 4 quarter hours in anthropology.

d. 9 quarter hours in economics, including 2110-20 and an elective.

e. 7-8 additional quarter hours in the above-listed or related fields.

Program II
Specific subject major (45 hours plus 27 hours for a minor).

Minors: A minor is defined as 27 quarter hours in a single subject area, i.e., biology, history, French, psychology, speech, etc. A minor does not meet certification requirements in all cases.

IV. Art and Music Education

A. Art Education

GENERAL EDUCATION

Communications

(12-13 hours)

English 1010-20 and 1031 or 1032 or 1033; and 3-4 hours in speech.

Health and Physical Education (9 hours)

Activities courses in physical education plus School Health 3510.

Humanities

(15-16 hours)

Art History 1815 and 1825, one literature course, and one elective from anthropology, philosophy, foreign language above 1000 level, upperdivision history, library service, religion or music.

Mathematics (4 hours)

Natural Science

(12 hours)

Any twelve hours from the biological and/or physical sciences.

Psychology (4 hours)

Psychology 2500.

Social Studies

(12 hours)

Any twelve hours from at least two areas.

CORE PROFESSIONAL EDUCATION

Education (Piano or Organ Principal)

a. 25 quarter hours in Music Education: 1010-20; 2110; 2411; 2421; 2431; 3130; 3150; 4420; 4510.

b. 60 hours in music: 1111-21-31; 1113-23-33; 2111-21-31; 2111-23-33; 2340; voice 22 hours; required ensemble 11 hours plus piano proficiency.

Concentration in Vocal Music (Voice Principal)

a. 25 quarter hours in Music Education: 1010-20; 2110; 2411; 2421; 2431; 3130; 3150; 4420; 4510.

b. 60 hours in music: 1111-21-31; 1113-23-33; 2111-21-31; 2111-23-33; 2340; piano or organ 22 hours; voice 6 hours; required ensemble 11 hours.

Concentration in Elementary Music Education

Program I

a. 31 quarter hours in Music Education: 1010-20; 2110; 2411; 2421; 2433; 3141-42; 3150; 4420; 4441-42-43; 4450.

b. 66 hours in music: 1111-21-31; 1113-23-33; 2111-21-31; 2113-23-33; 2340; piano 22 hours; piano proficiency; required ensemble 11 hours.

Program II

a. 31 quarter hours in Music Education: 1010-20; 2110; 2411; 2421; 2433; 3141-42; 3150; 4420; 4441-42-43; 4450.

b. 66 hours in music: 1111-21-31; 1113-23-33; 2111-21-31; 2113-23-33; 2340; piano or organ 22 hours; voice 6 hours; required ensemble 11 hours.

Concentration in Instrumental Music Education (Voice Principal)

a. 35 quarter hours in Music Education: 1010-20; 2110; 2411; 2421; 2433; 3141-42; 3150; 4420; 4441-42-43; 4450.

b. 72 hours in music: 1111-21-31; 1113-23-33; 2111-21-31; 2113-23-33; 2340; piano or organ 22 hours; voice 6 hours; required ensemble 11 hours.

Concentration in Instrumental Music Education

Program I

a. 35 quarter hours in Music Education: 1010-20; 2110; 2411; 2421; 2431; 3130; 3150; 4420; 4430.

b. 72 hours in music: 1111-21-31; 1113-23-33; 2111-21-31; 2113-23-33; 2340; 3122 or 4124; principal instrument 22 hours; secondary instrument 6 hours; piano proficiency; required ensemble 11 hours.

Program II

a. 35 quarter hours in Music Education: 1010-20; 2110; 2411; 2421; 2433; 3141-42; 3150; 4420; 4441-42-43; 4450.

b. 72 hours in music: 1111-21-31; 1113-23-33; 2111-21-31; 2113-23-33; 2340; piano or organ 22 hours; voice 6 hours; required ensemble 11 hours.

Program III

a. 35 quarter hours in Music Education: 1010-20; 2110; 2411; 2421; 2433; 3141-42; 3150; 4420; 4441-42-43; 4450.

b. 72 hours in music: 1111-21-31; 1113-23-33; 2111-21-31; 2113-23-33; 2340; 3122 or 4124; principal instrument 22 hours; secondary instrument 6 hours; piano proficiency; required ensemble 11 hours.

c. 35 quarter hours in Music Education: 1010-20; 2110; 2411; 2421; 2433; 3141-42; 3150; 4420; 4441-42-43; 4450.

D. Music Education

GENERAL EDUCATION

Communications

(12-13 hours)

English 1010-20 and 1031 or 1032 or 1033; and 3-4 hours in speech.

Health and Physical Education (9 hours)

Activities courses in physical education plus School Health 3510.
or vocal organization each quarter in residence (on-campus) as a music education major, as approved by the student's adviser and the directors of the organizations concerned. Students preparing to be band directors are expected to enroll in Marching band unless officially excused.

Instrumental Major. Concert Band; University Marching Band; or University Orchestra.

Vocal Major. Concert Choir; University Chorus; Chamber Singers.

Elementary Music Education Major. Same as Vocal Major.

B. Transfer students must take proficiency examinations in applied music, music theory, sight singing and dictation prior to registration in music education curricula.

*Requires admission to Teacher Education Program.

V. Health, Physical Education, Recreation, and Safety

A. Concentration in Elementary Physical Education (1-9)

GENERAL EDUCATION ........................................ 90 hours

Communications (12 hours)

English 1010 or 1011; 1020 and 1031 or 1032; 3030-40; Speech 2311.

Humanities (16 hours)

English 2510 or 2520; 3550, 3560, 3570; 3660, 3670, 3680, 3230, 4110, 4150, 3330, 4440, 4310, 4320, 4360, 4370, 4380, 4390, 4400, 4480.

Social Studies (16 hours)

Sociology 1510 plus 12 hours of electives.

Natural Science (24 hours)

Chemistry 1510-20, Physics 1450, and Zoology 2520-30 and 4540.

Mathematics (4 hours)

Psychology (4 hours)

Psychology 2500.

Health and Physical Education (14 hours)

School Health 3000 and 3420; physical education activities (8 hours) including P.E. 2012, 2022, 2032.

C. Concentration in Secondary Physical Education (7-12)

GENERAL EDUCATION ........................................ 96 hours

English 1010 or 1011; 1020 and 1031 or 1032; 3030-40; speech elective (4); chemistry (1510-20 suggested); Physics 1450; Zoology 2920-30 and 4940; Mathematics elective (3);

School Health 3210. Humanities electives (16 hours) selected from: history; anthropology; art; foreign language; music; philosophy; religion; dance appreciation; interior design and housing. Social studies electives (20 hours) selected from: "Creative" courses; government; political science; sociology; psychology; education electives (12 hours); P.E. 1020, 1021 or 1022, 1032, 2012, 2022, 2032.

PROFESSIONAL EDUCATION ................................ 33 hours

Education C & I 3010-20-30*, Edu. Psych. 3810; Edu. C & I 4710-20, education elective (3 hours); Physical Education 4100, 3260 (practicum, field experience-2 hours).

SPECIALIZED PROFESSIONAL EDUCATION 48 hours

P.E. 1000; 3210; 4140; 3230; 4110; 4120; 4230; 3220 or 3170; 4310; 4440 or 4450; 3330; 4400 or 3100; 3180; 3240; and 13 hours of electives from any upper division P.E. course.

ELECTIVES .................................................. 20 hours

Hours used for minor, endorsement, or electives (None of the 20 hours may be taken in lower-division physical education.)

TOTAL MINIMUM REQUIRED: 197 hours

Core Courses and Electives (24 hours)


DANCE .................................................... 70 hours


CONCENTRATION AREAS ..................... 12 hours

Ballet: Physical Education 4000, 4005; or Modern: Physical Education 3030, 4101.

ELECTIVES .............................................. 20 hours

TOTAL MINIMUM REQUIRED: 193 hours

G. Minor in Dance (27-28 hours)

Option I. Physical Education 2070, 3040, 3070, 3090, 3151; 2040-50-60 or 3060-61-62; 4 hours selected from 3010 and/or 3020; 6 hours selected from 3075 or 4000 or 4005.

Option II. Physical Education 2070, 3010, 3040, 3090, 3151; 2040-50-60 or 3060-61-62; 4 hours selected from 3070 and/or 3075; 6 hours selected from 3020 or 3040 and 4101.

Option III. Physical Education 3070, 3010, 3090, 3151, 4150, 4310, 4550, 3060-61-62; 4 hours selected from 3020-3030-4010.

H. Major in Recreation

GENERAL EDUCATION ....................................... 98 hours

Selection of specific courses in each area below dependent on career goals in recreation. Consult advisor.

Natural Science (16 hours minimum)

4 hours selected from chemistry, physics, geology, astronomy, and Geography 1810, 1820, 3530. 4 hours selected from: biology or botany, zoology, the areas of anatomy or physiology. At least 8 additional hours selected from any or a combination of the above.

Mathematics (3-4 hours)


Social Science (16 hours minimum)

Sociology 1510 and 4550; at least eight additional hours selected from Sociology 1520, 3130, 3410, 3420, 3690, 4330, 4560, or Rural Sociology 3420 or Human Services 2680, 4690, 3630 or Political Science 2530, 2020, 2510-20, 3565-66, 3710-20, Economics 2110-20, 2001, 3220, 3240.

Behavioral Science (16 hours minimum)

Psychology 2500, at least 12 additional hours selected from Psychology 2540, 3030, 3550, 3260, 3616-26 or Educ. Psych. 2430, 2510-20, 4130, 4800, or CFS 2110, 3210-20, 4260, 4610, 4810.

Communications (16 hours minimum)

English 1010 or 1011; 1020 and 1032; Speech 2311 and Journalism 3710.

Health and Safety (3 hours minimum)

School Health 2210, Public Health 3210 or Safety 3520.

Humanities (16 hours minimum)

At least 4 hours selected from English 2000 level and above; at least 3 hours selected from history; at least 5 additional hours selected from English 2000 level and above, History 1510-20, 1950-60, 2510-20, 2350, Anthropology 2530, Geography 3660, Classics 2810-20, 3910-20, 3210-20-30, 3310-30-20, 4010, Philosophy 1510-20, 2310, 2410, 3315, 3630, 3910, Religious Studies 2610, 2611.

Cultural Arts (12 hours minimum)

4 courses from at least 2 of the following arts: Music 1210-20, 3210-11-12, 3350, 4230.
PROFESSIONAL RECREATION EDUCATION: 24 hours
Recreation 1100, 3140, 3100, 3200, 3220, 4130, 4200, 3880.

FIELD STUDY ........................................21-24 hours
Recreation 1000, 2000, 3000, 4000.

SKILLS AREAS ........................................18-24 hours
Student selects two of the following skill areas and completes at least 3 courses (9-12 hours) in each:


**Sports**: Physical education—2 team sports, 3 individual sports.

FREE ELECTIVES: to be added to above requirements to total minimum of 192 hours for the degree.

TOTAL MINIMUM REQUIRED .......................... 192 hours

I. Major in Public Health

GENERAL EDUCATION ......................... 87 hours
Communications (13 hours)
- English 1010 or 1011; 1020 and 1032; Speech 2311.

Health and Physical Education (11 hours)
- Public Health 3000
- Public Health 3210
- Physical education electives.

Humanities (16 hours)
- English—any 4 hours from literature
- Anthropology 2530
- Philosophy or religious studies elective (4)
- Art or music elective (4)

Mathematics (4 hours)

Natural Science (20 hours)
- Chemistry or physics sequence (4, 4, 4)
- Biology 1210-20 or Zoology 2920-30.

Psychology (4 hours)
- Psychology 2500.

Social Studies (19 hours)
- Economics 2110
- Geography 2110 or Political Science 2510 or 2520
- History 1510-20 or 2510-20
- Sociology 1510.

CORE PROFESSIONAL EDUCATION ............. 9 hours

SPECIALIZED PROFESSIONAL EDUCATION: 25 hours
- Education C & I 4750
- Education C & I 4710 and 4720
- Education Psychology 3810
- School Health 3650, 4100.

TEACHING AREAS AND ELECTIVES ........... 69 hours
School health required courses (9): 3410, 3420, 3620
School health electives (3): 4710 or 4810-20-30
Public health required courses (9): 3310, 3320, 3330
Public health electives (6)
- Safety: 3520
- Biology 1230
- Microbiology 2010
- Psychology 3150
- Sociology 1520
- Sociology 2130

Public Health 4100, 4700-10-20 (9) and
Public Health 4740
(6) - Non-Teacher Certification
School Health 3650
Educational Psychology 3810.
Special Education 3333

TEACHING AREAS AND ELECTIVES .............. 66 hours
Public health required courses (12): 3310, 3320, 3330, and 4220.
Public health electives (6)
School health required courses (9): 3410, 3420, 3620
Safety required courses (3): 3520
Biology 1230
Microbiology 2910-19
Psychology 3150
Sociology 1520
Sociology 3130
Nutrition 1230
Electives (12)

Special Note: If some of the specific courses cited above are dropped or changed, they may be substituted with an equivalent course.

TOTAL MINIMUM REQUIRED .................... 190 hours

*Requires admission to Teacher Education Program.

J. Major in School Health Education

GENERAL EDUCATION ......................... 87 hours
Communications (13 hours)
- English 1010-20 and 1032; Speech 2311.

Health and Physical Education (11 hours)
- School Health 3000
- School Health 3210
- Physical education electives (4).

Humanities (16 hours)
- English—any 4 hours from literature
- Anthropology 2530
- Philosophy or religious studies elective (4)
- Art or music elective (4).

Mathematics (4) 

Natural Science (20 hours)
- Chemistry or physics sequence (4, 4, 4)
- Biology 1210-20 or Zoology 2920-30.

Psychology (4 hours)
- Psychology 2500.

Social Studies (19 hours)
- Economics 2110
- Geography 2110 or Political Science 2510 or 2520
- History 1510-20 or 2510-20
- Sociology 1510.

CORE PROFESSIONAL EDUCATION ............. 9 hours

SPECIALIZED PROFESSIONAL EDUCATION: 25 hours
- Education C & I 4750
- Education C & I 4710 and 4720
- Education Psychology 3810
- School Health 3650, 4100.

TEACHING AREAS AND ELECTIVES ............. 69 hours
School health required courses (9): 3410, 3420, 3620
School health electives (3): 4710 or 4810-20-30
Public health required courses (9): 3310, 3320, 3330
Public health electives (6)
- Safety: 3520
- Biology 1230
- Microbiology 2010
- Psychology 3150
- Sociology 1520
- Sociology 2130

Public Health 4100, 4700-10-20 (9) and
Public Health 4740
(6) - Non-Teacher Certification
School Health 3650
Educational Psychology 3810.
Special Education 3333

TEACHING AREAS AND ELECTIVES ............. 66 hours
Public health required courses (12): 3310, 3320, 3330, and 4220.
Public health electives (6)
School health required courses (9): 3410, 3420, 3620
Safety required courses (3): 3520
Biology 1230
Microbiology 2910-19
Psychology 3150
Sociology 1520
Sociology 3130
Nutrition 1230
Electives (12)

Special Note: If some of the specific courses cited above are dropped or changed, they may be substituted with an equivalent course.

TOTAL MINIMUM REQUIRED .................... 190 hours

*Requires admission to Teacher Education Program.

K. Minor in Driver and Traffic Safety Education (28 hours)

REQUIRED COURSES ............................. 17 hours
- Safety 3520, 4410, 4420; Public Health 3210.

ELECTIVES .................................. 11 hours
At least nine hours selected from: Public Health 4120, Educ. C & I 4750, Educ. Psychology and Guidance 2520; School Health 3650.

L. Minor in School Health Education (30 hours)
- School Health 3000, 3210, 3410, 3650, 3420; Safety 3520; Public Health 3310, 3320, 4110; Nutrition 1230 or Public Health 4420 or School Health 3620.

VI. Special Education*

A. Concentration in General Special Education

GENERAL EDUCATION ......................... 74 hours
Communications (9 hours)
- English 1010-20 and 1031 or 1032 or 1033.

(Some students may be required to take English 1010 based on placement scores.)

Health and Physical Education (18 hours)
- P. E. 3450, School Health 3510, P. E. 4110, 3430, Psychology 2500, P. E. activities electives (4 hours).

Humanities (12 hours)
- Language (4 hours); electives from anthropology, art, literature, library and information science, upper-division history, music, philosophy, religious studies, or foreign language above the introductory level (6 hrs.),

Mathematics (3 hours)
- Elective (Math 2110 recommended).

Natural Science (16 hours)
- Biological science (12 hours); Physical science (4 hours).

Social Studies (16 hours)
- History 2510, 2520 and electives from anthropology, economics, geography, political science or sociology (6 hours).

CORE PROFESSIONAL EDUCATION ............. 6 hours
- Educ. C & I 3010* and 3301*.

SPECIALIZED PROFESSIONAL EDUCATION: 25 hours
- Education C & I 4750
- Education C & I 4710 and 4720
- Education Psychology 3810
- School Health 3650, 4100.

Language Arts (12 hours): Educ. C & I 3260, 3280, 3281 and three elective hours.


Psychology or Educational Psychology (9 hours)
- Ed. Psych. 2430 or 3810 and six elective hours.

Child Development (9 hours)
- Nine elective hours.

Student Teaching in Elementary Schools (9 hours):
110 College of Education

SPECIAL EDUCATION COURSES ..........39 hours Special Education 3333, 4520, 4110, 4120, 4130, 4150, 4351, 4361, 4440, 4610, 4740, 5260, 5620,

SPECIAL EDUCATION STUDENT TEACHING ..........15 hours Special Education 4880, 4881, 4882.

ELECTIVES ......................13 hours TOTAL MINIMUM REQUIRED ..........189 hours

*Required admission to Teacher Education Program.

B. Concentration In Combined General Special Education and Elementary Education

GENERAL EDUCATION .....................89 hours Communications (12 hours) English 1010-20 and 1032 or 1033; Speech 1211 or 2011 or 2311 or any speech elective. (Some students may be required to take English 1019 based on placement scores.) Physical Education (12 hours) History 2510; electives from anthropology, economics, geography, political science and sociology. Minimum of three areas to be represented (14-16 hours).

Health and Physical Education (20 hours) P. E. 3450, School Health 3510, School Health 3680, Psychology 2500, P. E. 480 and 3430, and four elective hours. Humanities (12 hours) Literature (8 hours); elective from foreign language above the introductory level, philosophy, religious studies, art, or music (4 hours). Mathematics (9 hours) Math 2110, 2120, 2130.

Natural Science (20 hours) Biology 1210, 1220, 1230 and Physics 1410, 1420. Social Studies (18-20 hours) History 2510; electives from anthropology, economics, geography, political science and sociology. Minimum of three areas to be represented (14-16 hours).

EDUCATION PROFESSIONAL CORE (9 hours) Educ. C & I 3010*, 3020*, 3030*.

EDUCATION PROFESSIONAL COURSES ........36 hours Educ. C & I 3260, 3270, 3280, 3281, 3350, 3391, 3720, 3711-12-13 or Special Education 4361, 4810*, 4820.*


SPECIAL EDUCATION COURSES ........42 hours Special Education 3333, 4520, 4110, 4120, 4130, 4150, 4351, 4440, 4740, 5260, 5620, and 6 hours psychology or educational psychology electives.

STUDENT TEACHING WITH EXCEPTIONAL CHILDREN ...........15 hours Special Education 4880, 4881, 4882.

TOTAL MINIMUM REQUIRED ..........209 hours

1. File application for admission to the program
2. The Program Screening Committee will review all applications quarterly. The following criteria will be considered:
   a. cumulative grade point average
   b. completion of these courses: Special Education 2110-20, 3333 and 9 additional hours of course work in the major field
   c. advisement's recommendations (based on personal interview and career planning)
   d. instructor's recommendations from the courses in Special Education listed above
   e. the candidate's personal aptitude for teaching in Special Education as indicated by practicum experiences
   f. writing sample
   g. the Committee will grant full, provisional admission or will deny admission. A candidate may appeal the decision to the Departmental Appeals Committee.

3. Formal admission to the Program will be granted after the Program Screening Committee reviews applications and the above criteria are considered.

4. A comprehensive examination in Sign Language and Speech and deafness must be taken at least two quarters before student teaching.

5. Transfer students will follow the same admission procedures.

1. Specialization in Early Childhood Development

GENERAL EDUCATION .....................74 hours Communications (9 hours) English 1010-20 and 1032 (Some students may be required to take English 1019 based on placement scores.)

Health and Physical Education (10 hours) School Health 3510, Physical Education 3450, physical education electives.

Psychology (4 hours) Psychology 2500.

Humanities (3 hours) Mathematics 2110.

Natural Science (16 hours) 8-12 hours in biological science (choose one series): Biology 1210-20-30, Botany 1110-20. 8-12 hours in physical science: Physics 1410-20-30, Astronomy 2110-20-30, Chemistry 1110-20.

Social Studies (18 hours) History 1510-20 or 2510-20. Choose 3 areas: anthropology, economics, geography, political science, sociology.

CORE PROFESSIONAL COURSES ........9 hours Ed. C & I 3010, 3020, 3030.

ELEMENTARY EDUCATION COURSES ........18 hours Educ. C & I 3260, 3270, 3280, 3281, 3350, 3391, 3720, 3711-12-13 or Special Education 4361, 4810*, 4820.*


SPECIAL EDUCATION COURSES ........42 hours Special Education 3333, 4520, 4110, 4120, 4130, 4150, 4351, 4440, 4740, 5260, 5620, and 6 hours psychology or educational psychology electives.

STUDENT TEACHING WITH EXCEPTIONAL CHILDREN ...........15 hours Special Education 4880, 4881, 4882.

TOTAL MINIMUM REQUIRED ..........209 hours

2. Specialization in Elementary Education

GENERAL EDUCATION .....................77 hours Communications (8 hours) English 1010-20 and 1032 (Some students may be required to take English 1019 based on placement scores.)

Health and Physical Education (15 hours) Physical Education 3450; School Health 3510, 3610; physical education electives.

Psychology (4 hours) Psychology 2500.

Humanities (2 hours) Literature (8); elective from philosophy, art, religious studies, or music.

Mathematics (3 hours) Mathematics 2110.

Natural Sciences (16 hours) 8-12 hours in biological science (choose one series): Biology 1210-20-30, Botany 1110-20. 8-12 hours in physical science: Physics 1410-20-30, Astronomy 2110-20-30, Chemistry 1110-20.

Social Studies (18 hours) History 1510-20 or 2510-20. Choose 3 areas: anthropology, economics, geography, political science, sociology.

CORE PROFESSIONAL COURSES ........9 hours Ed. C & I 3010, 3020, 3030.

ELEMENTARY EDUCATION COURSES ........18 hours Educ. C & I 3260, 3270, 3280, 3281, 3350, 3391, 3720, 3711-12-13, 3333, 4180, 4200, 4210-20-30, 4250, 4280, 4290, 4351, 4361, 4371, 4870, 4871, and pre-student teaching seminar.

TOTAL MINIMUM REQUIRED ..........189 hours

*Requires admission to Transfer Education Program.

3. Specialization in Secondary Education

GENERAL EDUCATION .....................75 hours Communications (9 hours) English 1010-20 and 1032. (Some students may be required to take English 1019 based on placement scores.)

Health and Physical Education (9 hours) Physical Education 3450; School Health 3510 and physical education electives.

Humanities (11-12 hours) English literature; 7-8 elective hours (choose from two areas): anthropology, economics, geography, political science, sociology.

CORE PROFESSIONAL COURSES ........9 hours Ed. C & I 3010, 3020, 3030.

AREA OF CONCENTRATION ............67 hours Audiology and speech pathology elective (3050 recommended). Audiology and Speech Pathology 3010, 3710, 4930 or 5950, Special Education 2110, 2120 (or Educ. C & I 3511-12-13), 3333, 4180, 4200, 4210-20-30, 4250, 4280, 4290, 4351, 4361, 4371, 4870, 4871, and pre-student teaching seminar.

TOTAL MINIMUM REQUIRED ..........189 hours

*Requires admission to Teacher Education Program.

C. Concentration in the Hearing Impaired Admission to the Program for Teachers of the Hearing Impaired In addition to the above requirements for Admission to Special Education, Special Education students in the program for teaching the hearing impaired will follow these procedures:

1. File application for admission to the program.
2. The Program Screening Committee will review all applications quarterly. The following criteria will be considered:
   a. cumulative grade point average
   b. completion of these courses: Special Education 2110-20, 3333 and 9 hours of course work in the major field
   c. advisement's recommendations (based on personal interview and career planning)
   d. instructor's recommendations from the courses in Special Education listed above
   e. the candidate's personal aptitude for teaching in Special Education as indicated by practicum experiences
   f. writing sample
   g. the Committee will grant full, provisional admission or will deny admission. A candidate may appeal the decision to the Departmental Appeals Committee.

3. Formal admission to the Program will be granted after the Program Screening Committee reviews applications and the above criteria are considered.

4. A comprehensive examination in Sign Language and Speech and deafness must be taken at least two quarters before student teaching.

5. Transfer students will follow the same admission procedures.
philosophy, foreign language (above introductory level), religious studies, music, library and information science.

Mathematics (4 hours)
Mathematics 2101

Natural Science (20 hours)
If major is in science education, student must take 12 hours in biological sciences.

8-12 hours in the biological sciences:
(biology one series) Biology 1210-20-30,
Botany 1101-20, microbiology, zoology.

8-12 hours in physical science:

Social Studies (18 hours)
History 1510-20-20, 2510-20.

Choose 3 areas from: anthropology, economics, geography, political science, sociology.

CORE PROFESSIONAL COURSES...........9 hours
Educ. C & I 3010, 3020, 3030.

SPECIALIZED PROFESSIONAL EDUCATION...6 hours
Educational Psychology 3810 and appropriate methods course for major area.

AREA OF CONCENTRATION.............67 hours
Audiology and speech pathology elective (3050 recommended), Audiology and Speech Pathology 3010, 3710, for Sp. Ed. 4240, 4930 (or 5950), Special Education 2110-20, 3333, 4190, 4200, 4210-20-30, 4250, 4280, 4290, 4351, 4361, 4371, 4870, 4871, and pre-student teaching seminar.

MAJOR AREAS..........................30-45 hours

NOTE: 30 quarter hours are required for graduation and Council on the Education of the Deaf Certification. For Tennessee State Certification for Teaching Non-handicapped Students, additional credit hours are required.

TOTAL MINIMUM REQUIRED.............187 hours

4. Specialized in Multiple Handicapped

GENERAL EDUCATION.....................75 hours

Communications (9 hours)
English 1010-20 and 1032. (Some student may be required to take English 1019 based on placement scores)

Health and Physical Education (10 hours)
School Health 3510; Physical Education 3450 and physical education electives.

Mathematics (4 hours)
Psychology 2500.

Humanities (11-12 hours)
English literature; 8 hours electives (choose 3 areas): anthropology, art, history, philosophy, foreign language (above introductory level), religious studies, music, library and information science.

Mathematics (3 hours)
Mathematics 2110.

Natural Science (20 hours)
8-12 hours in biological science:
(biology one series) Biology 1210-20-30;
Botany 1101-20.

8-12 hours in physical science:
Physics 1401-20-30, Geology 1510-20;
Astronomy 2110-20-30, Chemistry 1110-20-30.

Social Studies (18-20 hours)
History 1510-20 or 2510-20.

Choose 3 areas: anthropology, economics, geography, political science, sociology.

CORE PROFESSIONAL COURSES.........9 hours
Educ. C & I 3010, 3020, 3030.

AREA OF CONCENTRATION..............67 hours
Audiology and speech pathology elective (3050 recommended), Audiology and Speech Pathology 3010, 3710, for Sp. Ed. 4240, 4930 (or 5950), Special Education 2110-20, 3333, 4190, 4200, 4210-20-30, 4250, 4280, 4290, 4351, 4361, 4371, 4870, 4871, and pre-student teaching seminar.

AREA OF SPECIALIZATION..............30 hours
Selected from the following: Spec. Ed. 3210-20-30, 4740, 3910, 3520, 4110-20-30, 4150-60, 4440, 4610-20, 4840, 5400, 5401, 5620, and special education electives.

TOTAL MINIMUM REQUIRED..............181 hours

D. Concentration in Speech and Hearing

GENERAL EDUCATION....................84 hours

Communications (12 hours)
English 1510-20, Speech 2311.

Health and Physical Education (6 hours)
Activities courses recommended plus health and physical education electives (both areas must be represented).

Humanities (16 hours)
English (4 hours from 2000-level literature). Electives representing two areas from the following: anthropology, art, English (literature), foreign language (above introductory level), history (upper division), Library and Information Science 3510-20-30, music, philosophy, and religious studies.

Mathematics elective (4 hours).

Natural Sciences (16 hours)
8 hours biological sequence; 8 hours physical sequence.

Psychology 2500.

Social Studies (20 hours)
History electives (8 hours) plus 12 hours representing three areas from anthropology, economics, geography, political science, sociology.

General Electives (6 hours).

CORE PROFESSIONAL EDUCATION....9 hours
Education C & I 3010*, 3020, Special Ed. 4030.

SPECIALIZED PROFESSIONAL EDUCATION......................19 hours
Psychology 2520 or 2530, Psychology 3550 or 2540 or Ed. Psych. 2430 or 3810, 11-12 hours upper-division psychology or educational psychology including Psychology 3150. (Ed. Psych. 3110, 4800, 4640 recommended.)

TEACHING AREAS AND ELECTIVES...69 hours
Special Education 3333, three-hour elective (4110 or 4130 recommended). Audiology and Speech Pathology (for Special Education) 3310, 3710, 4040, 4510, 4400, 4720, 4930. Audiology and Speech Pathology 3010, 3050, 3065, 3200, 4610, 4650. Clinical Practicum Courses (12-15 hours)*
Audiology and Speech Pathology 4320-40-30; Special Education 4341, 4342.

TOTAL MINIMUM REQUIRED.............181 hours

*Requires admission to Teacher Education Program.
**Requires admission to Teacher Education Program.
*See Speech and Hearing Center staff for assignment each quarter. Total 200 clock hours necessary for State Certification.

The following area of endorsement requires completion of requirements of the elementary (K-9) or secondary education curriculum.

E. Concentration in Partially Seeing

a. Completion of requirements of Elementary (K-9) or Secondary Education Curriculum;
b. Special Education and Rehabilitation 333, 4160, 4650, 4923;
c. Six quarter hours selected from the following: Special Education and Rehabilitation 3520, 4110, 4120, 4150, 4220, 4250, 5850;
d. Office Administration 2110 (for those lacking high school credits in typewriting).

TOTAL MINIMUM REQUIRED:
Total hours required for endorsement in the above Special Education program appear on curriculum sheets available from the faculty advisers.

VI. Vocational-Technical Education

A. Business Education

See curricula for Secondary Education (7-12) p. 104 for General Education and Professional Education requirements.

63 quarter hours in business and economics to meet five business endorsement areas approved by the department adviser. A statement of requirements and alternative programs may be obtained from the coordinator of business education.

B. Distributive Education

GENERAL EDUCATION.................71-73 hours

Communications (12 hours)
English 1010 or 1011; 1020; 1031 or 1032; 1033; speech elective.

Health and Physical Education (9 hours)
Physical education or health electives.

Mathematics (3-4 hours)
Mathematics elective.

Humanities (16 hours)
Literature elective (4) plus 12 hours humanities electives.

Natural Science (12 hours)
Natural science electives.

Psychology (7-8 hours)
Psychology 2500, Psychology 2620 or Educ. Psych. 3110.

Social Studies Electives (12 hours)
Economics 2110-20-30, plus 3 additional hours in any social studies other than economics.

PROFESSIONAL EDUCATION.............42 hours
Ed. C & I 3010*, 3020, 3030*; Bus. Ed. 4010. Educ. Psych. 3810; Dist. Ed. 4310-20-30; 4130, 4110-20; 4510-10-20 or 4530 (3 hours); Ed. C & I 4750; Special Education 3333.

SPECIALIZED COURSES..................42 hours
Business Adm. 1110, Office Adm. 4310 or 4320, Accounting 2110; Marketing 3110-20, 4140, 4310, 4150; Finance 3120, Management 3010; Business Law 4110; Vo. Tech. Ed. 4440; Textiles and/or Advertising electives (6 hours).

ELECTIVES ..................................23 hours

TOTAL MINIMUM REQUIRED............163 hours

*Requires admission to Teacher Education Program.
C. Industrial Education

Option 1. Concentration in Trades and Industries
GENERAL EDUCATION

Communications (12 hours)
- English (9 hours); speech elective (3 hours).

Health and Physical Education (9 hours)
- Health and P.E. electives. (Both areas must be represented.)

Humanities (15 hours)
- Literature elective (4 hours). Two additional areas taken from the following: philosophy, anthropology, art or art education, literature, foreign language, music or religious studies.

Mathematics (3 hours).

Natural Science (12 hours).

Psychology (4 hours) Psychology 2500.

Social Studies (12 hours)
- Two areas from the following must be represented: history, anthropology, economics, geography, political science, sociology.

PROFESSIONAL EDUCATION

- 12 hours
  - Educ. C & I 3010*, 3020, 3030* (select any two); Special Education 3333; Ed. Psych. 3810.

PROFESSIONAL INDUSTRIAL EDUCATION

- 42 hours
  - Vo. Tech. Ed. 3830, 3850, 3860, 3870, 4010, 4810, 4830, 4840, 4850, 4870, 4795.

OCCUPATIONAL COMPETENCY

- 45 hours
  - Vo. Tech. Ed. 3810, 3811, 3812.

ELECTIVES

- 20 hours

TOTAL MINIMUM REQUIRED

- 186 hours

*Requires admission to Teacher Education program.

Option 2: Concentration in Industrial Arts

GENERAL EDUCATION

Communications (12 hours)
- English (9 hours); speech (3 hours).

Health and Physical Education (9 hours)
- Health and P. E. electives. (Both areas must be represented.)

Humanities (15 hours)
- Literature elective (4 hours); art or art education (6 hours); Additional hours taken from the following: history (upper division), philosophy, anthropology, foreign language (beyond introductory level), music or religious studies.

Mathematics (3 hours).

Natural Science (12 hours).

Psychology (4 hours).

Social Studies (12 hours).
- Two areas from the following must be represented: history, anthropology, economics, geography, political science, sociology.

PROFESSIONAL EDUCATION

- 10 hours
  - Educ. C & I 3010*, 3020, 3030* (select one); Special Education 3333; Ed. Psych. 3000, 3810.

PROFESSIONAL INDUSTRIAL EDUCATION

- 30 hours
  - Vo. Tech. Ed. 3830, 3850, 3860, 4840, 4810, 4811.

TEACHING AREAS

- 63 hours
  - Communication (Draughting, Graphic Arts) Vo. Tech. Ed. 1620, 2620, 3620, 3672; Journalism 3910.
  - Power and Transportation (Prime Movers, Electricity/Electronics)

Vo. Tech. Ed. 1610, 1630, 2611, 2630, 3630.

Construction and Manufacturing

Vo. Tech. Ed. 1643, 1661, 2641, 2652, 2660, 3640, 3651, 3662, 4660, 4662, 4670.

ELECTIVES

- 186 hours

TOTAL MINIMUM REQUIRED

- 186 hours

*Requires admission to Teacher Education Program.

D. Agricultural Education

See page 60 for this program.

E. Home Economics Education

See page 163 for this program.

Departments of Instruction

Art and Music Education

Professors:
- C. H. Ball (Head); Ph.D. Peabody; A. W. Humphreys (Emeritus), Ed.D. Illinois; J. H. Jones (Emeritus), Ed.D. Columbia; W. J. Julian; Ph.D. Northwestern; J. W. Robertson, Ed.D. Columbia.

Associate Professors:

Assistant Professors:

Art Education (141)

1511 Field Experiences in Teaching Art (1) Field experiences in which students perform tasks related to teaching and to teacher roles. S/NC. May be repeated for credit.

2100 Introduction to Art Education in the Schools (3) Art grades 1 through 12; growth and development, objectives, motivation, evaluation. Experiences with school media. 1 hour and 2 labs.

2110 Drawing Painting, and Design Activities in Elementary School (3) Prereq: 2100. 1 hour and 2 labs.

2120 Drawing Painting, and Design Activities in Junior and Senior High School (3) Prereq: 2100. 1 hour and 2 labs.

3110 Crafts in the Elementary School (3) Prereq: 2110. 1 hours and 2 labs.

3210 Art in Secondary School Program (3) Program planning; materials and equipment; relation to other school experiences. Classroom observation. Prereq: 9 hours in art education. 1 hour and 2 labs.

3511 Field Experiences in Teaching Art (1) Field experiences in which students perform tasks related to teaching and to teacher roles. S/NC. May be repeated for credit.

3920 Clay in School Program (3) Exploring methods of working, cubing, and plaster, and techniques of working. Prereq: 2100. 1 hour and 2 labs.

3930 Textiles in School Program (3) Exploration of weaving, stitching, batik, and silk screen. Prereq: 2100. 1 hour and 2 labs.

1400 Pre-Student Teaching Seminar (1) Orients student teachers to the off-campus centers and the student teaching program; describes the objectives and policies of the student teaching program; meets special needs of student teachers; and raises awareness of professional liability. The pre-student teaching seminars must be completed the quarter immediately preceding student teaching. Fall quarter student teachers complete pre-student teaching seminars spring quarter. Prereq: full admission to the Teacher Education Program. Undergraduate credit only. May not be repeated for credit. S/NC only.

4120 Designing of Teaching Aids for Art in School Program (3) Design and preparation of charts, exhibits, slides, films, and other teaching aids for art grades one through twelve. Prereq: 2100 or consent of instructor. 1 hour and 2 labs.

4130 Three-Dimensional Design in School Program (3) Exploration of wood, wire, plastics, and other sculptural materials. Prereq: 2100 or consent of instructor. 1 hour and 2 labs.

4150 Lettering, Posters, and Displays in the School Program (3) Design and layout, techniques and procedures. Prereq: 2100 or consent of instructor. 1 hour and 2 labs.

4160 Appreciation of the Arts in School Program (3) Prereq: 2100 or consent of instructor. 1 hours and 2 labs.

4350-60-70 Problems in Art Teaching (3, 3, 3) Prereq: consent of instructor.

4410 The Administration and Organization of Recreational Arts and Crafts Programs (3) Purpose of art activity in recreation; scope of activities, organizational procedures, resources, and coordination required in community arts and crafts programs.

GRADUATE

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15)

5210 Organization, Administration, and Supervision of Art in the School Program (3)

5310 Art of Education (3)

5320 Program Development in Art Education (3)

5850-60-70 Problems in Art Education (3, 3, 3)

Music Education (707)

The curricula in music education provide for five areas of concentration: vocal music (voice principal); vocal music (piano or organ principal); elementary music education (voice principal); elementary music education (piano or organ principal) and instrumental music.

1019-20 Choral Laboratory (1, 1) Choral conducting: methods and materials required of all music education majors. Prereq: Consent of instructor.

1511 Field Experience in Teaching Music (1) Field experiences in which students perform tasks related to teaching and to teacher roles. S/NC. May be repeated for credit.

2100 Basic Experiences in Classroom Music (3) Vocal, instrumental, rhythm, listening, music reading, and creative activities. Prereq: Major in elementary special education. 5 hours.

2110 Experiences in Classroom Music (3) Vocal, instrumental, rhythm, listening, music reading, and creative activities. For music education majors. Prereq: Approval of instructor, one year of music theory. 2 hours and 1 lab.

2411-12-13 Methods, Materials, and Techniques of String Class Instruction (2, 2, 2) Structure, use, techniques of playing, care, and repair of principal instruments in school instrumental organizations. Emphasis on techniques necessary for basic understanding and effective teaching of the instruments. Practical use of current instructional materials. 2 hours per week.

2421-22-23 Methods, Materials, and Techniques of Woodwind Class Instruction (2, 2, 2) Structure, use, techniques of playing, care and repair of principal instruments in school instrumental organizations. Emphasis on techniques necessary for basic understanding and effective teaching of the instruments. Practical use of current instructional materials. 2 hours per week.
2431-32 Methods, Materials, and Techniques of \textit{Basic Class Instruction} (2, 2) Structure, use, techniques of playing, care and repair of principal instruments in school instrumental organizations. Emphasis on techniques necessary for basic understanding and effective teaching of instruments. Practical use of current instrumental materials. 2 hours per week.

2433 Methods, Materials, and Techniques of \textit{Per-Curricular Class Instruction} (2) Structure, use, techniques of playing, care and repair of principal instruments in school instrumental organizations. Emphasis on techniques necessary for basic understanding and effective teaching of the instruments. Practical use of current instrumental materials. 2 hours per week.

3110 Teaching Music in the Primary Grades (3) Singing, rhythmic, instrumental, listening, creative, and music reading activities; evaluation; materials appropriate for grades K-3. For elementary education majors only. Prereq: 2100 or 2110; Educ. Psych. 2430, upper-division standing.

3120 Teaching Music in the Intermediate and Upper Grades (3) Singing, rhythmic, instrumental, listening, creative, and music reading activities; evaluations; materials appropriate for grades 4-6; primarily for elementary education majors. Prereq: Music 2100 or 2110; Educ. Psych. 2430 and upper-division standing.

3130 Teaching Music in the Elementary School (3) Singing, rhythmic, instrumental, listening, creative, and music reading activities; evaluation; materials appropriate for grades K-3. For education music majors only. Prereq: 2110, Educ. Psych. 2430 or 3810, and two years of music theory.

3150 Teaching Music in Junior and Senior High School (3) Singing, techniques, curriculum, scheduling, administration, evaluation, material and equipment, community relations. Prereq: Two years of music theory; coreq: 3911.


3511 Field Experiences in Teaching Music (1) Field experiences in which students perform tasks related to teaching and to teacher roles. S/N/C. May be repeated for credit.

4100 \textbf{Pre-Student Teaching Seminar} (1) Orients student teachers to the off-campus centers and the student teaching program; describes the objectives and policies of the student teaching program; meets special needs of student teachers; and raises awareness of professional responsibility. The pre-student teaching seminar must be completed the quarter immediately preceding student teaching. Fall quarter student teachers complete pre-student teaching seminars spring quarter. Prereq: Senior Teaching Education Program. Undergraduate credit only. May not be repeated for credit. S/N/C only.

4350-60-70 Problems in Music Teaching (3, 3, 3) 4420-30 Choral and Instrumental Conducting (3, 3) Reading, conducting, and interpretation of vocal and instrumental music; development of leadership skills. Prereq: 1010-20 and 3 hours of credit from 2411-21-31 series and two years of music theory. Must be taken in sequence. 2 hours and 1 lab.

4441-42-43 Teaching \textit{Class Piano} (1, 1, 1) For majors in music, music education, or elementary education. Prereq: Piano 3110.


4460 Marching Band Techniques (3) Functions, organization, and direction of a school marching band. Prereq: Senior standing and approval of instructor; coreq: 3511.

4510 Choral Methods and Materials (3) Organization and administration, teaching techniques, choral literature, and interpretation. Prereq: 1010-20; 4420, one year of music theory, one year of voice instruction, two lecture hours and one hour lab; labs meet with 1010-10.

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15) 5150 Studies in Secondary School Music (3) 5210 Psychological Foundations in Music (3) 5220 Administration and Supervision of School Music (3) 5230 Comparative Teaching Procedures in Music Education (3) 5240 Evaluation Procedures in Music Education (3) 5250 Role of Music in Education (3) 5260 Music for Early Childhood (3) 5270 Studies of Music for Children in Primary Grades (3) 5320 Advanced Choral Literature and Conducting (3) 5350-60-70 Special Problems in Music Education (3, 3, 3) 5410 Advanced Band Literature and Conducting (3) 5410-20-30 The Talent Education Program of Shinnichi Suzuki (2, 2) 5710 Research in Music Education (3) 5810-20-30-40 Seminar (3, 3, 3, 3) 5990 Practicum in College Student Personnel (3)

Continuing and Higher Education (267) 3960 Introduction to Adult Education (3) Adult education as a profession including diversity and scope of clientele and programs, 4554-55-56 Student Leadership Workshops (1, 1, 1) Small group and individualized experiences to develop knowledge and skills in leadership roles. Sections are designed for resident assistants, student government leaders, student activities, and other student organizations. Prereq: Consent of instructor. S/N/C only.

5060 Adult Education: A General Survey (3) 5110 Seminar in College Teaching (3) 5360-70-80 Problems in Continuing and Higher Education (1-3, 1-3, 1-3) 5420 College and University Law—The Legal Environment (3) 5420 College and University Law—Constitutional Rights and Responsibilities of Students (3) 5430 College and University Law—Tort Liability and Risk Management (3) 5440 American Higher Education (3) 5450 Instruction in Higher Education (3) 5460 Adult Development (3) 5470 The Curriculum of Undergraduate Higher Education (3) 5510 Governance of Colleges and Universities (3) 5550 Fiscal Problems in Higher Education (3) 5560 Program Planning in Continuing and Higher Education (3) 5750 Student Personnel in Higher Education (3) 5770 Case Studies in College Student Personnel (3) 5860 The Community-Junior College (3) 5955-65-75 Practicum in Continuing and Higher Education (1-3, 1-3, 1-3) 5960-70-80 Seminar in Continuing and Higher Education (1-3, 1-3, 1-3) 5990 Practicum in College Student Personnel (3) 6450 Advanced Seminar in Program Planning (3)

Curriculum and Instruction


Instructors: M. A. Blank, M.S. Tennessee; F. L. Hagan, M.S. Tennessee.

1Alumni Distinguished Service Professor.

Educational Curriculum and Instruction (301) Undergraduate programs in the Department of Curriculum and Instruction provide the general professional courses for the preschool education of teachers in elementary and secondary schools.

1410 Efficient Reading and Study Skills (1) Improvement of reading rate, comprehension, vocabulary, and study skills, as they relate to content area subjects. S/N/C.

1500 Introduction to Early Education (3) (See also course listings under the Departments of Curriculum and Instruction, Educational Administration and Supervision, and Educational Psychology and Guidance.)

1500 Program Planning in Continuing and Higher Education (3) 5750 Student Personnel in Higher Education (3) 5770 Case Studies in College Student Personnel (3) 5860 The Community-Junior College (3) 5955-65-75 Practicum in Continuing and Higher Education (1-3, 1-3, 1-3) 5960-70-80 Seminar in Continuing and Higher Education (1-3, 1-3, 1-3) 5990 Practicum in College Student Personnel (3) 6450 Advanced Seminar in Program Planning (3)
methods of teaching, curriculum materials, school-commu
301 History and Philosophy of Education (3) Role
302 Principles and Organization of Education (3)
303 Social Foundations and Curriculum (3) Cul
3100 Curriculum I (6) Prereq: Educ. Psych. 1000,
3150 Analysis of Teaching (3) Use of interaction
3160 Analysis of Teaching (3) Use of interaction
3280 Teaching Developmental Reading in the Ele
3350 Teaching of Foreign Languages, Grades 7-12
3351-32-33 Field Experiences In Teaching: Social
3511 Teaching of Speech and Drama, Grades 7-12
3566 The Teaching of Latin, Grades 7-12 (3) For
description, see 3653. (Same as Classics 4270.)
3567 Teaching Language, Composition, and Speak
3571 Teaching of Mathematics: Numerical and Al
gebraic Concepts, Grades 7-12 (3) For description,
3572 Teaching of Mathematics: Geometry and Ana
3573 Teaching Strategies and Issues in Social Studi
3580 Developing Reading Skills In Content Fields
3589 Books and Related Materials for Children (3)
3592 Supervised Readings (1-6) Topics to be assigned.
3611 Non-Western Education: Anthropological Ap
3654 The Teaching of Mathematics: Algebraic Conc
3656 The Teaching of Mathematics: Geometric and
3657 The Teaching of Science, Grades 7-12 (3) For
3658 Teaching Reading, Literature, and Listening, G
3659 Teaching Language, Composition, and Social C
3660 Teaching Developmental Reading in the Ele
3661 Teaching Teaching Elementary School Mathemat
3662 Teaching of Modern Foreign Languages: Oral
3663 The The Teaching of Social Studies, Grades 7-12
3666 The Teaching of Modern Foreign Languages: R
3668 The Teaching of Social Studies, Grades 7-12 (3
3671 International Education: Europe and the America
4100 Pre-Student Teaching Seminar (1) Orient stude
4101 Independent Study (1-6) Topics to be assigned.
4111 Non-Western Education: Anthropological Appro
4150 School Library Administration (3) (Same as Libr
4201 Teaching Elementary School Social Studies (3
4215 Teaching Elementary School Science (3) Metho
4217 Teaching Elementary School Language Arts (3
4290 Orientation to Corrective Practices for Classr
4303 Language Development of Children: Birth to Th
4304 Developing Reading Skills In Content Fields (3
4306 Developing Reading Skills In Content Fields (3
4307 Teaching Elementary School Mathematics (3) Em
4308 Teaching Elementary Reading in the Elementary
4309 Teaching Elementary School Mathematics (3) Em
4310 Teaching Teaching Elementary School Mathemat
4410 Educational Sociology (3) (Same as Sociology
4430 Practicum In Teaching In the Elementary Schoo
4500 Problems in improvement of Instruction (1-9) S
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<td>Developmental Reading Practicum (3)</td>
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<td>Problems in Improvement of instruction (1-3)</td>
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<td>The High School Curriculum (3)</td>
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<td>Education In Cultural Perspective (3)</td>
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<td>The Junior High and Middle School Curriculum (3)</td>
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<td>Curriculum Planning and Development (3)</td>
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<td>Individualization of Instruction (3)</td>
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<td>Newer Trends in Elementary Education (3)</td>
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<td>Curriculum Laboratory for Elementary Schools (3-6)</td>
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<td>Curriculum for Early Childhood (K-3) (3)</td>
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<td>Teacher-Parent-Community Relations (3)</td>
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<td>Design of Instructional Media (3)</td>
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<td>Advanced Production of Audiovisual Software (3)</td>
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<td>Evaluation of Instructional Media (3)</td>
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<td>Administering Instructional Media Programs (3)</td>
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<td>Utilization of Educational Television and Radio (3)</td>
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<td>Research in Instructional Media (3)</td>
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<td>Practicum Experiences in Instructional Media (3)</td>
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<td>Application of Instructional Media (3)</td>
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<td>Techniques of Research in Education (3)</td>
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<td>Observation and Analysis of Instruction (3)</td>
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<td>Career Development: Workshop (1-6)</td>
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<td>Seminar In Cooperative Curriculum Research (3)</td>
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<td>Introduction to Data Processing in Education (3)</td>
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<td>Seminar in the Teaching of Mathematics (3)</td>
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<td>Teaching Mathematics in the Middle and Junior High School (3)</td>
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<td>Seminar in Mathematics Education (3)</td>
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<td>Teaching Mathematics in the Senior High School and Community/Junior College (3)</td>
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<td>Trends and Issues in Early Childhood (3)</td>
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<td>Applications of Theory in Early Childhood Education (K-3) (3)</td>
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<td>Seminar In Early Childhood Education (3)</td>
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<td>Mathematics in Early Childhood Education (K-3) (3)</td>
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<td>Social Studies and Science in Early Childhood Education (K-3) (3)</td>
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<td>5846</td>
<td>Language Arts in Early Childhood Education (K-3) (3)</td>
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<td>Seminar In the Teaching of English in the Secondary School (3)</td>
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<td>Linguistics and the Teacher of English (3)</td>
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<td>Teaching Composition in the High School (3)</td>
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5903 Teaching Fiction in the Secondary School (3)  
5904 Teaching the Mass Media in the English Classroom (3)  
5905 Teaching English in the Community/Junior College (3)  
5906 Teaching Poetry in Grades 7-12 (3)  
5907 Teaching Drama in Grades 7-12 (3)  
5908 Developing Speaking and Listening Skills in Grades 7-12 (3)  
5909 Instructional Theory and Design (3)  
5910-20-30 Problems in Lieu of Thesis (3, 3, 3)  
5911 Directing the Forensic Program (4)  
5912 Play Production in Secondary Schools (4)  
5913 Reflective Thinking: The Method of Education (3)  
5960 Advanced Studies in Secondary Science and Grades 7-12 (3)  
5961 Seminar in Science and Environmental Education (3)  
5962 Studies in Energy Education (3)  
5963 Teaching the Social Studies (3)  
5964 Projects, Programs, and Materials in Social Studies (3)  
6000 Doctoral Research and Dissertation  
6010 Studies in English Education (3)  
6020 Seminar in Teaching the Social Studies (3)  
6030 Research and Theory in Teaching Reading (3)  
6031 Seminar in Reading and Language Arts (3)  
6032 Organization and Administration of Reading Programs (3)  
6040 Seminar in Curriculum and Instruction (1, 1, 1)  
6060 Advanced Studies in Elementary Education (3)  
6080 Advanced Seminar in Philosophy of Education (3)  
6081 Phenomenology and Education (3)  
6082 Philosophical Analysis and Education (3)  
6090 Special Topics (1-5)  
6091 Independent Study (1-6)  
6092 Supervised Readings (1-6)  
6150 Education as Social Policy (3)  
6210 Seminar in Elementary School Social Studies Research (3)  
6220 Programs for Curriculum Improvement (3)  
6230 Seminar in History of Education (3)  
6232 Advanced Studies in Elementary School Science (3)  
6235 The Professional Education of Teachers (3)  
6240 The Dynamics of Educational Change (3)  
6250 Seminar in History of Education (3)  
6252 Advanced Studies in Elementary School Science (3)  
6253 The Professional Education of Teachers (3)  
6400 The Dynamics of Educational Change (3)  
6500 Advanced Studies in Early Childhood Education (3)  
6510 Advanced Studies in Elementary School Language Arts (3)  
6511 Advanced Studies in Education Anthropology (3)  
6512-20-30 Seminar in Dissertation Proposal Writing (2,2,2)  
5710 Advanced Educational Statistics (3)  
5720 Interpretation of Data (3)  
5730 Evaluation in Curriculum Planning: Theory and Application (3)  
5731 Advanced Studies in Curriculum (3)  
6830 Studies in Mathematics Education (3)  
6850 Principles of Educational Leadership (3)  
6899 Internship (1-6)  
6960 Advanced Studies in Secondary Science and Environmental Education (3)  

**Education (289)**

**GRADUATE**

6001 Trans-College Seminar (1)  
6002 Seminar in Educational Administration and Supervision (292)  

Professors:  
Associate Professors:  
H. F. Atkinson, Ed.D. Tennessee (Vice Chancellor for Student Affairs); G. W. Harris, Jr., Ph.D. Michigan; P. M. Husen, Ed.D. Stanford.

**GRADUATE**

5000 Thesis  
5002 Non-Thesis Graduation Completion (3-15)  
5100 Internship in Educational Administration (3)  
5130 Introduction to Educational Administration (3)  
5180-90-5200 Educational Specialist Research and Thesis (3, 3, 3)  
5220 Philosophy and Theory in Educational Administration (3)  
5230 Seminar in the Behavioral Sciences for Educational Administration (3)  
5290 The Politics of Education (3)  
5310 School Administration and Civil Rights issues (3)  
5420 District Level Administration (3)  
5430 Building Level Administration (3)  
5440 Introduction to Law, Finance, and Business Management at the Building Level (3)  
5450 Organization of the School Program (3)  
5460 Personnel Administration: Local School (3)  
5470 Introduction to School Facility Planning (3)  
5480 Instructional Supervision—Local School (3)  
5530 Introduction to Educational Planning (3)  
5540 Tennessee School Law (3)  
5560 Research for Educational Administrators (3)  
5560 Seminar in Communication Skills for Educational Administrators (3)  
5711 Problems in Educational Administration and Supervision: School Operation (3)  
5712 Problems in Educational Administration and Supervision: Higher Education (3)  
5713 Problems in Educational Administration and Supervision: State School Administration (3)  
5714 Problems in Educational Administration and Supervision: Preparation Programs (3)  
5715 Problems in Educational Administration and Supervision: Community Education (3)  
5751 Problems in Educational Administration and Supervision: Theory (3)  
5752 Problems in Educational Administration and Supervision: Finance (3)  
5753 Problems in Educational Administration and Supervision: Transportation (3)  
5754 Problems in Educational Administration and Supervision: Business Management (3)  
5755 Problems in Educational Administration and Supervision: Personnel (3)  
5756 Problems in Educational Administration and Supervision: School Plant (3)  
5757 Problems in Educational Administration and Supervision: Organization and Structure (3)  
5758 Problems in Educational Administration and Supervision: School Law (3)  
5759 Problems in Educational Administration and Supervision: Supervision (3)  
5770 Maintenance of School Plants (3)  
5810 Survey Research Methods (3)  
5850-60-70 Independent Study in Educational Administration (3, 3, 3)  
5890 Decision Making and Decision Theory in Educational Organizations (3)  
5900 Special Topics (3)  
5910-20-30 Problems in Lieu of Thesis (3, 3, 3)  
5950 Elementary Administrators Seminar (3)  
5960 Middle School Administrators Seminar (3)  
5970 Secondary Administrators Seminar (3)  
6000 Doctoral Research and Dissertation  
6040 Seminar in Educational Administration and Supervision (1, 1, 1)  
6100 Internship in Educational Administration (3)  
6110 Administrator Update (3)  
6190 Administration in Higher Education (3)  
6220 Programs for the Professional Preparation of Educational Administration and Supervision (3)  
6340 Current Trends in School Law (3)  
6380 Instructional Supervision—School District (3)  
6420 School Board/Superintendency Relationships (3)  
6440 School Business Management (3)  
6450 Grant and Contract Proposal Preparation (3)  
6460 School Personnel Administration (3)  
6480 Special Topics in School Personnel Administration (3)  
6530 Futuristic Educational Planning Methods (3)  
6540 Contemporary Economics and Educational Finance (3)  
6550 State-Federal Relations in Education (3)
6560 Legal Foundations of Public Education (3)
6580 Seminar in Managing Conflict (3)
6750-60-70 Independent Studies in Educational Administration and Supervision (3, 3, 3)
6800 Administration of Complex Educational Organizations (3)
6870 Advanced Study in School Facility Planning (3)
6900 Special Topics (3)
6981 Specialized Seminar: School Operation (3)
6982 Specialized Seminar: Higher Education (3)
6983 Specialized Seminar: State School Administration (3)
6984 Specialized Seminar: Preparation Programs (3)
6990 Specialized Doctoral Seminar in Politics of Education (3)
6992 Specialized Seminar: Finance (3)
6994 Specialized Seminar: Business Management (3)
6995 Specialized Seminar: Personnel (3)
6996 Specialized Seminar: School Plant (3)
6997 Specialized Seminar in Organization and Structure (3)
6998 Specialized Seminar: School Law (3)
6999 Specialized Seminar: Supervision (3)

**Educational Psychology and Guidance (311)**

**Professors:**
- L. M. DeFidder (Head), Ph.D. Michigan; S. C. Dietz, Ed.D. Arizona State; S. W. Huck, Ph.D. Northwestern; R. P. Lorton², Ph.D. Rochester; E. W. McClearn, Ph.D.
- D. Texas; W. A. Poppen, Ph.D. Ohio State; C. L. Thompson, Ph.D. Ohio State; J. A. Wiberley², Ph.D. Syracuse; R. L. Williams, Ph.D. George Peabody.

**Associate Professors:**

**Assistant Professors:**
- G. D. Claibourn², Ed.D. Tennessee; S. H. Franzblau, Ph.D. New York (Stony Brook); D. C. Johnson², Ph.D. Oregon; P. G. Klukken², Ph.D. Florida; P. A. Matthes², Ph.D. Texas; M. C. Molloy², Ph.D. Florida State; R. L. Nash¹, Ed.D. Colorado; K. L. Stoner², Ed.D. Tennessee; M. A. Wood-Pentz², Ph.D. Syracuse.

*Footnotes:
²Part time
¹Adjunct*

**2000 Field Experience (1)** Field experiences in working with children and youth and their teachers. Students will perform various teaching tasks and be given opportunity to act in teaching roles. May be repeated for a total of 6 credit hours.

**2210 Academic Development (3)** The development of skills for competence in higher education, including principles of learning, self-knowledge, techniques of behavior change, time use, examination preparation, and independent study. Application of learned skills to current courses.

**2220 Personal Development (5)** A study of the relationships among self, others, and environment in contemporary culture. Topics include self-awareness, interpersonal skills, environmental awareness, value clarification, and socialization.

**2230 Career Development (3)** Vocational opportunities and aspirations, including self-appraisal, career planning, decision making, occupational exploration, and vocational development.

**2299 Developmental Laboratory (1)** Repeatable to three credit hours. Specialized laboratory experiences in the improvement of skills related to academic, personal, or career development.

**2430 Child Study (3)** Child learning and development: study of individual children, ages 5-12. Prereq: Psychol 2500 or equivalent; coreq: either Educ. Psych. and Guidance 2000 or a 2 hr/week field experience.

**3000 Field Experience (1)** Field experiences in working with children and youth and their teachers. Students will perform various teaching tasks and be given opportunity to act in teaching roles. May be repeated for a total of 6 hours.

**3100 Application of Learning Theory to Classroom Teaching (4)** Overview of learning theories such as contiguity theory, reinforcement theory, cognitive theory, and statistical models with particular emphasis on concepts applicable to classroom teaching. Two-hour lab and/or field experience included. Prereq: Psychology 2500.

**3110 Classroom Behavior Management (4)** Students will develop understanding of behavior management procedures and skill in utilizing behavior management procedures in shaping pupil classroom behaviors. Prereq: Psychology 2500.

**3550 Child Psychology (4)** (Same as Psychology 3500.)

**3560 Individual Skills for Campus Leaders (3)** Knowledge and skills for effectively managing leadership and administrative roles in campus organizations.

**3810 Educational Psychology: Adolescence (3)** Physical, emotional, intellectual, social, career, and ethical dimensions of adolescent development; major emphasis given to effective communication with adolescents within the educational setting. Prereq: Psychology 2500 or equivalent; coreq: either Educ. Psych. and Guidance 3000 or a 2 hour/week field experience.

**4100 Pre-Student Teaching Seminar (1)** Orients student teachers to the off-campus centers and the student teaching program; describes the objectives and policies of the student teaching program, meets special needs of student teachers; and raises awareness of professional liability. The pre-student teaching seminars must be completed the quarter immediately preceding student teaching. Fall quarter student teachers complete pre-student teaching seminars during quarter. Prereq: full admission to the Teacher Education Program. Undergraduate credit only. May not be repeated for credit. S/NC only.

**4110 Psychology of Sex Role Development (3)** Examination of both a theoretical and research base, of factors which contribute of sex role development with attention to changes in sex role definition in society and role of education in these changes. Aimed at the undergraduate or graduate student with minimal background in behavioral sciences. (Same as Psychology 4110.)

**4130 Mental Health (3)** Studies and exploration of positive mental health. Application of mental health criteria to study of one's self based on a battery of personality assessment instruments.

**4350-60-70 Special Topics and Problems (1-6, 1-6, 1-6)** May be offered for letter grade or S/NC and may be repeated.

**4440 General Evaluation Procedures for Public Schools (3)** Prereq: 2430 or equivalent.

**4551-52-53 Student Leadership Workshops (1, 1, 1)** Series of small group and individualized experiences to develop knowledge and skills required of students in leadership roles. Sections are designed for resident assistants, student government leaders, student activities, and other student organizations. Prereq: Consent of instructor. S/NC.

**4640 Standardized Testing (3)** Use and interpretation of standardized group instruments in assessment of intelligence, aptitude, achievement, vocational interests, and personality adjustment.

**4650 The Construction of Classroom Tests (3)** Concerned with teacher-made classroom tests: instructional objectives, principles of test construction, item analysis, evaluating a test's reliability and validity, interpretation of test scores, relationship between testing and grading.

**4700 Assertiveness Training (1)** Readings and group exploration of the principles of assertiveness and the application of assertive behavior in a variety of settings.

**4760 Advanced Child Study (3)** Prereq: 2430 or 3810 or consent of instructor.

**4800 Psychology of the Disadvantaged Child (3)** Significant behavioral differences and causes; appropriate intervention approaches.

**4810 Psychoeducational Aspects of Appalachian People (3)** Exploration of psychology of people of Appalachian region through an examination of history, culture, and role of education.


**4890 Differential Psychology (3)** Nature and sources of individual differences in behavioral characteristics, and differences between racial, ethnic, socioeconomic, sex, and other groups.

**Graduate Level Courses**

**5000 Thesis**

**5002 Non-Thesis Graduation Completion (3-15)**

**5040 Guidance and Pupil Personnel Services in Education (3)**

**5050 Children and Adolescents (3)**

**5060 Group Approaches with Students (3)**

**5070 Seminar in Elementary School Guidance (3)**

**5099 Field Work in School Psychology (1-6)**

**5100 Developmental Psychology (3)**

**5101 Advanced Psychology of Adolescence (3)**

**5110 Psychology of Women (3)**

**5111-12-13 Seminar in Current Issues in School Psychology (1, 1, 1)**

**5120 Seminar in Bias-Free Counselling (3)**

**5140-50-60 Psychoeducational Assessment (3, 3, 3)**

**5149-59-69 Practicum in School Psychology (1, 2, 2, 2)**

**5180-00-5200 Educational Specialist Research and Thesis (3, 3, 3)**

**5210 Interpreting Published Articles: Statistics (3)**

**5220 Interpreting Published Articles: Research Design (3)**

**5310 Diagnostic and Corrective Teaching (3)**

**5319 Field Work in School Psychology: Level I (2)**

**5320 Advanced Classroom Behavior Modification (3)**

**5330 Theory and Research in Human Learning (3)**

**5331 Current Developments in Human Learning (3)**

**5340 Group Dynamics (3)**

**5350 Educational Applications of Cognitive Theories (3)**

**5560 The College Student (3)**

**5720 Evaluation in Education (3)**

**5780 Career Development: Theory and Research (3)**

**5785 Career Development: Program Development Implementation and Evaluation (3)**
Health and Safety

Professors:

A. J. Brown, Ed.D. Tennessee; J. D. Gorski, Dr. P.H. UCLA; C. O. Summilton, Dr. P. H. Oklahoma; R. J. Pursey, Ph.D. Iowa; A. F. Thompson, Ph.D. Michigan.

Associate Professors:


Assistant Professors:

D. S. Holloway, M.S. Tennessee.

Public Health (BSN)

1110 Principles in Personal Health (3) To develop ability to approach health scientifically and to develop justifiable confidence in judgments affecting personal health.

2040 Seminar in Human Sexuality (2) Problems and responsibilities of being male and female. S/NC.

2050 Seminar in Drug Use and Abuse (2) Intensive look at problems related to use and abuse of drugs. S/NC.

3000 Foundations of Health Science (3) In-depth study of content areas relating to personal health and contemporary health problems, i.e., mood modifying products, consumer health, international health, personal health practices, reciprocal relationships involving man, disease, and environment. (Same as School Health 3000.)

3210 First Aid and Emergency Care (4) Theory and practice of first aid and emergency care. Instruction in medical self-help. Course leads to Red Cross Certification in Advanced First Aid and Emergency Care. (Applicant must be at least 16 years of age for certification.) (Same as School Health 3210.)

3310 Communicable and Noncommunicable Diseases (3) Modern concepts of diseases; etiology of common communicable and chronic disease problems including prevention and control. Prereq. One year of biological science and one course in bacteriology.

3320 Sanitation (3) History of sanitary, water, and sewage treatment; problems of control and protection of water supply and sewage system. Healthful school living as affected by buildings and grounds, lighting, acoustic, thermal control, and other conditions. Prereq.: One year of biology. One course in microbiology. 2 hours and 1 lab.

3330 Introduction to Public Health (3) Philosophy, organization, and functions of federal, state, and local public and voluntary public health agencies. Includes periodic field trips.

4100 Pre-Student Teaching Seminar (1) Orients student teachers to the off-campus centers and the student teaching program; describes the objectives and policies of the student teaching program, meets special needs of student teachers; and raises awareness of professional liability. The pre-student teaching seminars must be completed the quarter immediately preceding student teaching. Fall quarter student teachers complete pre-student teaching seminars spring quarter. Prereq: full admission to the Teacher Education Program. Undergraduate credit only. May not be repeated for credit. S/NC only.

4120 Community Health Problems—Alcoholism (3) Explores problems of alcoholism and related health of community. Emphasis placed on factors making alcoholism a serious public health problem. Various types of educational programs to control the disease covered.

4130 Community Health Problems—Suicide (3) Explores problems of suicide and related health of community.

4140 Community Health Problems—Death Education (3) Exploration of ramifications of death and dying as related to personal and community health.

4210 Urban and Industrial Health (3) Health problems created by a burgeoning population and the megalopolis, industrial health problems of concern to management, supervisor, and industrial worker; control of occupational disorders; effects of accidents, and other conditions incidental to industry.

4220 Communications for Better Health (3) Selective study of communications in health enterprise. Consideration in logical progression the problems of omitting current and new information to practitioners; communications among members of modern health teams; among health information.

4410 Consumer Health and Safety Education (3) Survey major consumer health and safety problems; selecting, purchasing, and financing of safety and medical services.

4411 Instructor's Advanced First Aid and Emergency Care (3) Designed to teach First Aid. Satisfactory completion qualifies one for American National Red Cross Certification as an Advanced First Aid for Emergency Care Instructor. (A requirement for this certification is that an applicant must be at least 21 years of age.) Prereq: 3210 or valid Advanced First Aid and Emergency Care Certificate.

4412 Cardiopulmonary Resuscitation (2) Theory and skills necessary to implement basic cardiac life support following cardiac arrest due to such conditions as heart attack, drowning, electrocution, suffocation, poisoning, drug intoxication, and vehicular and other accidents. Educational and preventive aspects of controlling cardiovascular disease will be stressed. (Same as School Health 4412.)

4420 Drug Abuse Education (3) Drug abuse problem and suspected causes; pharmacology of drugs and their effects on society and methods of drug abuse education.

4430 Women's Health (3) Study of factors influencing women's health and women as consumers of the nation's health service delivery systems.

4700-10-20 Field Practice in Public Health (3, 3, 3, 3) Field practice in public health under supervision of public health profession. S/NC.

4730 Workshop in Public Health Education (3-4) For teachers, nurses, case workers, sanitarians, and other voluntary and public health agency personnel; emphasizes the problem-solving approach through small group interaction, case method, and critical incident technique. May be repeated for credit.

4740 Public Health Fieldwork (6) Field practice in public health under the supervision of public health profession. S/NC.

4840-50-60 Problems in Public Health Education (1, 1, 1) Individual identification and study of current problems in public health education. Extensive reading of literature required.

School of Health, Physical Education, and Recreation
Madge M. Phillips, Director

At the undergraduate level, professional preparation programs are offered in health, physical education, dance, and recreation. For information on graduate programs leading to the Master of Science, the Master of Public Health, Educational Specialist, the Doctor of Education, or the Doctor of Philosophy degrees, see the Graduate Catalog. The School of Health, Physical Education, and Recreation also provides activities programs for all students in physical education and service courses in health and safety.
3520 Principles of General Safety (3) Deals with principles, practices and procedures in general safety. Covers safety problems in school traffic, recreation, industry, home, and other public areas.


4410 Driver and Traffic Safety Education (5) Preparation of teachers of driver education in schools and colleges. Students are required to teach at least one semester to the off-campus centers and the student teaching program; describes the objectives and policies of the student teaching program, meets special needs of student teachers; and raises awareness of professional liability. The pre-student teaching seminars must be completed the quarter immediately preceding student teaching. Fall quarter student teachers complete presudent teaching seminars spring quarter. Prereq: full admission to the Teacher Education Program. Undergraduate credit only. May be repeated for credit. 5/3/NC only.


4430 Sports Safety (5) Accident prevention and injury control in sports activities; philosophy of sports safety; human environmental factors and their interrelationships in sports injury and their control; risk-taking and decision solution strategies; and contributions of sports medicine to safety. 3 hours of lecture and 2 hours of lab.

4720 Workshop in Safety (3-6) Deals with special safety education problems. For advanced undergraduates, graduate students, teachers, supervisors, and administrators. May be repeated for credit.

GRADUATE

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15)

5320 Behavioral Problems in Safety Education and Accident Prevention (3)

5330 Problems and Research in Accident Prevention (3)

5340 Organization, Administration and Supervision of Safety Programs (3)

5350 Civil and Defense Education (3)

5720-30-40 Graduate Workshop in Safety (3-6, 3-6, 3-6)

5810-20-30 Problems in Safety (1-3, 1-3, 1-3)

5870-80-90 Current Issues in Safety Education (1, 1, 1)

6010-20-30 Internship and Research in Safety Education (3, 3, 3)

School Health (898)

3000 Foundations of Health Science (3) (Same as Public Health 3000)

3210 First Aid and Emergency Care (4) (Same as Public Health 3010)

3410 School Health Instruction (3) Selection of health content in school curriculum.

3420 School Health Services (3) Development, maintenance, and protection of health of students including examination, screening, special services; communicable disease control, emergency care, and school health records.

3510 The School in Community Health (3) Role of teacher in community health education; school's responsibility in promoting healthful living and the place of existing media and agencies in program. Not open to health and physical education majors.

3610 Methods in Elementary Health Instruction (3) Preparation and presentation of health topics. Teaching method is emphasized and student participation stressed. Required for elementary teachers. Prereq: 3510 or Public Health 1110 or Nutrition 1230.

3620 The Teaching of Sex Education (3) Trends, content, methods, and materials.

3650 Methods in Secondary Health Instruction (3) Preparation and presentation of health topics. Teaching method is emphasized and student participation is stressed. Prereq: 3140.

4100 Pre-Student Teaching Seminar (1) Orientates student teachers to the off-campus centers and the student teaching program; describes the objectives and policies of the student teaching program, meets special needs of student teachers; and raises awareness of professional liability. The pre-student teaching seminars must be completed the quarter immediately preceding student teaching. Fall quarter student teachers complete pre-student teaching seminars spring quarter. Prereq: full admission to the Teacher Education Program. Undergraduate credit only. May be repeated for credit. 5/3/NC only.

4710 Workshop in School Health Education (3-6) For advanced students, teachers, school administrators, nurses, and other paramedical school personnel. Lectures, demonstrations, films, field trips, and supervised research in special health programs. May be repeated for credit.

4810-20-30 Problems in School Health Education (1, 1, 1) Individual identification and study of current programs in school health education. Extensive reading of literature required.

GRADUATE

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15)

5010 Problems and Practices in School Health (3)

5020 Teaching of Sex Education and Human Sexuality (3)

5510 Curriculum Construction in School Health Instruction (3)

5520 Evaluation in School Health Instruction (3)

5530 School Health Program Surveys (3)

5620 School Health Administration and Supervision (3)

5630-40 Workshop in School Health Education (3, 3)

5720-30-40 Graduate Workshop in Health Education (3-6, 3-6, 3-6)

5810-20-30 Problems in School Health Education (1-3, 1-3, 1-3)

6000 Doctoral Research and Dissertation

6030 Critical Analysis of Writing and Research in Health Education (3)

6050-60 Seminar in Health Education (3, 3)

6210 Health Aspects of Gerontology (3)

6220 Seminar on the Nation's Health (3)

6230 International Health (3)

6240 Seminar on Health Problems (3)

6260 Health Services Administration (3-5)

6270 Health Planning I (3-5)

6280 Health Planning II (3-5)

6290 Health Planning III (3-5)

6300 Health and Medical Care Legislation and Law (3-5)

6310 Health and Medical Care Legislation (3-5)

6400-50-60 Problems in Public Health Education (1-3, 1-3, 1-3)

6500 Seminar in Public Health Education (3, 3, 3)

6610-20-30 Problems in School Health Education (1-3, 1-3, 1-3)

7000-30-90 Excursions in School Health Education (1, 1, 1)

7110-20-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

7210-20-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

7310-20-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

7410-30-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

7510-20-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

7610-30-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

7710-30-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

7810-30-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

7910-30-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

8010-30-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

8110-30-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

8210-30-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

8310-30-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

8410-30-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

8510-30-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

8610-30-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

8710-30-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

8810-30-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

8910-30-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

9010-30-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

9110-30-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

9210-30-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

9310-30-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

9410-30-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

9510-30-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

9610-30-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

9710-30-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

9810-30-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)

9910-30-30 Seminar in Health Teacher Education (1-1, 1-1, 1-1)
dance. May be repeated. Maximum credit 6 hours. Prereq: 3010. Available to dance majors and minors or with consent of instructor.

3030 Intermediate/Advanced Modern Technique (2) Practical and theoretical study of classical ballet technique. May be repeated. Maximum credit 6 hours.

3040 Elementary Jazz Techniques (2) Instruction and practice in styles and techniques of jazz. May be repeated. Maximum credit 6 hours.

3041 Intermediate Jazz Technique (2) Intermediate instruction in jazz dance technique with emphasis on lyrical and percussive styles. Prereq: 3040.

3050 Rhythmic Analysis (2) Emphasis on analysis of organic movement. Prereq: Junior standing, consent of instructor.

3060 Beginning Dance Composition (2) Experience in creative forms of dance. Prereq: 3010.

3061 Dance Composition II (2) Further development of solo and duo compositional skills with particular emphasis on form, content and use of music. Prereq: 3060.

3062 Dance Composition III (2) Study of choreography for small groups. Exploration of costumes, props, state space, and alternative environments. Prereq: 3061.

3070 Elementary Ballet Techniques (2) Practical and theoretical study of classical ballet technique. May be repeated. Maximum credit 6 hours.

3075 Intermediate Ballet Technique (2) Emphasis on various classical ballet styles and techniques. May be repeated. Maximum credit 6 hours. Prereq: 3070. Available to dance majors and minors or with consent of instructor.

3080 Officiating Volleyball (3) Officiating appropriate to volleyball competition. Emphasis on knowledge of rules and officiating mechanics.

3090 History of Dance and the Related Arts I (2) Dance history and the arts related to it from beginnings in primitive societies through the 19th century.

3100 Social Dance (2) Instruction, practice, and teaching in basic social dance steps.

3110 Athletic Coaching of Football (2) Fundamentals and coaching techniques. Prereq: Approval of instructor.

3120 Coaching of Basketball (2) Individual and team fundamentals for the high school coach. Attention given to conditioning, schedule making, and other business arrangements. Prereq: Approval of Instructor.

3130 Athletic Coaching of Track and Field Events (2) Techniques and training procedures. Prereq: Approval of instructor.

3151 History of Dance and the Related Arts II (2) Survey of dance and the arts related to it tracing their development in the 20th century.

3160 Officiating Basketball (3) Officiating appropriate to basketball competition. Emphasis on knowledge of rules and officiating mechanics.

3170 Weight Control and Physical Activity (3) Theoretical and practical study of weight control techniques. Emphasis on weight control and related physical activity.

3180 Track and Field (2) Methods and practical experience in various events of track and field. Special emphasis on teaching techniques, demonstration, progression, and analysis.

3200 Athletic Coaching of Baseball (2) Individual and team fundamentals for high school and college coach. Prereq: Consent of instructor.

3210 History and Principles of Physical Education (3) Principles from basic sciences of anatomy, biochemistry, biology, physiology, psychology, and sociology applied to health, physical education, and athletic coaching.

3220 Physical Fitness Activities (3) Teaching of calisthenics, conditioning activities, and weight training with emphasis on fitness concepts including muscular development of the body.

3240 Team Sports (2) Instruction, practice, and student teaching in selected team sports.

3250 Athletic Training Techniques (3) Theory and practice in the prevention and care of basic athletic injuries.

3260 Practicum for Physical Education Majors (1-10) Observation and limited teaching, coaching, and leadership experiences in physical education programs. Experiences intended to cover the last three years of professional preparation. May be repeated. Maximum credit 10 hours. S/NC.

3280 Applied Anatomy and Kinesiology (3) Bones, joints, ligaments, and muscles involved in movements; reaction to joints and muscular mechanism to bodily development and efficiency.

3330 Stunts and Tumbling (2) Instruction and practice; student teaching and lesson planning stressing with focus upon safety techniques.

3430 Adapted Physical Education Laboratory (1) Practical work, including student teaching, supplementing 4110.

3450 Physical Education in the Elementary School (3) Movement experiences appropriate for elementary school children: planning and teaching a developmental program.

3510 Conceptual Bases for Study of Human Movement Behavior (2) Biophysical, percepto-cognitive, and psycho-social bases which cause humans to move as they do. Prereq: 1011 or 1012.

3530 The Teaching of Swimming and Lifesaving (2) Certification in ARC Water Safety Instructor Training or Senior Lifeguarding with additional practice in teaching of swimming.


3560 Human Growth and Motor Development (3) Structural and functional changes in man from birth to old age, and relationship of fitness concepts to physical performance and skill development.


3610-20 Individual and Dual Sports (2, 2) Instruction, student teaching, and practice in organizing adults' sport and recreational activities suitable for schools, churches, or community recreation centers.

3650 Teaching Strategies and Program Implementation and relationship of Education to Education (3) Understanding and employing teaching strategies appropriate to elementary physical education, and study of program content and implementation. Prereq: 3570.

3680 Basic Movement Sequences for Children (3) Movement patterns and skills which are fundamental to movement activity, with emphasis upon designing and presenting sequential learning tasks and creative activity experiences. Prereq: 3570.

3670 Practicum in Developmental Movement for Early Childhood (3) Experiences in designing and presenting developmental movement tasks to preschool children. Prereq: or coreq: 3660.

3680 Structured Movement Activities in Elementary Physical Education (4) Self-testing, games and sports, and dance activities included in elementary school physical education program, with emphasis upon design and presentation of sequential learning experiences. Prereq: 3670.

3720 Philosophy of Physical Education and Sport (3) Introduction to form and content of philosophy of physical education and sport. Specific emphasis on examination of metaphysical, epistemological and axiological status of physical education and sport.

3910 Principles and Problems of Coaching (3) Examination of practical problems and situations which confront students to make judgments and decisions in a coaching environment. Prereq: At least sophomore standing.

4000 Intermediate Advanced Ballet Technique (2) Emphasis on basic technique and conditioning. May be repeated. Maximum credit 6 hours. Prereq: 3075. Available to dance majors and minors or with consent of instructor.

4100 Pre-Student Teaching Seminar (1) Orient students to the off-campus centers and the student teaching program; describes the objectives and policies of the student teaching program, meets special training needs of students and is a requirement for prestudent teaching seminars spring quarter. Prereq: Admission to the Teacher Education Program. Undergraduate credit only. May not be repeated for credit. S/NC only.

4105 Advanced Ballet Technique (2) Emphasis on classical variations and partnering. May be repeated. Maximum credit 6 hours. Prereq: 4000. Available to dance majors and minors or with consent of instructor.

4110 Advanced Modern Technique (2) Development, integration, and synthesis of previous dance vocabularies and movements into an advanced practice program. May be repeated. Maximum credit 6 hours. Prereq: 3030. Available to dance majors and minors or with consent of instructor.

4200 Practicum in Dance Production (2) Prereq: Consent of instructor.

4205 Advanced Composition (4) Application of compositional, production, and administrative skills culminating in the presentation of two complete choreographic works. Prereq: 3062, 4020.

4206 Stagecraft for Dance Production (2) Equipment, light design, properties, sets, and stage management.

4160 Pre-Student Teaching Seminar (1) (Same as Curriculum and Instruction 4100, Art Education 4100, Music Education 4100, Physical Education and Sport 4110, Counseling Psychology 4100, School Health 4110, Public Health 4110, and Business Education 4100.)

4110 Adapted Physical Education (3) Classification of atypical students who require modified programs in physical education, activities and clinical organization suitable for required or special physical education classes.

4120 Administration of Physical Education (3) Selected topics in organization and administration problems related to physical education programs in schools. Emphasis placed on human relations approach to solving problems in administration.

4140 Measurement and Evaluation in Physical Education (3) Relationship of measurement and evaluation in physical education. Administration and critique of appropriate measures of physical fitness, sports skills, and knowledge.

4150 Creative Rhythms for Children (3) Methods and materials for grades 1-6. 3 hours and 1 lab.

4160 Athletic Coaching Field Experience (2) Practical experience in coaching and related responsibilities. Must be approved. Maximum credit 4 hours. Prereq: Approval of instructor.

4230 Program Planning in Physical Education (3) Curriculum building, course construction, and lesson planning for public schools and colleges.

4310 Folk and Square Dance (2) Materials and methods for public schools, colleges and recreation centers.
4320 Tap Dance (2) Instruction, practice, and student teaching.
4330-40-50 Specialization Study in Physical Education (1-3, 1-3, 1-3)
4410 Wrestling (2) Theoretical and practical work for prospective teaching; emphasis on safety procedures.
4430 Women's Gymnastics (2) Development of skills on balance beam, uneven parallel bars, and side horse vaulting; special emphasis on progression, safety, and teaching techniques. Open to women. Prereq: 4330.
4440 Men's Gymnastics (2) Development of skills on pommel horse, parallel bars, and long horse vaulting. Special emphasis placed on safety, progression, and teaching techniques. Open to men and women. Prereq: 4440.
4450 Men's Gymnastics II (2) Development of skills on still rings, horizontal bar, trampoline, and exhibition gymnastics; special emphasis placed on safety, progression and teaching techniques. Open to men and women. Prereq: 4440.
4460 The Coaching and Judging of Women's Gymnastics (3) Appreciation of women's gymnastics according to the rules of the United States Gymnastics Federation. National tests and ratings will be given. Both men and women are encouraged to take this course. Prereq: 2734 or 4440.
4550 Methods of Teaching Dance (2) Individual work with analysis and criticism. Prereq: Senior standing and approval of instructor.
4880 Motor Behavior: A Theoretical Perspective (4) Examines motor behavior from an information processing perspective and applies current research to support theoretical base. Prereq: Senior or graduate standing or consent of instructor.
4890 Motor Behavior Laboratory (2) Provides a beginning experience in methodology and instrumentation for assessing factors related to or affecting motor learning/performance. Prereq/ conreq: PE 4880 or consent of instructor. Prereq: PE 4140 and/or PE 5520 or consent of instructor.

GRADUATE
5000 Thesis (3)
5002 Non-Thesis Graduation Completion (3-15)
5110 Administrative Problems in Physical Education (3)
5130 Methods in Physical Education (3)
5140 Advanced Philosophy of Sport (3)
5150 Systematic Philosophic Analyses of Sport (3)
5210 Principles and Philosophy of Physical Education (3)
5220 Readings in Physical Education (3)
5230 Supervisory Problems in Physical Education (3)
5310 Analysis of Basic Motor Skills (1)
5320 Seminar in Research Techniques in Physical Education (3)
5330 Psychology of Sport (3)
5340 Motor Behavior and Skill Acquisition (3)
5410-20-30 Specialization Study in a Selected Physical Education Area (1-3, 1-3, 1-3)
5500 Advanced Kinesiology (3)
5510 Selected Topics in Anatomy (3)
5550 Advanced Adaptive Physical Education (3)
5580 Physical Activity and Health (5)
5600 Applied Physiology (3)
5610 Advanced Exercise Physiology (4)
5620 Experimental Techniques in Applied Physiology (3)
5650 Social-Psychological Dimensions of Physical Activity (3)
5610-20-30 Seminar in Physical Education (1, 1, 1)
5610-20-30 Problems and Projects in Physical Education (1-3, 1-3, 1-3)
6000 Doctoral Research and Dissertation
6010 Seminar in Physical Education (1)
6220 Independent Research (3)
6330 Advanced Motor Behavior (3)
6410 Practicum in Kinesiology (3)
6510-20 Issues and Problems in Physical Education (3, 3)
6610 Seminar in Applied Physiology (2)
6640 Research Participation in Applied Physiology (1-6)
6810-20 Practicum (2, 2)

Service Program in Physical Education
The service program in physical education provides all students a program of physical education planned in accordance with their present and future needs and interests.
2701 ARC Advanced Life Saving (2)
2702 ARC Water Safety Instructor Training (2)
2703 ARC Water Safety Instructor for Hand-capped (2)
2706 Archery (2)
2707 Badminton Elementary (2)
2708 Badminton Intermediate (2)
2711 Ballet Elementary (2)
2712 Ballet Intermediate (2)
2713 Ballet Advanced (2)
2714 Basketball (2)
2715 Bowling Elementary (2)
2716 Bowling Intermediate (2)
2717 Bowling Advanced (2)
2718 Equitation Elementary (2)
2725 Field Hockey (2)
2727 Flag Football (2)
2728 Folk and Square Dance (2)
2730 Foundations of Physical Fitness (Lecture, Lab, Activity (2)
2731 Golf Elementary (2)
2732 Golf Intermediate (2)
2734 Women's Elementary Gymnastics (Coed) (2)
2735 Women's Intermediate Gymnastics (Coed) (2)
2736 Women's Advanced Gymnastics (Coed) (2)
2737 Handball Elementary (2)
2738 Handball Intermediate (2)
2739 Handball Advanced (2)
2741 Ice Skating Elementary (2)
2742 Ice Skating Intermediate (2)
2743 Ice Skating Advanced (2)
2745 Lacrosse Elementary (2)
2747 Modern Dance Elementary (2)
2748 Modern Dance Intermediate (2)
2749 Modern Dance Advanced (2)
2750 Modern Jazz (2)
2752 Paddleball Elementary (2)
2753 Paddleball Intermediate (2)
2755 Racquetball Elementary (2)
2756 Physical Fitness (Conditioning Program) (2)
2757 Men's Elementary Gymnastics (Coed) (2)
2758 Personal Safety and Defense for Women (2)
2759 Men's Intermediate Gymnastics (Coed) (2)
2760 Soccer (2)
2761 Men's Advanced Gymnastics (Coed) (2)
2762 Social Dance (2)
2764 Softball (2)
2765 Sport in Society (2)
2766 Racquetball Intermediate (2)
2770 Racquetball Advanced (2)
2771 Swimming Elementary (2)
2772 Swimming Elementary II (2)
2773 Swimming Intermediate (2)
2774 Swimming Advanced (2)
2775 Synchronized Swimming Elementary (2)
2776 Synchronized Swimming Intermediate (2)
2778 Tap Dance Elementary (2)
2779 Tap Dance Intermediate (2)
2781 Tennis Elementary (2)
2782 Tennis Intermediate (2)
2783 Tennis Advanced (2)
2784 Track and Field (2)
2785 Tumbling Elementary (2)
2786 Tumbling Intermediate (2)
2787 Tumbling Advanced (2)
2788 Volleyball Elementary (2)
2790 Volleyball Intermediate (2)
2791 Volleyball Advanced (2)
2792 Weight Control and Figure Improvement (2)
2794 Weight Training Elementary (2)
2795 Weight Training Intermediate (2)
2797 Wrestling Elementary (2)
2798 Wrestling Intermediate (2)

Recreation (853)
Professor: M. L. Peters (Chairman), Ph.D. Illinois
Assistant Professor: K. L. Krick, Re.D. Indiana.
1000-2000-3000 Field Practice (2-3, 2-3, 2-3) Supervised practice in an approved agency offering leisure services. Each hour's credit requires 25 hours of work in field agency. For recreation students only. Must be taken in sequence.
1100 Orientation to Recreation Profession (3) Overview of types, functions, and interrelationships of delivery systems for recreation and park services.
3100 Recreation Leadership Procedures (3) Principles and practices of recreation leadership; techniques and methods of working with individuals and groups in leisure activity. Prereq: 1000, 1100.

3140 Philosophical Foundations of Recreation (3) Examination of recreation as personal experience; theories of leisure, recreation and leisure in the context of society, economy, ecology, health, government, culture, and self-realization; history of recreation movement.

3200 Planning Leisure Programs (3) Principles and methods employed in planning effective and well-balanced leisure time programs for individual and groups in various settings. Prereq: 2000, 3100.

3301 Outdoor Recreation Skills and Techniques I (3) Fundamentals necessary for safe participation in outdoor recreational activities as such as skate shooting, hunting, casting and angling, power boating, rappelling, and backpacking. Emphasis: enjoyment of natural environment without disturbance or destruction of plant and animal habitats. Prereq: Consent of instructor.

3302 Outdoor Recreation Skills and Techniques II (3) In instruction in conduct of outdoor recreational activities such as sailing, skin diving, caving, orienteering, and nature interpretation without disturbance of environment. Provision of outdoor recreation experiences for the handicapped. 2 hrs. lectures and 1 to 2 hrs. lab each week. Prereq: Consent of instructor.

3710 Camp Counselling (3) History and philosophy of camping movement, counselor leadership and programs skills and outdoor living skills.

3880 Social Recreation (3) Principles and practice of social recreation suitable for all age groups and appropriate to a variety of settings. Content includes methods of conducting low-organized and social-interaction activities for special events and programs.

4000 Practicum In Recreation (15) Full-time practice in an approved recreation agency. Emphasis on supervision and administrative procedures. Prereq: 1000, 2000, 3000, senior standing S/NC.

4130 Recreation Administration (3) Introduction to recreation administration, including planning, personnel, areas and facilities, program services, finances, and public relations. Prereq: 3140, 3200, 3880 or consent of instructor.

4200 Survey of Recreation for Special Populations (3) Responsibility of recreation profession to minority groups whose leisure opportunities and needs may require special attention. Prereq: 3140, 3200, 3880 or consent of instructor.

4310 Camp Administration (3) Program planning and organization, personnel management, camp site development and maintenance and camp operation for administrators and supervisors of organized camps.

4500 Specialized Study in a Selected Area of Recreation (1-9) Comprehensive study in a selected specialized area within the broad field of recreation. For recreation students only. May be taken for variable credit up to 9 hours. May be repeated for a maximum credit of 9 hours with consent of the division. Prereq: Consent of instructor.

GRADUATE

5000 Thesis (9)

5002 Non-Thesis Graduation Completion (3-15)

5130 Interpretation of Leisure (3)

5140 Leisure Service Delivery Systems (3)

5150 Current Issues in Recreation (3)

5240 Therapeutic Recreation (3)

5250 Implementations of Recreation Services for the Ill or Disabled (3)

5260 Leisure and Mental Health (3)

5300 Seminar in Recreation (1)

5340 Administration of Recreation Funds (3)

5350 Organizational Policies for Recreation (3)

5360 Management and Operation of Recreation Facilities (3)

5440 Problems and Projects in Recreation (1-9)

5450 Specialized Study in Recreation (1-9)

Special Education and Rehabilitation (933)

Professors:

Associate Professors:

Assistant Professors:

Instructors:
A. M. Griffin, M.S. Tennessee; D. D. McCampbell, M.S. Tennessee; N. E. Tedder, M.S. Minnesota; G. D. Tyler, M.S. Tennessee; M. K. Wardem, M.S. Tennessee.

Lecturers:

The undergraduate programs in the Department of Special Education and Rehabilitation provide the general professional courses for the preserve education of candidates for certification in meeting the needs of exceptional children. Facilities are available for continuous observation and participation in direct relationships with exceptional children who are hospitalized, homebound, in residential schools, special classes, or regular classes.

Course sequences may be planned in the areas of (1) General Special Education; (2) the Hearing Impaired; (3) Speech and Hearing; (4) Rehabilitation Counselor Education.

It is possible to plan a program which will lead to certification in more than one area. For planning a program, the student must consult with an advisor in the chosen area.

General Special Education:
3333, 4110, 4120, 4130, 4150, 4351, 4361, 4440, 4520, 4610, 4740, 4860, 4861, 4882, 5260, 5260

The Hearing Impaired:
2110, 2120, 3333, 4190, 4200, 4210, 4220, 4230, 4250, 4260, 4290, 4351, 4361, 4371, 4374, 4370, 4371, 4380, 5220, 5240, 5280, 5310, 5320, 5320, 5320

Speech and Hearing:
3010, 3333, 3710, 4030, 4040, 4310, 4320, 4330, 4340, 4341, 4342, 4440, 4470, 4830. Other courses from Audiology and Speech Pathology: 3010, 3050, 3065, 3200, 4610, 4690.

Rehabilitation Counselor Education:
5100, 5110, 5115, 5120, 5150, 5145, 5146, 5147, 5150, 5160, 5170, 5180, 5700, 5710, 5720, 5730, 5740, 5750, 5760, 5770, 5771

2110 Field Experience (1) Students observe, tutor, and perform teacher-related tasks in special education programs. S/NC.

2120 Field Experience (3) Students observe, tutor, and perform teacher-related tasks in special education programs. S/NC.

3310 Articulation Disorders (4) (Same as Audiology and Speech Pathology 3310.)

3333 Education of the Exceptional Child (3) Principles, characteristics, and special needs; local and state programs for diagnosis and care; educational provisions in regular or special classes; home teaching; special education services.

3710 Audiology I (3) (Same as Audiology and Speech Pathology 3710.)

4000 Rehabilitation Practicum (3) Evaluation of client data in predicting rehabilitation prognosis. Prereq: 4230.

4030 The Public School Speech and Hearing Program (3) Organization, administration, and procedures.

4040 Appraisal of Speech and Language Disorders (4) (Same as Audiology and Speech Pathology 4040.)

4110 The Nature and Concept of Mental Retardation (3) Identification, description, and study.

4120 Education of the Mentally Retarded Child (3) Philosophy and rationale underlying the teaching and guidance of the mentally retarded; methods and materials in special and regular classes. Prereq. or coreq: 4110.

4130 Education of the Brain-Impaired Child (3) Nature of brain-impaired child; skills for identifying educational, physical, and emotional characteristics; special education and educational qualifications.

4150 Education of Children with Crippling and Special Health Conditions (3) Medical and educational characteristics of children with crippling and special health conditions, appropriate educational modifications and associated services. Prerequisites: Corequisite 3333 or consent of instructor.

4160 Education of Partially Sighted Children (3) Curricular adjustments and materials; home visits for partial cooperation in medical care and special needs.

4190 Speech Development of the Hearing Impaired (3) Anatomy and physiology of speech system. Relationship of hearing to speech development. Theories and techniques of speech development and improvement for hearing impaired children. Prereq: Speech 3060. (Same as Audiology and Speech Pathology 4190.)

4200 Practicum in Speech Development of Hearing Impaired (3) Application of theories and techniques of speech development and improvement with hearing impaired children. Prereq. or Coreq: 4190. (Same as Audiology and Speech Pathology 4200.)

4210 Language Development of Hearing Impaired (3) Systems by which formal language is presented. (Same as Audiology and Speech Pathology 4210.)

4220 Language Development for the Hearing Impaired (3) Techniques by which formal language is presented. (Same as Audiology and Speech Pathology 4220.)

4230 Communication Processes for the Hearing Impaired (3) Various communicative skills required by hearing impaired person; speech and language development, and its relation to other forms of communication. Observation practice. (Student must acquire a degree of proficiency in use of manual language.) Prereq: Consent of instructor.

4231 Communication Processes for the Hearing Impaired II (3) Intermediate courses in manual communication skills and formal language. Prereq: 4210 or consent of instructor. (Same as Audiology and Speech Pathology 4220.)

4240 Communication Processes for the Hearing Impaired II (3) Various communicative skills required by hearing impaired person; speech and language development and improvement with hearing impaired children. Prereq. or Coreq: 4190. (Same as Audiology and Speech Pathology 4200.)

4250 Introduction to the Psychology and Education of the Hearing Impaired (3) Offered for those
planning to enter field of teaching the deaf and hard-of-hearing. Review of history of education of the deaf. Research studies relating to psychology, social adjustment, and learning of the deaf. Survey of professional literature on educational deaf studies. (Same as Audiology and Speech Pathology 4320.)

4280 Curriculum Development in Elementary and Secondary Schools for the Hearing Impaired (3) Adaptation of curriculum development and methods in public school education to meet the needs of deaf and hard-of-hearing students in residential and integrated settings.

4290 The Teaching of Reading to Hearing Impaired Children (3) Readiness activities, developmental approaches, theories, and specialized materials for curricula in reading teaching.

4310 Stuttering (3) (Same as Audiology and Speech Pathology 4310.)

4320 Introduction to Clinical Practice in Speech Pathology (3) (Same as Audiology and Speech Pathology 4320.)

4330 Clinical Practice in Speech Pathology (1-6) (Same as Audiology and Speech Pathology 4330.)

4340 Clinical Practice in Speech Pathology (1-6) (Same as Audiology and Speech Pathology 4340.)

4341 Clinical Practice in Communication Disorders in Schools (3) Prereq: Audiology and Speech Pathology 4320-30-40, Special Ed. 4039, and consent of instructor. S/NC.

4342 Seminar in Communication Disorders in Schools (3) Prereq: Audiology and Speech Pathology 4320-30-40, Special Ed. 4039, and consent of instructor.

4350-60-70 Problems in the Education of Exceptional Children (3, 3, 3) Prereq: Consent of instructor.

4351-61-71 Practicum in Special Education (3, 3, 3) Students prepare and deliver units of instruction in special education programs. S/NC.

4400 Voice Disorders (4) (Same as Audiology and Speech Pathology 4400.)

4440 High School Program for the Mentally Retarded (3) Trends, issues, and research relating to core and work study programs.

4520 Language-Speech Handicapped Child in the Classroom (3) Recognition, understanding, observation of communication disorders, and development of referral procedures, agencies, legislation; incorporation of speech improvement - language development activities into the regular curriculum. For students not majoring in speech-language pathology or audiology.

4610 Nature and Characteristics of Learning and Behavior Disorders (3) Forms of academic and social behaviors; the diagnosis of severity, possible causes, and relationships to each other. Relationships with respect to personality characteristics and developmental factors interpreted through behavioral and psychodynamic theory as well as practical situations in which learning and behavior disorders may occur.

4620 Education of the Emotionally Disturbed Child (3) Managing behaviors, models for instruction, teaching techniques and materials, and teacherteacher-family-interpersonal relationships as basic to academic achievement for the pupil. Prereq. 4610.

4630 Practicum in Residential Settings Serving Children with Disturbing Behavior (3) Practicum scientifically identifying, observing, and recording disturbing behaviors. Initiating behavior changes regarding academic and social behaviors. To perform in a tutorial capacity within a residential classroom and to take part in discussion and evaluation of relevant academic curriculums and curricular schedules. Prereq. 4610 and 4620 or consent of instructor.

4640 Practicum in Public School Systems Serving Children with Learning and Behavior Problems (6) Academic and social roles of the teacher aide. Acquiring tutor and classroom aide capacity within regular classrooms. Particular emphasis and practice in individualizing instruction for learning and behavior problems children within the regular classroom setting. Discussion and evaluation of relevant methods and materials unique to each teaching situation. Prereq. 4610 and 4620 or consent of instructor.

4720 Audiology II (4) (Same as Audiology and Speech Pathology 4720.)

4740 Evaluating Exceptional Students (3) Explores methodologies relative to evaluation; examines theoretical considerations and methods of evaluating exceptional students; introduces basic statistical concepts relative to normative criterion-referenced testing. Prereq. Sp. Ed. & Rel. 3333 or consent of instructor.

4810 Student Teaching Mental Retardation (3) Prereq: Major in education of mental retardation. S/NC.

4811 Student Teaching Mental Retardation (9) Prereq: Major in education of mental retardation. S/NC.

4840 Educational Problems of the Cerebral Palsied Child at Home and School (3) Physical, social, and emotional needs of cerebral palsied; evaluative techniques; related services.

4850 Eye Problems Encountered by the Teacher (3) Eye anatomy and hygiene; common diseases and defects; testing and treatment; educational adjustments for specific eye conditions; related service resources.

4870 Student Teaching with Hearing Impaired Children (9) Supervised practicum with preschool, day school, and residential pupils. S/NC.

4871 Practicum with Hearing Impaired Children (6) S/NC.

4880 Student Teaching in Special Education (1-6) Application for student teaching must be filed not later than January 1 of the academic year preceding the actual experience. Prereq. 4110, 4120, 4130, 4150, 4351, 4361, 4740. S/NC.

4881 Student Teaching in Special Education (1-6) Application for student teaching must be filed not later than January 1 of the academic year preceding the actual experience. Prereq. 4110, 4120, 4130, 4150, 4351, 4361, 4740. S/NC.

4921 Student Teaching in Crippling and Special Health Conditions (3-15) Observation and supervised practicum in home, hospital, and classroom. S/NC.

4922 Student Teaching of the Educable Mentally Retarded (3) Observation and supervised practicum. S/NC.

4923 Student Teaching of the Partially Seeing (3) Observation and supervised practicum in special and regular classes. S/NC.

4924 Student Teaching of the Emotionally Disturbed (3-9) Individual tutoring and classroom observation and teaching. Prereq. or coreq: Educ. C & 4720 or 4820. S/NC.

4930 Aural Rehabilitation: Speechreading and Auditory Training (3) (Same as Audiology and Speech Pathology 4930.)

4940 Introduction to the Verbo-Tonal System (4) (Same as Audiology and Speech Pathology 4940.)

GRADUATE

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15)

5040 Advanced Clinical Practice in Audiology (1-6)

5100 Orientation to Rehabilitation (3)

5110 Medical Aspects of Rehabilitation Counseling (3)

5111 Psychology of Mental Retardation (3)

5112 Psychology of the Severely Mentally Retarded (3)

5113 Advanced Curriculum for the Mentally Retarded (3)

5115 CaseLOAD Management In Rehabilitation (3)

5120 Psycho-Social Aspects of Disability (3)

5121 Job Development and Placement in Rehabilitation (3)

5130-40 Seminar in Rehabilitation (3, 3)

5141 Diagnostic Vocational Evaluation in Rehabilitation (3)

5142 Prognostic Vocational Evaluation In Rehabilitation (3)

5143 Interpretation of Vocational Evaluation Data in Rehabilitation (3)

5144 Development and Supervision of Client Evaluation Programs (3)

5145-49-47 Practicum in Rehabilitation (3, 3, 3)

5150-60 Internship in Rehabilitation (6, 9)

5170 Systematic Human Relations Training I (3)

5180 Approaches to Rehabilitation Counseling (3)

5220 Linguistics in the Education of the Hearing Impaired (3)

5240 Seminar in Language Remediation for the Hearing Impaired (3)

5260 Education of Gifted Children (3)

5280 Seminar in Educational Implications of Language Deficiency (3)

5310-20-30 Manual Communication (2, 2, 2)

5380 Cerebral Palsy (3)

5390 Cleft Palate (3)

5400 Assessment and Remediation of Learning Disabilities (3)

5401 Prescriptive Teaching for Children with Learning Disabilities (3)

5402 The Exceptional Child In the Regular Classroom (3)

5403 Resource Teachers for the Handicapped (3)

5410 Instructional Media for the Handicapped: Design, Production, and Evaluation of Prototypical Curriculum Materials for the Deaf (9)

5450-60-70 Experience in Teaching and Supervision of Exceptional Children (1-6, 1-6, 1-6)

5490 Educational Vocational Guidance of the Deaf and Hard-of-Hearing (3)

5510-20-30 Administrative Practicum or Problems in Institutional Care of Children (3, 3, 5)

5540 Seminar in Language Pathology (3)

5550-60-70 Problems in the Education of Exceptional Children (3, 3, 3)

5555-65-75 Special Topics (1-3,1-3,1-3)

5620 Counseling Parents of Exceptional Children (3)

5630 Psychology of the Exceptional Child (3)

5700 Evaluation and Mobilization of Community Resources (3)

5710 Medical Aspects of Disability I (3)

5720 Medical Aspects of Disability II (3)

5730 Vocational Assessment in Disability Evaluation (3)

5740 Disability and Work in Society (3)

5750 Principles and Problems of Disability Evaluation (3)

5760 Seminar: Functional Capability Assessment (3)
Vocational-Technical Education (988)

Proponents:
J. I. Matthews (Head), Ph.D., Arizona State; R. J. Woodlin (Emeritus), Ph.D., Ohio State; W. A. Cameron, Ph.D., Ohio State; D. G. Cheek (Coordinator Ind. Ed.), Ph.D., Kansas State; C. B. Coakley (Coordinator Dist. Ed.), Ph.D., Wisconsin; D. G. Craig, Ed.D., Cornell; R. W. Haswell, Ph.D., Purdue; N. P. Logan (Emeritus), Ed.D., Tennessee; J. L. Reed (Emeritus), M.S., Oklahoma; G. A. Wagner (Emeritus), M.S., Indiana; G. W. Wiegens, Jr., Ed.D., Missouri.

Associate Proponents:

Assistant Proponents:

Instructors:

GENERAL

2010-20-30 Field Experience in Vocational Education (1, 1, 1) Field experience in public school programs in agriculture, business, distributive, home economics, trades and industries and industrial arts education. S/NC only.

3000 Introduction to Vocational Education (1) Introductory and exploratory experiences concerned with teaching careers in all areas of vocational education. Includes visitation within a vocational setting.

4010 Development and Utilization of Advisory Committees (2) Philosophy and rationale for use of the advisory committee systems. Their selection, organization, implementation and utilization.

4140 Individual Study in Vocational-Technical Education (1-3) Individual study must be approved by the supervising instructor and the service area coordinator or department head. Approval form must be filed in the Office of the Department Head. May be repeated.

4750 Utilization of Instructional Media (3) (Same as Education 1475) and Information Science 4750.)

GRADUATE

5000 Thesis

5002 Non-Thesis Graduation Completion (3-15)

5005 Problems in Lieu of Thesis (3)

5010 History and Organization of Vocational-Technical Education (3)

5015 Issues and Trends in Vocational-Technical Education (3)

5020 Placement, Follow-up, and Evaluation Procedures in Occupational Education (3)

5040 Guidance and Pupil Personnel Services in Education (3)

5050 Supervision of Vocational-Technical Education (3)

5070 Competency Based Vocational Education (3)

5080 Continuing Education in Vocational-Technical Education (3)

5100 Occupational Program Development for Disadvantaged Persons (3)

5110 Principles and Objectives of Vocational-Technical Education (3)

5130-31-32 Problems in Vocational-Technical Education (1, 1, 1)

5140 Individual Study in Vocational-Technical Education (1-3)

5155 Software Design for Microcomputers in Education (3)

5180-90-5200 Educational Specialist Research and Thesis (3, 3, 3)

6000 Doctoral Research and Dissertation

6010 Curriculum Planning in Vocational-Technical Education (3)

6020 Program Planning and Development in Vocational-Technical Education (3)

6030 Evaluation of Vocational-Technical Education Programs (3)

6040 Seminar in Vocational-Technical Education (1, 1, 1)

6050 Administration of Vocational-Technical Education (3)

6111-12-13 Internship in Vocational-Technical Education (3, 3, 3)

Agricultural Education (056)

3450 Agricultural Experience and Future Farmers of America Programs (3) Prereq: Consent of instructor.

3460 Methods in Teaching Agriculture (3) Prereq: Consent of instructor.

3470 Program Development and Adult Education in Agriculture (3) Prereq: Consent of instructor.

4110 Organizing and Teaching Agricultural Mechanics (3) Methods of teaching agricultural mechanics to vocational agricultural students. Emphasis on special competencies needed for planning, conducting, and evaluating agricultural mechanics programs. Prereq: Agriculture 1120, Agricultural Mechanization 3110, and/or consent of instructor. 2 hours and 2 labs.

4230-31-32 Problems in Agri-business Education (1, 1, 1) Prereq: 3450 or consent of department head. S/NC only.

4240-41-42 Seminar in Agricultural Education (1, 1, 1) Prereq: 4350 or consent of department head.

4350-60 Student Teaching in Agricultural Education (4-6) Offered in off-campus centers. Application must be filed not later than final quarter of junior year. Courses must be taken concurrently. Prereq: 3450, 3460, 3470, consent of instructor. Undergraduate credit only. S/NC.

GRADUATE

5210 Supervision of Student Teaching in Agricultural Education (3)

5220 Teaching Agricultural Mechanization in Vocational Agriculture (3)

5230-31-32 Special Problems in Agricultural Education (3, 3, 3)

5240 Current Literature in Agricultural Education (1-3)

5250-51 Agricultural Education in Off-Farm Agricultural Occupation (3, 3)

5260 Agricultural Education for First-Year Teachers (3)

5270 Adult Education in Agriculture (3)

5290 Supervised Occupational Experience in Agriculture (3)

Business Education (207)

4300 Principles of Business Education (3) Historical background and present status; principles of vocational education applied to business education; guidance activities of business teachers.

4310 Pre-Student Teaching Seminar (1) Orienta student teachers to the off-campus centers and the student teaching program; describes the objectives and policies of the student teaching program; meets special needs of student teachers; and raises awareness of professional liability. The pre-student teaching seminars must be completed the quarter immediately preceding student teaching. Fall quarter student teachers complete presudent teaching seminars spring quarter. Prereq: full admission to the Teacher Education Program. Undergraduate credit only. May not be repeated for credit. S/NC only.

4320 Teaching Basic Business Subjects (2) Materials, evaluation procedures, and recent research in subject fields.

4330 Teaching Typewriting and Word Processing (3) Materials, methods, evaluation procedures, and recent research in subject fields.

4350 Teaching Accounting and Data Processing (3) Materials, methods, evaluation procedures, and recent research in subject fields.

4370 Seminar in Business Education (3) Current business education problems; viewpoints of leaders in field, special attention to problems of these enrolled.

GRADUATE

5305 Methods and Materials for VOE Programs (3)

5306 Organization and Management of VOE Programs (3)

5307 Measurement in Business Education (3)

5308 Curriculum in Business Education (3)

5309 Evaluation of Research in Business Education (3)

5310 Graduate Seminar in Business Education (3)

5311-12 Special Topics in Business Education (1, 1)

5313-14-15 Practicum in Business Education (2, 2, 2)

5320 Improvement of Instruction in Basic Business Courses (3)

5330 Improvement of Instruction in Typewriting and Clerical Programs (2)

5340 Improvement of Instruction in Short-hand/Secretarial Subjects (3)

5350 Improvement of Instruction in Accounting and Data Processing Programs (3)

5360 Improvement of Instruction in Business Communications and Word Processing (3)

5380-85 Problems and Projects in Business Education (3, 3)

5390 Problems in Business Education (1-9)

6300-10-20 Current Issues in Business Education (3, 3, 3)

6330-40 Advanced Studies in Business Education (3, 3)

6350 Advanced Studies in Business Education (3)

6360 Higher Education for Business (3)

Distributive Education (273)

4410 Student Teaching in Distributive Education (9) Full-time, supervised experience in classroom
teaching, coordination, club work, and adult education. Prereq: 4400, 4478; Education 3050; Educ. Psych. 3160; 4140 or equivalent. Undergraduate credit only. S/NC.

4420 School and Community Relationships for the Teacher Coordinator (6) Content dependent upon teaching assignment; human relations involving from school, parent, business, and other community contacts, will be taken with 4410. Undergraduate credit only. S/NC.

4430-31-32 Problems in Distributive Education (1-3, 1-3, 1-3) Selected research problems in teaching and coordinating distributive education programs. May be repeated. Maximum credit 6 hours each.

4440 Supervised Distributive Experience (3) Minimum 200 hours experience for each 3 credit hours in approved distributive business; concurrent analytic project. May be repeated.

4450 Areas of Distribution (3) Marketing, product or service technology, social skills, basic skills, and distribution as these areas affect the distributive education curriculum in secondary and post secondary programs.

4460 Organization and Operation of Distributive Education Programs (3) Background and development needs, federal and state legislation; curriculum implications, establishing, evaluating, reporting, and improving the program.

4470 Methods and Materials in Distributive Education (3) Prereq: 4460 or consent of instructor.

4480 Coordination Techniques in Distributive Education (3) Selecting training agencies; job analysis; selecting and briefing the training supervisors; advisory committees; adult education and other community services. Prereq: 4460 and 4470.

GRADUATE

5140 Administration and Supervision of Distributive Education (3)

5146-26-36 Problems in Distributive Education: Retailing (3, 3, 3)

5240 Organizing and Teaching Adult Distributive Education (3)

5430-31-32 Special Problems in Distributive Education (3, 3, 3)

Home Economics Education (490)

2240 Introduction to Teaching Vocational Home Economics (3) Introductory and exploratory experi-ences concerned with a teaching career in vocational home economics. Includes observation and participa-tion within various educational and vocational settings.

2340 Strategies of Teaching Home Economics (4) Teaching strategies, methods, techniques, and use of media. Field experience included. Prereq: 2240.

2420 Curriculum Development in Vocational Home Economics (4) Includes observation and participation in the classroom. Prereq: 2240, 3240. To be scheduled one of the two quarters immediately preceding student teaching.

3130 Student Teaching (5) Underlying philosophy, techniques, and methods: relation to school program and community. S/NC.

4600 Teaching in Community-Based Home Economics Programs (4) Planning and implementing community-based home economics educational programs—methods, curriculum, delivery systems, evaluation. Includes a field experience. Senior standing re-quired.

4500 Field Experience in Home Economics Community-Based Programs (4) Supervised field experience in appropriate related community-based pro-gram—methods, curriculum, delivery systems, evaluation. Includes a field experience. Senior standing re-quired.

2600 General Plastics (3) Characteristics of ther-moplastics and thermal setting materials, methods of determination, and resin conversion to finished product.

2660 Furniture and Cabinet Construction (3) Comprehensive study of cases and carcass construction with emphasis placed upon furniture and cabinet making. Undergraduate credit only.

3080-01-02 Basic Experiences in Trade and Industrial Education (3,3,3) Methods and materials of instruction. 3 periods.

3612 Automotive Mechanics (3) Advanced laboratory experience in tune-up, overhaul, transmission, and the suspension system. Prereq: 1619.

3620 Architectural Graphics (3) Introduction to funda-mentals of graphic representation and architectural residence. Light construction principles are stressed and working drawings for a residential building are developed. Prereq: 1620.

3630 Digital Electronics Technology (3) Basic prin-ciples and application of digital electronics. Prereq: 2650 or permission of instructor.

3640 Advanced General Metals (3) Provides experi-ences in areas of metals, sheet metals, forgings, heat finish, forming, cutting, soldering, brazing, welding, and metal finishing. S/NC.

3650 Welding, Brazing, Cutting, and Related Pro-cesses (3) Various types of welding equipment and fundamental techniques of welding. Undergraduate credit only.

3651 Plastic Processing (3) Plastics production equipment and related product design and processing of plastics. Prereq: 2652 and 1661.

3662 Construction Methods and Materials (3) Materials, methods, and equipment used in residential construction, including location and excavation, found-dry, framing, roofing, interior and exterior finishes, installa-tion, and acceptable practices in assembly. Prereq: 1661.

3672 Graphic Arts Reproduction Processes (3) Graphic arts skills in printing and duplicating techniques and other modes of graphic communication.


3810 Related Science, Mathematics, and Technol-ogy in Occupations (15) Prior department approval for registration. Applicants must show evidence of bonafide occupational experience compatible with the required educational background. Occupational experience must be in a recognized trade area. S/NC.

3811 Manipulative Skills in Occupations (15) Prior department approval for registration. Applicants must show evidence of bonafide occupational experience compatible with the required educational background. Occupational experience must be in a recognized trade area. S/NC.

3812 Knowledge of Related Subjects in Occupa-tions and Personal Qualifica-tions (15) Prior department approval for registration. Applicants must show evidence of bonafide occupational experience compatible with State Plan requirements. Occupational experi-ence must be in a recognized trade area. S/NC.

3820-21-22 Physical Testing Technology (3, 3, 3) Skills and techniques involved in radiography, metal-lography, tensile and compression testing, and other destructive and non-destructive testing methods. Under-graduate credit only.

3830 History and Philosophy of Industrial Educa-tion (3)

3850 Shop Organization and Management (3)

3860-61 Materials and Methods for Teachers of Shop and Related Subjects (3, 3)

3870 Shop Safety (3)

4620 Special Topics in Drafting (3) Industrial practices in specialized areas of drafting selected for the individual student. Prereq: 6 hours of drafting.

4630 Industrial Electronics and Digital Equipment Controls (3) Applications of digital and analog electronics in industrial and control circuitry. Emphasis is placed on circuit analysis, trouble-shooting, and synthesis of systems, including microprocessor applications. Prereq: 3600.

4660 Vocational Technical Laboratory Equipment Maintenance (3) Understanding of preventive maintenance, maintenance, and calibration of instruments and power equipment used in industrial education shops.


4670 Manufacturing Processes (3) The manufacturing processes of industry and their relationship to careers. Prereq: 2621, 2641, 2660, 3651, or consent of instructor.

4671 Materials and Processes (3) Organic and inorganic materials and processes used to produce finished products. Content, curriculum, and techniques of laboratory operation. Prereq: Consent of instructor.

4682 Power and Energy (3) Development, control, transmission, conversion, interrelationship of power sources; content, curriculum, and techniques of laboratory operation. Prereq: Consent of instructor.

4690 Visual Communications in Industrial Arts (3) Methods of developing and transmitting ideas and information as related to industry and society. Content, curriculum, and techniques of laboratory operation. Prereq: Consent of instructor.

4691 Course Construction in Industrial Arts (3) Advanced work in the selection and arrangement of course content. Emphasis upon instructional objectives, project selection and informational assignments and evaluation. Prereq: Consent of instructor.

4801-02-03 Tools and Machine Design (3, 3, 3) Tool and machine design, calculations, design systems, and designing procedures. Undergraduate credit only.

4810 Directed Teaching (6) Guided observation and teaching in trade, industrial, and/or technical programs in secondary, area, adult, post secondary, and junior college industrial vocational and technical curricula. Undergraduate credit only. S/NC.

4811 Directed Teaching (6) Observation of all types of trade and industrial classes; preparation of lesson plans and supervised teaching in at least two types. Prereq: Senior standing in industrial education. Prereq, or coreq: 4210, 1 hour and 5 periods. Undergraduate credit only. S/NC.

4820 Foremanship Training by the Conference Method (3)

4830-31 Job Analysis (3, 3) Principles, practice, instructional methods.

4840 Methods of Teaching Shop and Related Subjects (3) Undergraduate credit only.

4850-51 Curriculum Building in Trade and Industrial Subjects (3, 3) Arranging course material in trade subjects, following up results of job analyses, preparing checking sheets and individual job sheets in both trade and related subjects. Prereq, or coreq: 4120.

4860-61-62 Problems in Industrial Education (3, 3, 3)

4870 Numerical Control (3) Tooling, manual programming, automatic programming, automatic programming language, and use of automatic programmer as a computer. Undergraduate credit only.

4880-81-82 Seminar in Industrial Education (3, 3, 3) Educational innovations, current events, problems, and other topics associated with the field of industrial education.

4890 New Developments in Industrial Education (3) Developments, pressing problems and recent trends in field of industrial education as presented by a coordinating instructor in conjunction with knowledgeable resource personnel.

4891 New Developments in Industrial Education (3) Developments, pressing problems and recent trends in field of industrial education as presented by a coordinating instructor in conjunction with knowledgeable resource personnel.

4895 New Developments in Industrial Education (3) Developments, pressing problems and recent trends in field of industrial education as presented by a coordinating instructor in conjunction with knowledgeable resource personnel.

GRADUATE

5030 Organization and Operation of Area Vocational-Technical Schools (3)

5055 Vocational School Administration and Management (3)

5810-11-12 Administration and Supervision of Industrial Education (3, 3, 3)

5830-31-32 Special Problems in Industrial Education (3, 3, 3)

5840 Method of Research in Industrial Education (3)

5850 Improving Teachers in Service (3)

5860 Advisory Committees and Apprentice Training (3)

5880 Advanced Methods of Teaching Skills and Technical Information (3)

5890-91-92 Seminar in Industrial Technical Education (3, 3, 3)
The engineer applies mathematical and scientific knowledge in planning economical ways of providing materials and energy in forms that are useful to humankind. In today’s technology-based society, everyone feels the effects of the engineer’s plans and decisions. Hence, there is a continuing and urgent need for engineering graduates who possess a thorough understanding of mathematical and scientific principles, who can apply these principles to the solution of practical problems, and who can view the solutions in their overall social perspective so that the actions that they recommend will be truly beneficial. It is the purpose of the College of Engineering to educate men and women to the high levels of technical competence and social understanding that will enable them to fulfill their responsibilities as professional engineers.

Graduates of the B.S. curricula offered by the college may enter directly a position in industry, government, or private practice, or may pursue advanced study in graduate school. Their professional activities include research, development, design, operations, analysis, construction, production supervision, and technical sales. Many practice their profession in Tennessee; but engineering knows no geographical bounds, and graduates of the college serve throughout the nation and in other countries as well.

The college had its beginnings early in the history of the University when surveying was introduced into the curriculum in 1838. In 1877 civil engineering was first recognized as a curriculum. The first mechanical course appeared in about 1847; other mechanical courses followed, and in 1877 this body of studies was designated as mechanical engineering. By 1877 mining had found a place in the University, but it was later dropped. Electrical engineering appeared in about 1896, when a Professor of Physics and Electrical Engineering was appointed. Although metallurgy was announced in the catalog as early as 1888, it was dormant until it was revived in the Department of Chemical Engineering shortly after 1940. A separate degree in metallurgical engineering was authorized in 1957. Although the rudiments of chemical engineering appeared in the form of industrial chemistry shortly after 1900, a full chemical engineering program and a department were not established until 1936. Industrial engineering was introduced in 1940, was dropped for a time during the war years, and was reinstated in 1947.

Nuclear engineering was established as a separate curriculum in 1957 in response to the rapidly increasing demand for engineers with a knowledge of nuclear phenomena. Engineering physics, a program operated jointly with the physics department, first appeared as an engineering curriculum around 1942. Curricula in aerospace engineering and engineering mechanics were added in 1966, and a curriculum in engineering science was added in 1967.

The first dean of the college, Professor Charles E. Ferris, was appointed in 1912. Prior to that time the engineering programs were organized as a school, with a chairman of the faculty. Other former deans are Nathan W. Dougherty, who served from 1940 to 1956, Armour T. Granger, who served from 1956 to 1965, and Charles H. Weaver, who served from 1965 to 1968, and Fred N. Peebles, who served from 1968 to 1983.

The Cooperative Engineering Program was established in 1926. The University of Tennessee was one of the early pioneers in this valuable type of education, which originated at the University of Cincinnati in 1905. A Cooperative Engineering Scholarship Program was formally established in 1957, with emphasis on participation by students of superior ability. A conventional cooperative program, open essentially to all students in good standing in the college, was re-established in 1967, replacing the scholarship program.

The Engineering Experiment Station was established in 1922.

The college has ten major undergraduate curricula in which a student may specialize: aerospace, chemical, civil, electrical, industrial, mechanical, metallurgical, and nuclear engineering; engineering physics, and engineering science.

Agricultural engineering is offered cooperatively by the College of Agriculture and the College of Engineering. Details of the curriculum may be found in the College of Agriculture section of this catalog.

Facilities

The College of Engineering is housed in Ferris, Estabrook, Perkins, Dougherty, and Berry Halls, and the Nuclear Engineering building, all located on the southeastern end of the campus.

**Ferris Hall.** This building houses the offices, classrooms, laboratories, and shops of the electrical engineering department, and the Water Resources Laboratory. There is also a remote input/output terminal, and computer graphics facility connected with The University of Tennessee Computing Center.

**Estabrook Hall.** Some operations of the Departments of Civil Engineering and Engineering Science and Mechanics and of the Engineering Experiment Station are carried out in Estabrook Hall.

**Perkins Hall.** This building houses the Departments of Civil Engineering, Engineering Science and Mechanics, and Industrial Engineering, and the Office of the Dean of the College of Engineering. The building contains laboratories, drafting rooms, and various classrooms.

**Nuclear Engineering Building.** This building houses operations of the nuclear engineering department and contains laboratories and equipment for monitoring, counting, and investigating various nuclear phenomena. It also houses subcritical reactors.

**Nathan W. Dougherty Engineering Building.** This building, the most recent and largest of the engineering buildings, houses the Department of Chemical, Metallurgical, and Polymer Engineering, and Mechanical and Aerospace Engineering. In addition to classrooms and instructional laboratories, it provides modern facilities for various types of research.
Cooperative Engineering Program

The five-year Cooperative Engineering Program is offered to students in the college in order to provide a superior engineering education that affords the opportunity to combine significant experience in industry with academic preparation.

Cooperative work assignments differ from part-time employment in that they involve regularly scheduled cycles of full-time academic quarters alternated with full-time work periods—usually six, a minimum of five—in career-related, planned assignments of progressive complexity and responsibility. In exposing the student in this manner to the world of work, the college and the facilities of industry join together to offer a broader and richer preparation for life in general that can be provided by a conventional academic program alone. This experience in an industrial and professional environment contributes to the student's maturity, increases the scope of acquaintances and concepts, and enables the student to define more clearly educational and career interests and objectives. Some of the experience received is at a subprofessional level not available to an engineer after graduation, yet is of great significance in total education and effectiveness.

Admission to the Cooperative Engineering Program is open to academically qualified freshman and sophomore students. A fall application period conducted in early October is the source of most candidates placed for the following spring and summer; a late application period is usually held in May for students who failed to apply during the previous fall and who hope for placement for the subsequent fall or winter. Students must be attending the College of Engineering at the time of application. Those in school fall quarter who are undecided about co-op participation should nevertheless apply during the fall application period, and then request that their applications be held until they are ready to make a definite commitment since fall applicants take priority over spring applicants for all placements for which they are qualified.

In general, work periods begin after the freshman academic work has been completed and continues until the beginning of their senior coursework. Exceptionally well qualified candidates may be placed to begin their work experience after two quarters of freshman courses. Applicants must be able to schedule a minimum of five work periods alternating with academic quarters prior to beginning their senior year in order to qualify for co-op placement. With very few exceptions, transfer students must complete a minimum of two academic quarters in the College of Engineering at UTK before beginning co-op participation.

Students in the Cooperative Engineering Program are classified as follows in terms of quarter hours credit of completed courses:

<table>
<thead>
<tr>
<th>Class</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td>0-24</td>
</tr>
<tr>
<td>Sophomore</td>
<td>25-109.9</td>
</tr>
<tr>
<td>Junior</td>
<td>104-153.9</td>
</tr>
<tr>
<td>Senior</td>
<td>154-up</td>
</tr>
</tbody>
</table>

Sample academic schedules for co-op students are shown elsewhere in this section. A brochure with further details may be obtained from the Cooperative Engineering Program, University of Tennessee, Knoxville, Tennessee 37996-0630.

Binary Program (Dual Degree)

A binary program in engineering is available. The college has informal agreements with a number of liberal arts colleges to conduct a five-year program, three years of which will be given at the liberal arts college and the last two years at The University of Tennessee in engineering. At the end of the fifth year, the college will award a baccalaureate degree in one of the following engineering fields.

Institutions which have cooperated with UTK in offering this Liberal Arts-Engineering 3-2 Binary Plan include:

- Belmont College, Nashville, Tennessee
- Berea College, Berea, Kentucky
- Carson-Newman College, Jefferson City, Tennessee
- David Lipscomb College, Nashville, Tennessee
- East Tennessee State University, Johnson City, Tennessee
- King College, Bristol, Tennessee
- Knox College, Galesburg, Michigan
- Maryville College, Maryville, Tennessee
- Middle Tennessee State University, Murfreesboro, Tennessee
- Southwest Missouri State University, Springfield, Missouri
- Union University, Jackson, Tennessee

Questions about courses to be taken in preparation for transfer to UTK may be directed to the Dean of Engineering.

Graduate Program

GENERAL

Graduate programs leading to the degree of Master of Science are offered in all areas of study, and the degree of Doctor of Philosophy is offered in eight major subjects: aerospace engineering, chemical engineering, electrical engineering, engineering science, mechanical engineering, metallurgical engineering, nuclear engineering, and polymer engineering. A Master of Engineering degree focusing on engineering design professional practice is offered in aerospace, civil, electrical, environmental, industrial, mechanical, and nuclear engineering. Information concerning graduate programs is given in the Graduate Catalog.

Graduate Program at the UT Space Institute

At The University of Tennessee Space Institute near Tullahoma, graduate-level courses are offered in engineering fields such as aerospace, electrical, and mechanical engineering, and in mathematics and physics. Current programs lead to the M.S. and Ph.D. degrees. Members of the faculty of the Space Institute are also members of the faculty of the college at The University of Tennessee, Knoxville.
of the courses involved or where they were taken. The policy applies to all engineering students entering higher education after September 1, 1979.

GENERAL REQUIREMENTS

NOTE: Students are advised to consult the University's degree requirements as stated in the front section of this catalog as well as departmental requirements.

Institutional Credit. Each candidate for graduation majoring in aerospace, mechanical, chemical, or metallurgical engineering must participate in inspection trips scheduled by the major department.

Transfer Credit. Every attempt will be made to give maximum credit for courses taken elsewhere and transferred to the college. Discussions concerning the evaluation of transfer credit with the head of the department into which the student proposes to transfer following the evaluation of transfer credits by the Admissions Office.

Program for Second B.S. Degree. Upon approval by the engineering and the Committee on Degrees of a program of study recommended by the major engineering department, a student who already holds a bachelor's degree may obtain the appropriate first degree in engineering upon completion of a minimum of 45 quarter hours' credit. The prevailing University regulations shall apply (see page 33).

Satisfactory/No Credit Courses. An undergraduate engineering student may count towards a degree up to 12 quarter hours obtained by Satisfactory/No Credit (S/NC) grading. Such courses must be used for humanistic-social (non-technical) elective credit in engineering. Certain engineering courses carrying only S/NC grading do not count in this limit.

Correspondence Courses. A student should check with his or her major department to see what restrictions there are, if any, on the use of correspondence course credit to meet the minimum degree requirements.

Humanities and Social Science Electives. The college assumes an obligation to include in each of the engineering curricula a means whereby students gain greater insight into their interaction with society, both personally and professionally. For this purpose, a part of each engineering curriculum is devoted to humanistic-social considerations. They are interacting with the public in explaining their work as the implications of their work. They are interacting with the public in explaining their work as the implications of their work. In order to increase the effectiveness of this interest and to meet ABET accreditation guidelines, the Humanities and Social Sciences Committee of the college provides a list of approved courses in the form of 15 coherent groups of courses identified in three broad areas as follows:

Area I. Human, Economic, and Political Relationships to Engineering
A. Governance and Political Science
B. Economics
C. Sociology and Psychology
D. Human Values

Area II. Society—Its Culture, History, and Literature
A. Fine Arts
B. American Culture
C. History
D. Literature
E. Anthropology

Area III. Technology and Society
A. Human Habitat
B. Technology Assessment
C. Communication
D. Resources

Courses in the list which follows are selected by the committee with revisions as course offerings and needs change. They are recommended as satisfying the non-technical (humanistic-social) electives requirement in the various curricula of the college. However, the structure and permissible courses of the non-technical elective content of each engineering curriculum are established by the respective departments. Therefore, individual departments may delete courses from this list, require certain courses, or require selection of courses from specific subgroups. Students should consult their departments for any restrictions.

It is recognized that individual students may desire to take courses not on the approved list. Those students should discuss their interests and desires with their academic advisor prior to registering for elective courses if such courses are to be used to satisfy degree requirements. Also the catalog may state prerequisites for upper-division courses in the list. In such cases, students are encouraged to consult the instructor in the particular course.

With respect to student records, deviations from this list are handled by means of a substitution sheet which originates with the adviser.

ELECTIVE OPTIONS IN HUMANITIES AND SOCIAL STUDIES

Area I. Human, Economic, and Political Relationships to Engineering
IA. Governance and Political Science
Economics 3340
Geography 3615-20
History 3795, 4310-20-30, 4370, 4380
Political Science 2510-20, 3545-46, 3555, 3566, 3710-20, 3750-60, 3801-02-03-04, 3880, 4080, 4535-36, 4540-50, 4545-46, 4665-66
Sociology 3030, 4530, 4560

IB. Economics
Economics 3110-20-30, 3110-11-12, 3120, 3210-11, 3220, 3240, 3310, 3410-20, 4110

IC. Sociology and Psychology
Economics 3340, 3800, 3960
Psychology 2500, 3120, 3220, 4650-60, 4900
Rural Sociology 3420
Sociology 1510-20, 3930, 3150, 3320, 3410-20, 3620, 4330, 4560

ID. Human Values
Geography 3000
History 3060-70-80, 3270
Philosophy 3210, 3111-21-31-41-51, 3440, 3690
Religious Studies 2610, 3550, 3600-10-20, 3611, 3740
Zoology 3410 (Bioethics)

Area II. Society—Its Culture, History, and Literature
IA. Fine Arts
(Note: No more than 8 quarter hours may be taken in the performing arts—band, chorus, etc.)
Art 1815-25, 3715-16, 3725-26, 3750, 3765-66
English 2660, 3411-12-20-30-40
Music 1210-20-30-40, 3350, 4210, 4230, 4241, 4261-71
Philosophy 2410, 3910
Theatre 3252-53, -54

IB. Culture
American Studies 3010
Anthropology 3410
Black Studies 2010-20, 3550-60, 4830
English 2640-50, 3310, 4721-31-41
French 2610-20
Geography 3430, 3450, 3660, 3910-20-30-40
History 1950-60, 2350, 3670, 3680, 4290, 4640-50-60
Italian 2610-20
Music 1210-20-30, 1340, 2310-20-30-40, 3350
Philosophy 1510-20, 3111-12-13, 3720
Political Science 3801-02-03-04
Religious Studies 3510-20, 3560
Spanish 2610-20
Theatre 3262-63

IC. History
Art 3735-36, 3745-46
Geography 4240
Religious Studies 2611, 3121-31

ID. Literature
Classics 2710-20, 3210-20-30
Comparative Literature 2010
German 2110-20, 3110-20-30
Psychology 4880
Religious Studies 3710-11
Russian 3610-20-30

IE. Anthropology
Anthropology 2610-20-30, 3410, 3450, 3710, 4420
Asian Studies 2510-20
Geography 1910-20, 3740, 4240-50-60-70, 4640-50-60, 4670

Area III. Technology and Society
IA. Human Habitat
Economics 3320
Geography 3520-30, 3600, 3910, 4075

College of Engineering 129
American History Requirement.

Engineering students, regardless of national origin, must fulfill the American history requirement described on page 27 of this catalog. Those students who have not had the required year of American history in high school may choose the required nine quarter hours from History 2510, 2520, 2511, and 2521, or other courses deemed suitable by the Department of History. These hours can be counted as part of the required block of humanities and social science electives.

Technical Electives.

Technical electives should be selected with the advice and approval of the student's major department. In some of the curricula, tabulation of a choice of such electives is indicated, and regulations in regard to their selection are stated.

The Voluntary ROTC Program.

Engineering students may participate in the ROTC Program. Advanced ROTC courses (3000 and 4000 series) may be counted as technical elective credit toward an engineering degree up to a total of nine (9) quarter hours. Practically no ROTC course can be used as a humanistic-social elective. Individual departments determine the appropriate substitute.

Approval of Electives and Substitutions.

Not later than the beginning of the third quarter prior to anticipated graduation, each student shall discuss with an adviser the status of the program of study. Any necessary additions to or substitutions in the program, or electives requiring special approval, shall be cleared in written form at that time, and it is each student's responsibility to see that all necessary approvals are secured. Inattention to such matters may delay graduation.

CURRICULA, TABULAR VIEW

Following are the course requirements for the various engineering curricula. The numbers in the columns indicate the number of quarter hours of credit for each course. Columns represent the three principal quarters of the academic year—fall, winter, and spring. This is not a schedule, and courses are given in quarters other than those indicated here. This listing is a guide, not a rigid schedule. Individual course prerequisites should be strictly adhered to, even if all courses are not taken as indicated. Although the requirements for each degree can be completed in four academic years (five for the cooperative program), the quality of the learning experience is much more important than the speed with which the curricula is completed.

Humansociallyelectives are the same as non-technical electives in these tabulations. Questions about individual courses should be directed to the department responsible for the course; questions about a particular curriculum should be directed to the major department.

Aerospace Engineering

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</table>

Before entering the third quarter of the junior year, the student, with the aid and approval of the advisor, must select a program of technical electives.

Junior

| Aero. Engr. 3040 | 3 | 3 | 3 |
| Aero. Engr. 3110 | 3 | 3 | 3 |
| Aero. Engr. 3610-20 | 3 | 3 | 3 |
| Aero. Engr. 3950 | 2 | 2 | 2 |
| Elect. Engr. 3110-20-30 | 3 | 3 | 3 |
| Engr. Sci. & Mech. 3320 | 3 | 3 | 3 |
| Mech. Engr. 3311, 3521-30 | 3 | 3 | 3 |
| Mech. Engr. 3420, 4240 | 3 | 3 | 3 |
| Mech. Engr. 3950 | 3 | 3 | 3 |

Senior

| Aero. Engr. 4210-50-60 | 3 | 3 | 3 |
| Aero. Engr. 4220, 4510, 4230 | 3 | 3 | 3 |
| Aero. Engr. 4471-81 | 3 | 3 | 3 |
| Aero. Engr. 4950 | 3 | 3 | 3 |
| Mech. Engr. 4210 | 3 | 3 | 3 |
| Technical Elective | 6 | 6 | 6 |
| Industrial Engr. 4520 | 3 | 3 | 3 |

TOTAL: 203 hours

Humanities/social studies electives: minimum of 19 hours required.

Technical electives: upper-division courses in engineering, mathematics, or physical science as approved by the department.

Agricultural Engineering

(See College of Agriculture Section.)

Biomedical Engineering

Available In Engineering Science Degree Program.

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<td>Biomedical/social studies electives</td>
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</tbody>
</table>

Junior

| Chem. Engr. 3211-21-31, 3219-29-30 | 4 | 4 | 4 |
| Elec. Engr. 3110-20 | 3 | 3 | 3 |
| Chem. Engr. 3311 | 3 | 3 | 3 |
| Computer Science 3150 | 3 | 3 | 3 |
| Mechanical engineering | 3 | 3 | 3 |
| Biomedical/social studies electives | 3 | 3 | 3 |

Senior

| Engr. Sci. & Mech. 3120 or 3320 | 3 | 3 | 3 |
| Engr. Sci. & Mech. 4610, 4620 | 3 | 3 | 3 |
| Zoology 3080 or 3050 | 5 | 5 | 5 |

*Engr. Sci. electives (including bio. med. engr. electives) | 4 | 3 | 6 |
*Technical elective | 6 | 6 | 6 |
*Humanities/social studies electives | 3 | 3 | 3 |

TOTAL: 199 hours

Chemical Engineering

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Sophomore

| Chem. Engr. 2010-20-30 | 4 | 4 | 4 |
| Chem. Engr. 2011 | 3 | 3 | 3 |
| Chem. Engr. 3110 | 3 | 3 | 3 |
| Chem. Engr. 3410, 4110 | 3 | 3 | 3 |
| Chem. Engr. 3430, 4110 | 3 | 3 | 3 |
| Chem. Engr. 3520 | 3 | 3 | 3 |
| Chem. Engr. 3630, 4110 | 3 | 3 | 3 |
| Technical Electives | 4 | 4 | 4 |
| Technical Electives | 4 | 4 | 4 |
| Technical Electives | 4 | 4 | 4 |
| Technical Electives | 4 | 4 | 4 |

Senior

| Chem. Engr. 3620, 4220 | 3 | 3 | 3 |
| Chem. Engr. 4410 | 3 | 3 | 3 |
| Chem. Engr. 3450, 4530 | 3 | 3 | 3 |
| Chem. Engr. 4310-20 | 3 | 3 | 3 |
| Met. Engr. 3520 | 3 | 3 | 3 |
| Chem. Engr. 3430, 4110 | 3 | 3 | 3 |
| Mechatronics | 3 | 3 | 3 |
| Technical Electives | 3 | 3 | 3 |
| Technical Electives | 4 | 4 | 4 |

Civil Engineering

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Sophomore

| Civil Engr. 2260, 2360 | 4 | 4 | 4 |
| Civil Engr. 2310 | 3 | 3 | 3 |
| Civil Engr. 3110 | 3 | 3 | 3 |
| Engr. Sci. & Mech. 3311, 3720, 3110 | 4 | 4 | 4 |
| Math 2840-50-60 | 4 | 4 | 4 |
| Mechatronics | 3 | 3 | 3 |
| Technical Electives | 3 | 3 | 3 |
| Physics 2310-20 | 3 | 3 | 3 |
| Geology 2610 | 3 | 3 | 3 |
| Economics 3110 | 3 | 3 | 3 |

Junior

| Civil Engr. 3310, 4220, 4430 | 3 | 3 | 3 |
| Civil Engr. 3320, 4800 | 3 | 3 | 3 |
| Civil Engr. 3360, 3110 | 3 | 3 | 3 |
| Civil Engr. 3610, 4110 | 3 | 3 | 3 |
| Computer Science 3150 | 3 | 3 | 3 |
| Elec. Engr. 3110 | 3 | 3 | 3 |
| Engr. Sci. & Mech. 3330 | 3 | 3 | 3 |
| Engr. Engr. 4510, 4520 | 3 | 3 | 3 |
| Mech. Engr. 3520 | 3 | 3 | 3 |

Senior

| Civil Engr. 4320, 4330 | 3 | 3 | 3 |
Electrical Engineering

Hours Credit

I II III

Math 1840-50-80 4 4 4
Chemistry 1110-20-30 4 4 4
English 1010-20-33 3 3 3

3 Tech. elective... 9 9 9

TOTAL: 202 hours

Electronics and Instrumentation

Hours Credit

I II III

Elec. Engr. 4680-90, 4600 3 3 3
Elec. Engr. 4470 3 3 -
Elec. Engr. 4700 3 3 -
Elec. Engr. 4110 3 3 -
Elec. Engr. 4800 3 3 -
Elec. Engr. 4850 3 3 -
Elec. Engr. 4800 or 4750 3 3 -
Economics 2110 3 3 -
Elec. Engr. 4100 Non-tech. elective 4 4 4

TOTAL: 203 hours

Bioelectric Option

Hours Credit

I II III

Biology 1210-20-30 4 4 4
Chemistry 2320 4 4 4
Elec. Engr. 4600 3 3 -
Zoology 3080-3089 5 3 3
Dental Engr. 4850 5 3 3
Elec. Engr. 4600 3 3 -
Elec. Engr. 4850 3 3 -
Elec. Engr. 4310 3 3 -
Elec. Engr. 4820 3 3 -

TOTAL: 206 hours

Engineering Physics

Hours Credit

Freshman

Mathematics 1840-50-60 4 4 4
English 1010-11-20-33 3 3 3
Non-technical elective 3 3 3
Chemistry 1110-20-30 4 4 4
Graphics 1410-20 3 3 -
Physics 1318-28-38 4 4 4
Physics 3710-20 3 3 -

TOTAL: 199 hours

Computer Engineering

Hours Credit

I II III

Elec. Engr. 3460 3 3 -
Elec. Engr. 4740 3 3 -
Elec. Engr. 4700 3 3 -
Elec. Engr. 4680 3 3 -
Elec. Engr. 4630 3 3 -
Elec. Engr. 4620 3 3 -

TOTAL: 203 hours
### Departments of Instructions

#### Agricultural Engineering

(See College of Agriculture)

#### Basic Engineering and Graphics

*(Non-Departmental Unit)*

### Basic Engineering (179)

Co-Director: W. T. Snyder

### 1310 Basic Mechanics I

*4 Forces in a plane, free body diagram analysis, equilibrium in two dimensions, application to frames, machines, friction, introduction to forces in space, required of all engineering students except engineering physics majors. Coreq: Math 1840. 4 hrs. lab.*

### 1320 Basic Mechanics II

*Position and displacement vectors, particle kinematics using Newton's laws, impulse-momentum, work-energy, introduction to simple harmonic motion. Coreq: Math 1840. 4 hrs. lab. Coord. P. F. Pasqua

### Other Engineering Courses

**Chemical, Metallurgical, and Polymer Engineering**


**Technology Forecasting and Assessment**

Introduces non-engineering students to representative fields of the humanities and social sciences. Open to all students. 

**Agricultural Engineering**

(See College of Agriculture)

### Engineering Studies

*(Non-Departmental Unit)*

### Engineering Studies (338)

Coordinator: E. E. Stanbury

**2100 Introduction to Engineering Methodology**

Introduces non-engineering students to representative fields of the humanities and social sciences. Open to all students. 

**4100 History of Engineering**

History of technology and engineering with emphasis on identification of and developments in major areas such as transportation, communication, energy, manufacturing, design, and materials. Relationship to social and political structures of historical periods. Open to all students.

**4200 Technology Forecasting and Assessment**

Introduces non-engineering students to representative fields of the humanities and social sciences. Open to all students. 

**4300 The Interaction Between Science and Engineering**

Introduces non-engineering students to representative fields of the humanities and social sciences. Open to all students. 

**Chemical, Metallurgical, and Polymer Engineering**

Cooperative Curriculum in Aerospace Engineering

**Students Working Spring and Fall Quarters—Group A**

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**Students Working Summer and Winter Quarters—Group B**

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TOTAL: 203 hours

*Humanities/social studies electives; minimum of 19 hours required.

Technical electives; upper-division courses in engineering, mathematics, or physical science as approved by the department.
## Cooperative Curriculum in Civil Engineering

**Students Working Spring and Fall Quarters—Group A**

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1. Humanities/social studies courses approved by the department.
2. Mechanical engineering 3520 or 3311 may be substituted.
3. Technical electives must be approved by the student's advisor and the primary and one of the two secondary areas of study must come from the departmental list of approved courses for 15 credits and 6 credits respectively.
4. Math/science courses approved by the department.
## Cooperative Curriculum in Electrical Engineering

### Students Working Spring and Fall Quarters—Group A

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### FIFTH YEAR
See Senior Year Areas of Interest, page 131.

TOTAL: 203-206 hours
## Cooperative Curriculum in Engineering Physics

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### Students Working Summer and Winter Quarters—Group B

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1. To be taken from the College of Liberal Arts triads of Language, Literature and Arts, or History and Society, with at least 16 hours from courses approved for Language, Literature and Arts.
2. The honors sequence (Physics 1318-28-38) is recommended for qualified majors.
3. To be taken in College of Engineering.
5. From engineering, mathematics, computer science, physics, chemistry, or astronomy.
6. Students not pursuing graduate studies may substitute Physics 3710-20-30.

TOTAL: 199 hours
### Cooperative Curriculum in Engineering Science

**Students Working Spring and Fall Quarters—Group A**

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**Students Working Summer and Winter Quarters—Group B**

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2. Appropriate courses approved by the department.
3. Appropriate courses in the College of Engineering approved by the department.
4. Upper-division courses in mathematics, statistics, natural science, or engineering approved by the department.
### Cooperative Curriculum in Industrial Engineering

**Students Working Spring and Fall Quarters—Group A**

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### Cooperative Curriculum in Mechanical Engineering

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**Students Working Summer and Winter Quarters—Group B**

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TOTAL 203 hours

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*Humanities/social studies electives: Minimum of 19 hours required.

2Mechanical engineering electives: senior courses in mechanical or aerospace engineering not otherwise required.

3Technical electives: upper-division courses in engineering, mathematics, or physics as approved by the department.
## Cooperative Curriculum in Metallurgical Engineering

### Students Working Spring and Fall Quarters—Group A

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**TOTAL: 200 hours**

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*A minimum of one-half (12 hours) of the non-technical electives must be taken from a single group under one of the three areas of the humanities and social studies electives.
C. O. Thomas, Ph.D. Tennessee; R. A. Vandermeer,
Ph.D. Illinois Institute of Technology; R. E. C. Weaver
(Dean of Engineering), Ph.D. Princeton, P.E.; J. L. 
White, Ph.D. Louisiana State University; M. A. Wright*, Ph.D. Wales.
Associate Professor
W. T. Becker, Ph.D. Illinois; D. B. Bruner, Ph.D.
Houston; R. M. Counce, Ph.D. Tennessee.

1Alumni Distinguished Service Professor
2Distinguished Professor
3Space Institute, Telehome

BACHELOR OF SCIENCE PROGRAM
Separate complete curricula are offered in chemical engineering and in metallurgical engineering. However, the first two years of these curricula are identical and a decision as to their choice can be made in the third year. Both curricula are arranged to provide a central core of courses with flexibility in the upper-division years to permit emphasis on preparation for graduate study or technical employment. Graduation in either chemical or metallurgical engineering requires a minimum grade point average of 2.00 for all departmental courses.

GRADUATE STUDY PROGRAMS
Graduate programs are offered leading to the degrees of Master of Science and Doctor of Philosophy with majors in chemical engineering, metallurgical engineering, or polymer engineering are offered.

These programs have been strengthened by fellowships or grants provided by industrial companies including Dow, DuPont, General Electric, Shell, Texaco, Procter and Gamble, Celanese, Monsanto, American Enka, Union Carbide, Stauffer, Owens Corning, Cities Service, and Eastman Kodak, and by graduate fellowships and traineeships provided by National Science Foundation. Other aid to students has been available through research assistantships on contracts with industry and governmental agencies. The University's Graduate School operates a Resident Graduate Program at Oak Ridge, Kingsport, and Chattanooga.

See the Graduate Catalog for detailed information.

Chemical and Metallurgical Engineering (227)


2011 Sophomore Inspection Trip (6) Inspection trip to industrial plant. Usually scheduled in fall on ETAE day. Required for chemical engineering and metallurgical engineering majors. S/N/C.


2303 Process Principles and Materials III (4) Materials structure—property relationships for metals, inorganic and organic compounds, with emphasis on mechanisms of control of properties by chemical composition, thermal and mechanical treatment; crystallography, imperfections, mechanical properties, heat treatment, molecular weight, and particle size distributions. Prereq: 2010; Chemistry 1130. 3 hrs and 1 lab period.

2220 Analog Computer Practice (1) Introduction to fundamentals of analog programming. Analog computer facilities and analog simulation languages will be emphasized. Prereq: ECE 2840; ECE 2840; Physical 2310 or Electronics 3110 or consent of instructor. One lab. S/N/C.

2230 Mini Computer Practice (1) Use of mini computers. Prereq: Basic Engineering 1410, or consent of instructor. One lab. S/N/C.

2240 Mini Computer Data Acquisition (1) Mini computers. Prereq: 2220 or consent of instructor. One lab. S/N/C.

3100 Introduction to the Materials of Technology (4) Examination of sources, processing, and properties of metallic, ceramic, polymeric, and composite materials based upon the historical perspective and current practices in technology, architecture, and art. Lectures and demonstrations. Open to students in all colleges. Prereq: Introductory science course.

4310-20 Seminar (1, 1) Presentation and discussion of economic, political, humanitarian, and other topics of interest to chemical and metallurgical engineers. S/N/C.

Chemical Engineering (228)

3010 Industrial Inspection Trips (1) Technology of chemical processes. Principally emphasizing Tennessee industry; plant trips. S/N/C.

3040 Chemical Engineering Thermodynamics (4) Applications of the second law of thermodynamics to physical processes and thermodynamic cycles; applications of the Gibbs function to one, two, and three phase chemical systems; use of tabular and graphical data in equilibrium calculations. Prereq: Chem. Engr. 2020; Chemistry 1130; coreq: Math 2840. 3 hrs. and 1 lab period.


3230 Special Problems (3) Investigation of chemical engineering topics of interest to chemical and metallurgical engineers. S/N/C.

3410 Flow of Fluids (4) Differential and overall momentum balances, mechanical energy balances; flow in tubes, piping systems, and packed beds; metering devices, pumps. Prereq: Chem. Engr. 2020, Math 2850. 3 hrs. and 1 lab.

3420 Heat Transfer (4) Differential and overall energy balances; steady and unsteady state, heat conduction in simple geometries; heat transfer in tubes and heat exchanger heat balances; boiling radiation. Prereq: 3410. 3 hrs. and 1 lab.


3450 Diffusional Operations (3) Diffusion simultaneous heat and mass transfer in fixed and fluidized beds; applications including humidification, gas absorption, extraction. Prereq: 3420. Chem. Engr. 3040.

3610 Introduction to Process Dynamics and Control (3) Introduction to concepts of process dynamics and control. Steady-state analysis of chemical process control systems. Unsteady state nature of chemical processes. LaPlace transform techniques, block diagram algebra, and transfer functions. Mathematical models for several processes are developed and analyzed in detail. Prereq: Math 2840.

3620 Chemical Process Control (3) Basic control principles applied to chemical processes. Control systems, cascade control, feed-forward control, stability analysis, frequency response. Survey of modern control of typical industrial unit operations. Prereq: 3610.

4010-20 Thesis (3, 3) Investigation and report of elementary chemical engineering problem.

4110 Chemical Engineering Data Analysis (3) Analytical and experimental identification of system characteristics; systems modeling and source systems; empirical modeling of processes; statistical process control. Prereq: 3420. Math 3150.


4130 Introduction to Optimization (3) Principles and applications of optimization techniques to chemical process design; unconstrained optimization, equality and inequality constrained optimization, dynamic programming. Prereq: Math 2840.

4220 Chemical Engineering Laboratory (3) Laboratory investigation of chemical engineering topics of emphasis in chemical engineering operations. Prereq: 3440-50, 3620, 4530.

4230 Project Laboratory (3) Laboratory investigation of chemical engineering problem, stressing techniques of group effort. May be repeated.


4420 Process Design and Economic Analysis (3) Development of basic information on a process into an integrated plant design considering mass and energy balances, product specifications, equipment characteristics, capital investment, operating costs, and economic merit. Prereq: 4410, 4530.

4430 Special Problems in Design and Economics (3) Extension of 4420 for student participation in A.I.Ch.E. student contest problem; other advanced design projects. Prereq: 4420.

4450 Hydrocarbon Processing (3) Study of specialized characterization of physical properties of fossil fuel raw materials and products, and of processes for conversion of fossil fuel raw materials into products needed in industrial energy, industrial raw material and consumer markets. Prereq: 3440.

4470 Sulfur Removal from Coal and Associated Problems (3) Chemical and physical properties of domestic coals, sulfur distributions; beneficiation by both physical and chemical methods; fluidized bed combustion with both physical and chemical methods; application of synthetic S0x sorbents; stack gas SOx scrubbing. Prereq: Consent of instructor.

4480 Coal Processing to Liquid Fuels (3) Characterization of various coals with respect to current liquefaction methods; modeling of conversion processes and estimation of maximum yields; water and oxygen requirements; pyrolysis; catalytic hydrogasification; reactor design considerations; review critique of selected articles from both the current literature and patents. Prereq: Consent of instructor.


4540 Fluid-Solid Operations (3) Heat and mass transport in fixed and fluidized beds; applications including adsorption, ion exchange, crystallization. Prereq: 3440-50.

4620 Process Modeling, Simulation, and Control of Chemical Processes (3) Development of process models, experimental process identification, process computer simulation, conventional and unconventional feedback control, advanced control concepts. Prereq: 3620 or equivalent background in basic control theory and differential equations.

4730 Mass and Energy Flow in Biological Systems (3) Basic physicochemical and organizational principles for classification of living systems. Derivation of general equations of biomass and energy transfer. Thermodynamics of transport and equilibrium in biological systems. Discussion of Voiterra's equation and biological clocks, etc. Prereq: Consent of instructor.

4740 Introduction to Transport Phenomena in Biological Systems (3) Application of principles of transport to biological systems. Derivation of general equations of biomass and energy transfer. Thermodynamics of transport and equilibrium in biological systems. Discussion of Voiterra's equation and biological clocks, etc. Prereq: Consent of instructor.

4750 Microbiological Process Engineering (3) Application of chemical engineering principles and design
### Cooperative Curriculum in Agricultural Engineering

(See College of Agriculture Section)

### Cooperative Curriculum in Chemical Engineering

#### Students Working Spring and Fall Quarters—Group A

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TOTAL: 200 hours

1A minimum of one-half (12 quarter hours) of the humanities/social studies electives must be taken from a single group under one of the three areas of the humanities and social studies electives.
# Cooperative Curriculum in Nuclear Engineering

**Students Working Spring and Fall Quarters—Group A**

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**TOTAL: 198 hours**

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**Students Working Summer and Winter Quarters—Group B**

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**TOTAL: 198 hours**
concept to microbiological processes; continuous culture of microorganisms, food processing and pharmaceutical processes. Prereq: 3440, 3450, or consent of instructor.

4760 Principles of Biochemical Separation (3) Fundamental aspects and similarities of modern biochemical separation methods; classroom demonstrations, design of production and analytical systems. Prereq: Consent of instructor.

4781-82-83 Topics in Chemical Bioengineering (3,3,3) Problems of interest in chemical bioengineering. Prereq: Consent of instructor.

4900 Special Problems in Chemical Engineering (3) Chemical engineering problems related to recent developments in industrial practice or engineering research. Prereq: Consent of instructor. May be repeated. Maximum credit 9 hours.

GRADUATE

5000 Thesis

5010 Graduate Seminar (1)

5050 Engineering Analysis (3)

5120 Heat Convection (3)

5130 Methods of Optimization (3)

5210 Process Dynamics (3)

5220 Chemical Process Industry Economics (3)

5310 Thermodynamics of Heterogeneous Equilibrium (3)

5320 Statistical Thermodynamics (3)

5510 Chemical Reactor Design (3)

5610 Stagewise Mass Transfer Operations (3)

5620 Differential Mass Transfer Operations (3)

5810 Mechanics of Viscous Flow (3)

5900 Special Topics in Chemical Engineering

6000 Doctoral Research and Dissertation

6130 Process Optimization (3)

6210 Advanced Diffusional Operations (3)

6250 Venture Analysis in the Process Industries (3)

6310 Thermodynamics of Irreversible Processes (3)

6320 Statistical Thermodynamics of Non-equilibrium Systems (3)

6410 Stability Phenomena in Chemical Engineering: Discrete Systems (3)

6420 Stability Phenomena in Chemical Engineering: Continuous Systems (3)

6510 Applied Chemical Reaction Kinetics (3)

6520 Catalytic Reactor Design (3)

6710 Process Dynamics (3)

6900 Advanced Topics of Chemical Engineering (3)

Metallurgical Engineering (679)

2110 Engineering Materials I (3) Introductory course correlating the atomic, crystal, and microstructure of solids with mechanical, physical, and chemical properties of engineering significance. 3 hrs or 2 hrs and 1 lab.

2210 Electron Microscopy (1) Presents to science and engineering students a brief introduction to the operation of the electron microscope and its applications to scientific problems. Prereq: Physics 2310-20, 3-3 hr. lab. S/N.C.

3010 Industrial Inspection Trips (1) Technology of metallurgical industries, emphasizing Tennessee industry, plant trips. S/N.C.

3040 Metallurgical Thermodynamics (4) Applications of laws of thermodynamics to problems of metallurgical interest. Second law and entropy; auxiliary functions; relationship between free energies and phase diagrams; reaction equilibria in gases and between gases and condensed phases. Use of heat capacity and free energy data in calculations. Concepts of activity and activity coefficient and their variation with T, P, and molality and influence on solubility and reaction equilibria. Prereq: Chem. Engr. 2110, 3110; coreq: Math 2840. 3 hrs and 1 lab.


3060 Metallurgical Kinetics (3) Application of principles of chemical reaction kinetics, fluid flow, and heat and mass transfer, to pyro-, hydrometallurgical processing. Reaction order and basic rate laws; activated complex theory; principles of adsorption and catalysis. Consideration of processes such as roasting of sulfides, reduction of oxides, smelting, refining, electrolysis, and leaching. Prereq: Met. Engr. 3050; Chem. Engr. 3410 and 3420 or equivalent. 3 hrs or 2 hrs and 1 lab.

3110 Engineering Materials I (4) Introductory course correlating the atomic, crystal, and microstructure of solids with mechanical, physical, and chemical properties of engineering significance. 3 hrs and 1 lab.

3120 Engineering Materials II (3) Extension of 2110 with emphasis on mechanical properties of metals by specification of composition, thermal, and mechanical treatment; correlation of resultant properties with service performance. Suggested for mechanical, civil, and industrial engineering students.

3130 Engineering Materials III (3) Extension of 2110 with emphasis on control of electrical and magnetic properties of materials by specification of composition, thermal, and mechanical treatment; correlation or resultant properties with service performance. Suggested for electrical engineering students.

3140 Engineering Material IV (3) Extension of 2110 with emphasis on control of mechanical properties of metals by specification of composition, thermal, and mechanical treatment; correlation or resultant properties with service performance. Suggested for mechanical and industrial engineering students.


3160 Engineering Materials VI (3) Extension of 2110 with emphasis on mechanical properties of materials by specification of composition, thermal, and mechanical treatment; correlation or resultant properties with service performance. Suggested for nuclear and mechanical engineering.

3170 Engineering Materials VII (3) Extension of 2110 to biomedical applications of materials: engineering materials for state-of-the-art prostheses and dental applications; corrosion problems; failure analysis; fabrication. Prereq: 2110 or equivalent.


3220 Diffusion and Annealing (3) Introduction to solid state kinetics: point defects, solid solutions, diffusion equations and mechanisms, annealing of cold worked structures. Prereq: 3 materials. 3, 4 hrs. lab. S/N.C.

3230 Phase Transformations (4) Thermodynamic and structural factors governing binary and ternary systems. Kinetics and morphology of precipitation and phase transformations in simple and complex systems. Prereq: 2220, 3 hrs. and 1 lab.

3310 Biomedical Applications of Materials for Life Scientists (3) Principles of engineering materials; metals, polymers, and ceramics; methods of fabrication of components; applications of prosthetic devices and dental materials. Prereq: Chem. Engr. 1110-20-30 or equivalent.


3710 Metallurgical Applications in Manufacturing Technology (3) Fabrication methods and principles of mechanical/thermal processing for finished and semifinished articles; casting, powder metallurgy, plastic forming, joining, heat treatment. Prereq: 2110.


4230 Project Laboratory (3) Group or individual investigation of problems related to metallurgical engineering or materials science. May be repeated for a maximum of 9 credits. Prereq: Minimum of one course beyond 2110, 3110 or Chem. Engr. 2030.

4240 Engineering Materials Design (3) Property control through composition, heat treatment, and transformation in ferrous and nonferrous alloys, Plain carbon steels, Alloy steels, and tool steel processing for property selection and service requirements. Prereq: 3230 or consent of instructor.

4250 Design and Analysis (3) Design and laboratory sessions on analysis of materials requirements and performance in engineering structures and components. Prereq: Senior standing.

4510-20 X-Ray Diffraction and Crystallography (3,3,3) Principles and laboratory work in crystallography, x-rays, diffraction phenomena, and techniques; introduction to structure determinations. First quarter serves as introduction to subject. 2 hrs. and 1 lab.

4540 Fracture-Safe Design (3) (Same as Engr. Sci. and Mech. 4540.)

4610 Physical Properties of Materials (3) Electron theory of solids, types of bonding in solids; thermal, electrical, and magnetic properties of material; relationship between metallurgical structure and properties. Prereq: 3 hrs. or 2 hrs. and 1 lab.


4740 Mechanical Metallurgy II (3) Ductile and brittle fracture, creep and stress rupture, and fatigue and residual stresses. Effects of state of stress, loading rate, time, temperature, and metallurgical structure. 2 hrs. and 2 lab or 3 hrs. and 1 lab. Prereq: 3311 or consent of instructor.

4760 Casting and Welding (3) Principles and processes of casting and welding: heat transfer, solidification, segregation, gas-metal and slag-metal interactions, thermal treatments, associated stresses. Prereq: 3230, 2320, 3 hrs. or 2 hrs. and 1 lab.

4770 Mechanical Metallurgy III (3) Finite plastic strain. Plastic stress-strain relations; Principles of fabrication: forging, swaging, extrusion, rolling, deep drawing. 2 hrs. and 1 lab or 3 hrs. Prereq: 4730 or consent of instructor. Also suggested for mechanical engineering, engineering mechanics, and engineering science majors.

GRADUATE

5000 Thesis

5010 Graduate Seminar (1)

5050 Engineering Analysis (3)

5110 Point Defects and Dislocations (3)

5120 Plastic Deformation I (3)

5130 Plastic Deformation II (3)

5140 Diffusion and Annealing in Solids (3)

5150 Phase Transformations (3)
4220 Foundations and Substructures (3) Foundation of continuous beams and floor slabs; footings and retaining walls. Prereq: 4110 and 4410.

4220 Foundations and Substructures (3) Foundation of continuous beams and floor slabs; footings and retaining walls. Prereq: 4110 and 4410.

4290 Legal and Ethical Aspects of Engineering (3) Legal principles underlying engineering work; laws of contract, torts, agency, real property, problems of professional registration and ethics.

4240 Structural Design (3) Plate girders, composite steel and concrete beams, connections and details, and design of small industrial building. Two 3-hr. periods. Prereq: 3230 and 4419.

4260 Photogrammetry (3) Methods of plotting maps from aerial photographs, stereoscopic plotting instruments, applications. Prereq: 2360, or Forestry Summer Camp for forestry majors.

4320 Seminar (1,1) Selected topics dealing with historical and modern civil engineering achievements and professional and ethical responsibilities. Prereq: Senior standing and completion of all junior level non-elective engineering courses.

4410 Deflections and Statically Indeterminate Structures (3) Deflections of beams and trusses; analysis of indeterminate structures, trusses, bents, and frames. Prereq: 3210.

4430 Construction Methods and Equipment (3) Fundamental operations in construction and selection of equipment; production rates, balancing of equipment, and cost estimates. Prereq: 3710.

4460 Land Surveying (3) Procedures of locating properties; evaluating evidence; procedures to describe property, to create property lines, and to prepare plats; laws of land surveying. Prereq: 2260 or equivalent.

4510-20 Advanced Structural Design (3,3) Plastic design in steel in 4510; design of typical steel space structures in 4520. Prereq: 3230 for 4510; 3230 and 4410 for 4520.

4530 Cost Comparisons in Design and Construction (3) Cost of engineering and construction; Cost comparison of alternate designs with emphasis on applications to civil engineering problems. Prereq: 4450.


4550 Engineering Behavior of Soils (3) Plastic and elastic behavior of soils, determination and use of engineering properties of in-situ soils. 2 hrs. of lecture and 1 lab. Prereq: 4220 or consent of instructor.

4560 Stabilization of Soils (3) Mechanical stabilization of soils by compaction, drainage, and blending; chemical stabilization of soils with admixtures; water-proofing and modifying soils and additives. 2 hrs. of lecture and 1 lab. Prereq: 3310.

4620 Airport Planning and Design (3) Emphasis on airport master planning. Included for consideration on the air side are runway configuration, capacity, geometrics, and relationships among the terminal layout and design, and ground access systems and parking. Prereq: 3600, 3610.

4640 Traffic Engineering (3) Characteristics of driver, vehicle, and roadway and their interrelationship; traffic studies; basic considerations of traffic circulation and control; elements of urban transportation planning studies. Prereq: Senior Standing.

4650 Highway Engineering II (3) Integration and application of various engineering principles and techniques to process of planning, locating, and design of highway facility through comprehensive team project. 1 lecture and 2 labs. Prereq: 4620.

4710 Portland Cement Concrete Mix Design (3) Properties and tests of portland cement concrete, methods of concrete mix design, non-destructive concrete evaluation testing, use of concrete admixtures. 2 lectures and 1 lab. Prereq: 3710.

4720 Asphalt and Bituminous Concrete (3) Properties and tests of asphalt and asphaltic mixes, mix design and bituminous concrete. Emphasis on use of asphalt in transportation construction projects. 2 lectures and 1 lab. Prereq: 3710.

4731-32 Earthquake Resistant Structure I, II (4,4) (Same as Architecture 4731-32.)

4800 Introduction to Civil Engineering Systems (3) Introduction to civil engineering systems and their specific application to problems of transportation, environment, water resources, and materials. Prereq: Senior standing or consent of instructor.

4850 Elementary Structural Matrix Methods (4) (Same as Architecture 4850 and Engineering Science and Mechanics 4850.)

4860 Structural Wood Design (3) The application of structural design principles to structural members of various combinations of wood products. Beams, columns, and diaphragm construction with plywood are covered in some detail. Attention is given to various types of fastenings and connections. Prereq: 3230.

4880 Civil Engineering Systems Design and Management (3) Introduction to basic systems engineering concepts within civil engineering context; discussion of the role of decision maker and use of optimistic principles of engineering planning. Prereq: Computer Science 3160.

4910-20 Special Topics (1-3) Topics relating to recent developments and current practice in civil engineering through supervised self-study. Prereq: Consent of individual instructor and approved by department head. May be repeated.

GRADUATE

5000 Thesis

5022 Non-Thesis Graduation Completion (3-15)

5110-20 Statically Indeterminate Structures (3,3)

5140 Statically Indeterminate Structures (3)

5150 Matrix Formulation of Structural Problems (3)

5160 Analysis and Design of Plate Structures (3)

5170 Introduction to Structural Dynamics (3)

5180 Finite Element Structural Analysis (3)

5220 Pavement Design (3)

5240 Advanced Properties of Materials: Bituminous Substances and Mixes (3)

5270 Planning and Transportation (3)

5310 Engineering Practice (3)

5320-36 Engineering Practice Applied to Administration of Engineering Projects (3,3)

5410 Construction Contract Law and Administration (3)

5420 Structural Model Analysis (3)

5430-50 Construction Management I, II, III (3,3,3)

5460-70 Construction Estimating I, II, III (3,3)

5550 Soil Mechanics-Plastic Equilibrium (3)

5560 Soil Mechanics-Elastic Behavior (3)

5570 Soil Mechanics-Seepage (3)

5610 Behavior of Steel Structures (3)

5720 Prestressed Concrete (3)

5740 Behavior of Reinforced Concrete Members (3)

5800 Urban Systems: Engineering and Management I (3)

5805 Urban Systems: Engineering and Management II (3)

5810 Traffic Engineering-Characteristics(3)

5820 Traffic Engineering-Operations (3)

5840 Geometric Design (3)

5850 Functional Design of City Streets and Urban Freeways (3)

5860 Urban Transportation Planning (3)

5870 Public Transit Planning (3)

5890 Traffic Accident Reconstruction (3)

5900 Special Problems in Civil Engineering (1-9)

5910-20-30 Special Topics (1-6,1-6,1-6)

6000 Doctoral Research and Dissertation

6110 Research Development (3)

6120 Research Management (3)

6160 Behavior of Steel Bridges and Buildings (3)

6740 Behavior of Reinforced Concrete Beams and Frames (3)

6750 Behavior of Reinforced Concrete Slabs (3)

6830 Traffic Flow Theory (3)

6860 Statewide Passenger Transportation Planning (3)

6870 Future Transit Technology and Research (3)

6880 Planning Models for Transportation Systems I (3)

6890 Planning Models for Transportation Systems II (3)

6910-20-30 Special Topics In Civil Engineering (3,3,3)

Environmental Engineering (344)

3000 Introduction to Environmental Engineering (3) Introduction to human interaction with the air, water, and land environment in which they live; role of engineering in environmental control. Prereq: Junior standing.

3120 Hydraulics (3) Application of basic and developed principles of hydraulics. Flow measurement, flow in closed conduits; uniform and nonuniform open channel flow; pumps and turbines; basic hydrodynamics; flow similitude and models. Two lectures and one 3-hr. lab. Prereq: Engr. Mech. 3110.


4030 Environmental Engineering Chemistry (3) Fundamentals of chemistry which relate to generation,
4150 Urban Water Management (3) Introduction to urban water modeling; evaluation of optimum urban water policies; formulation of system constraints and analysis of decision-making process; management of storm water for beneficial use. Pre req: 3330.

4210 Water Resources Engineering Design (3) Elements of water resource structures and systems, including reservoirs, dams, control works and open channels. Pre req: Dam safety course; environmental impact of reservoir projects. Pre req: 3330 or consent of instructor.

4220 Water Resources Engineering Development (3) Multi-objective evaluation procedures for comparing and selecting among water resources development alternatives; achieving project optimality; single-and multi-purpose projects; special topics in new developments in water resources engineering. Pre req: 3330 or consent of instructor.

4510 Elements of Water and Wastewater Transport Systems (3) Introduction to theory and design of water transportation and distribution systems and wastewater collection systems. Pre req: 3120 and 3330.

4520 Elements of Water and Wastewater Treatment Systems Design (3) Introduction to unit operations and processes employed in physical, chemical, and biological treatment of water and wastewater. Application of unit operations and processes in design of water and wastewater treatment plants. Pre req: 3120.

4525 Water and Wastewater Treatment Plant Design (3) Detailed process design of water and/or municipal industrial wastewater treatment plants; sludge handling systems, and ultimate disposal of residuals. Pre req: 4520 or equivalent.

4530 Environmental Engineering Laboratory (3) Standard analytical techniques for evaluation of specific atmospheric, water and solid waste pollutants. 2 hrs. and 1 lab. Pre req: 4030.

4600 Solid and Hazardous Waste Management (3) Magnitude and characteristics of solid and hazardous waste problems; collection systems; disposal systems including landfill, incineration, composting, fixation, reburial, and recovery of new technologies; current and future development trends. Pre req: Junior standing.

4700 Air Pollution-Air Resource Management (3) Introductory course on concepts of air pollution; analysis of relationship among emission sources, meteorology and topographic factors, and adverse effects on receptors; engineering approaches for air pollution control. Pre req: Senior standing.

4820 Environmental Engineering Law (3) Legal aspects of water and air pollution, drainage, land use controls, and environmental impact statements with emphasis upon federal-state relations, current legislation and court decisions, and enforcement. Pre req: Senior standing.

4910-20-30 Special Topics (1-3,1-3,1-3) Topics relating to recent developments and current practice in environmental engineering through supervised self-study. Pre req: Consent of individual instructor and approved by department head. May be repeated.

5000 Thesis

Ph.D. Florida; G. W. Hoffman, Ph.D., Harvard; J. C. Hung, Ph.D. New York, P.E.; E. J. Kennedy, Ph.D. Tennessee, P.E.; W. O. Leffel (Emeritus), M.S. Tennessee; M. O. Pace, Ph.D. Georgia Institute of Technology; P. Z. Pesek, Ph.D. Cincinnati; J. F. Pierce, Ph.D. Pittsburgh; E. R. W. Rochelle, Ph.D. Maryland; J. R. Roth, Ph.D. Cornell; F. M. Shoffner, Ph.D. Tennessee; E. Smith, Jr. (Emeritus), M.S. Illinois; P.E.; F. W. Symonds, Ph.D. Nottingham (England); J. D. Tillman, Jr., Ph.D. Auburn; C. H. Wiesler (Vice President for Continuing Education) Dean, Space Institute; Ph.D. Wisconsin, P.E.

4240 Flood Control Hydraulics (3)

4251 Basic Principles of Remote Sensing (3)

4262 Remote Sensing Data Acquisition (3)

4263 Remote Sensing Data Analysis and Interpretation (3)

5301 Stormwater Modeling I (3)

5302 Stormwater Modeling II (3)

5310 Groundwater Transport Processes (3)

5330 Descriptive Hydrology (3)

5400 Introduction to Environmental Systems (3)

5501 Water and Wastewater Treatment Theory I (3)

5502 Water and Wastewater Treatment Theory II (3)

5503 Advanced Water and Wastewater Treatment Systems (3)

5530 Environmental Engineering and Natural Systems Behavior (3)

5551 Water Quality Management (3)

5582 Microbiology for Sanitary Engineers (3)

5593 Advanced Environmental Engineering Laboratory (3)

5620 Solid Waste Collection Systems (3)

5630 Design of Solid and Hazardous Waste Disposal Systems (3)

5700 Planning and Air Pollution Control (3)

5710 Air Pollution Control Engineering (3)

5715 Ambient Air Monitoring (3)

5720 Air Pollution Collection Theory (3)

5725 Air Quality Modeling and Impact Assessment (3)

5730 Air Pollution Control Device Design (3)

5735 Industrial Source Sampling (3)

5745 Ambient Air Chemistry (3)

5760 Diffusion in the Atmosphere (3)

5900 Special Problems in Environmental Engineering (1-9)

5910-90-90 Special Topics (1-1,1-1,1-3)

5960 Environmental Engineering Seminar (1)

5960-20-30 Advanced Topics in Fluid Mechanics and Convective Transfer (3,3)

6230 Kinematic Wave Theory (3)

6510 Industrial Waste Unit Operations and Processes (3)

6520 Industrial Waste Management (3)

6820 Advanced Theory and Applications in Water Resources Engineering I (3)

6910-20-30 Special Topics in Environmental Engineering (3,3,3)

Electrical Engineering (320)

Professors: J. M. Googe (Head), Ph.D. Georgia Institute of Technology, P.E.; I. Alexoff, Ph.D. Wisconsin, P.E.; J. R. Bishop, Jr., Ph.D. Rochester; T. V. Blaick*; Ph.D. Tennessee; R. E. Bolenheimer, Ph.D. Northwestern; W. L. Green, Ph.D. Texas A & M; R. C. Gonzalez*.

Electrical Engineering (320)

Graduate work leading to the degree of Master of Science in Electrical Engineering is planned to provide a foundation in both the basic science of electrical engineering and the specialized areas of modern engineering. The curriculum also contains a suitable amount of cultural work to enhance the growth of the student toward the goal of becoming a professional person with strong social awareness. In the senior year, the student may specialize in any one of the following areas of electrical engineering: bioelectric engineering, computer engineering, electromagnetic fields and communications, electronics and instrumentation, energy conversion and power systems, plasma and electro-optics engineering, and systems and networks. All of these areas except the bioelectric engineering option are continued through the M.S. and Ph.D. programs. The senior year curriculum is sufficiently flexible to allow a student to take several courses outside of the chosen area of specialization.

All sophomore and junior course work is offered every quarter and the senior work is scheduled so that the student may enter at the beginning of any quarter. This arrangement allows maximum flexibility, since the student may elect the normal four-year schedule, may choose to graduate in three calendar years, or may take the Cooperative Engineering Program. In addition to the usual research and teaching facilities in machinery, electronics, microwaves, solid state devices, and control equipment, the department has both digital and analog computers.

MASTER OF SCIENCE PROGRAM

Graduate work leading to the degree of Master of Science in Electrical Engineering is offered in the evening. Each course meets for two and one-half hours each week.

THE DOCTORAL PROGRAM

Graduate work leading to the degree of Doctor of Philosophy with a major in electrical engineering.

Ph.D. Florida; G. W. Hoffman, Ph.D., Harvard; J. C. Hung, Ph.D. New York, P.E.; E. J. Kennedy, Ph.D. Tennessee, P.E.; W. O. Leffel (Emeritus), M.S. Tennessee; M. O. Pace, Ph.D. Georgia Institute of Technology; P. Z. Pesek, Ph.D. Cincinnati; J. F. Pierce, Ph.D. Pittsburgh; E. R. W. Rochelle, Ph.D. Maryland; J. R. Roth, Ph.D. Cornell; F. M. Shoffner, Ph.D. Tennessee; E. Smith, Jr. (Emeritus), M.S. Illinois, P.E.; F. W. Symonds, Ph.D. Nottingham (England); J. D. Tillman, Jr., Ph.D. Auburn; C. H. Wiesler (Vice President for Continuing Education) Dean, Space Institute; Ph.D. Wisconsin, P.E.
3180 Logic Design of Digital Systems (3) Introduc-
tion to boolean algebra and design of combinational
circuits. Design and analysis of digital systems and
logic circuits. Design techniques: to include basic
structure and function of Arithmetic, Storage, Input/Out-
put, and Control Systems. Computer organization and
machine language programming. Prerequisites: 3010,
Computer Science 3150. 3 hrs. including biweekly lab.

3190 Plasma I (3) Engineering applications of pho-
etonic electronics, plasma effects and devices. Topics
include electron transport, plasma instabilities, fusion
power, and reactor designs. Prerequisites: 1120. 3
hrs. including biweekly lab.

3270 Linear Systems Analysis (3) Steady-state and
transient response; log-frequency, gain-phase,
and polar plots; block diagram transformation; signal flow
graphs; analog systems, properties of second order
system; introduction to feedback theory; stability crit-
eria. Prerequisite: 3010 and Math 3150; corequisite: 3180. 3 hrs. including project laboratory.

3280 Basic Electronics I (3) Physical operation of
bipolar transistors and vacuum tubes with applications
in basic amplifiers. Integrated circuit fundamentals.
Prerequisite: 3180. 3 hrs. including project laboratory.

3280 Basic Electricity Analysis (3) Fourier
series and transforms. Network response to signals
and noise. Elements of amplitude, frequency, and
phase modulation systems for analog messages. Noise per-
fomance. Fundamentals of broadcast AM, broadcast
FM, and television transmission systems. Prerequisite: Math
2850. 3 hrs. including biweekly lab.

3050 Basic Field Theory (3) Forces between charges,
electric and magnetic fields Gauss' law and diver-
gence, potential and line integrals, material bodies,
polarization, magnetic circuits, Maxwell's equations,
dynamic potentials. Prerequisite: Math 2860.

3060 Propagation (3) Propagation of waves in trans-
mision lines and in other guiding systems. Impedance
effects in transmission lines, TEM waves and travelling
wave measurements. Introductions to imped-
ance matching, transmission line filtering, microstrip
circuits, construction, graphical and computer aided de-
design methods. 3 hrs. including bi-weekly lab.

3080 Energy Conversion (3) Magnetic circuits, trans-
former theory and operation, principles of elec-
tromechanical energy conversion with emphasis on
input-output characteristics; steady-state analysis of
induction motors and d. c. machines. Prerequisite: 3040.
Includes a biweekly lab.

3090 Energy System Operation (3) Synchronous
machines, transmission-lines, and transformers as power
system elements. Basic power system representation, per
unit calculation, symmetrical components, and fault
studies. Prerequisite: 3080. Includes a biweekly lab.

3100 Random Signals and Noise In Engineering (3)
Theory of random signals as applied to engineering problems. Random signal
response of linear networks. Transformation of random
signals by non-linear networks. Prerequisite: 3010 and 3040.
3 hrs. including biweekly lab.

3110 Basic Electrical Engineering—Circuits and
Fields (3) For non-electrical engineering majors. Prerequisite: Math 2850, Physics 2310-20. 3 hrs. including biweekly lab.

3120 Basic Electrical Engineering—Electronics (3)
For non-electrical engineering majors. Prerequisite: 3110. 3
hrs. including biweekly lab.

3130 Basic Electrical Engineering—Mechanics (3)
For non-electrical engineering majors. Prerequisite: 3110. 3
hrs. including biweekly lab.

4391 Introduction to Applied Optimal Estimation (3) A project-oriented course stressing applications of optimal estimation theory. Course topics include: the state-space representation of systems, probability theory, linear algebra, statistical concepts, maximum likelihood and other techniques for parameter estimation. Prerequisite: 3170, Computer Science 3150, Math 2860 and 4120.

4410 Power System Components and Control (3) Analysis of power system components and their inter-
connections. Studies in control of power systems as well as voltage and reactive power. Prerequisite: 3350.

4420 Power Systems Analysis (3) System studies including load flow, faults, and stability. Prerequisite: 3350.

4430 Transmission, Distribution, and Protection (3) Studies in underground and d. c. transmission; consid-
eration of over-voltages and insulation requirements; system protection against faults. Prerequisite: 3350.

4460 Lasers and Masers (3) Principles of laser and maser operation based on classical concepts and electrical engineering analogies. Consideration of prac-
tical devices and applications. Prerequisite: Senior standing.

4470 Plasma II (3) Magnetohydrodynamics. Prerequisite: 3190.

4480 Plasma III (3) Microporous plasma physics, param-
tics, interactions, oscillations, and waves. Prerequisite: 3190.


4500 Electro-Optical Detection and Instrumentation (3) Sensitivity, resolution, frequency response and noise concepts of and practical engineering data for both spatial recording media (e.g. photographic emul-
sions) and temporal detectors (e.g. photodiodes) will be given. Last third of the course will be devoted to selected electro-optic instrumentation systems (e.g. laser light scattering, optical data processing, holo-
graphic interferometry).

4540 Antennas and Propagation (3) Dipole and linear
antennas, arrays and simple antennas. Antenna gain, impedance, and other parameters. Wave propagation in free space, earth's troposphere, and ionosphere. Wave reflections from earth. Prerequisite: 3360.

4570 Electro-Acoustics (3) Wave equation for sound,
reflection from pistons, impedance of a piston, loud-
speakers, horns, speaker systems, phonograph recording and reproduction, tape recording and reproduction, noise reducing systems. Prerequisite: senior standing.

4600 Analog Signal Processing Circuits for Elec-
tronic Instrumentation (3) Use of operational ampli-
ifiers, instrumentation amplifiers, and other integrated
circuits in signal processing. Design examples such as active filters, amplifiers, attenuators, function genera-
tors, active rectifiers, and synchronous demodulators. Analysis of interfacing problems between transistors and signal processors. Prerequisite: 3830. 3 hrs. including project laboratory.

4610 Analog-Digital Systems (3) Principles of analog
circuit design and digital signal processing and their
applications. A study of bit level and binary mathematics including problem set-up and scaling. Characteristics of analog multipliers, dividers, and function generators. Present day computer, digital to analog conversion, and analog to digital conversion techniques. Prerequisites: 3180 and 3830. 3 hrs. including biweekly lab.

4620 Sequential Machine and Digital System Theo-
ry (3) Design aspects of pulse-mode, clock-mode, and
synchronous sequential digital systems. Analysis of digital
characteristics of one- and two-dimensional iterative networks. Design of digital systems using the tools of MATLAB and SG tools. Technologies of probability and error detection in digital systems. Prerequisite: 3180. 3 hrs. including bi-
weekly lab.

4630 Digital System Organization and Design (3) System design including
minicomputer and microprocessor architectures and comparisons. Characteristics of ALU and CPU structures, storage systems (RAM, ROM, and PROM building blocks), and input/output systems. Control Unit organization to include serial-parallel modes of operation, synchronous-asynchronous time sequencing, and microprogramming of control functions. Prereq: 3180, 3 hrs. including biweekly lab.

4660 Bioelectric instrumentation (3) Nature and origin of bioelectric potentials, transducers, amplifiers, requirements, recording systems, and noise problems. Prereq: Senior Standing.

4680 Electric Amplifiers (3) Feedback amplifier principles. Wideband and linear amplifiers. Audio and radio frequency power amplifiers. Prereq: 3830, 3720. 3 hrs. including project laboratory.

4690 Communications Electronics (3) Receiver and transmitter circuits for communications. Prereq: 3040, 3830. 3 hrs. including project laboratory.

4700 Digital Integrated Electronics (3) Comparators, logic gates, flipflops, registers, counters, memories, analog switches, A/D and D/A conversion, clipping, clamping, and sweep circuits. Prereq: 3830, 3180. 3 hrs. including project laboratory.

4740 Integrated Circuits (3) Processing and fabrication of active and passive components for monolithic and hybrid circuits. Design techniques for linear and digital circuits. Prereq: 3830. 3 hrs. including project laboratory.

4750 Interactive Computer Graphics (3) (Same as Computer Science 4750 and Geography 4750.)

4760 Microcomputer and Microprocessor System Design (3) Minicomputer and microprocessor interface design. Hardware-software interaction and trade-off. Priority interrupt structures. Telecommunications. Project oriented, contract course. Completion of two projects, one utilizing a minicomputer and the other a microcomputer, are minimal course requirements. Prereq: 3180. 3 hrs. including project laboratory.

4800 Hardware-Software Interface In Minicomputer and Microprocessor System Design (3) Minicomputer and microprocessor interface design. Hardware-software interaction and trade-off. Priority interrupt structures. Telecommunications. Project oriented, contract course. Completion of two projects, one utilizing a minicomputer and the other a microcomputer, are minimal course requirements. Prereq: 3180. 3 hrs. including project laboratory.

4810 Discrete-Data Systems (3) Introduction to analysis and design of discrete data control systems using frequency domain techniques. Realtime digital filtering techniques; application of digital computers in closed-loop feedback systems. Prereq: 3720.

4820 Introduction to Pattern Recognition (3) Role of pattern recognition within framework of artificial intelligence. Design of learning and adaptive machines. Typical applications of pattern recognition to problems of practical significance. Computer simulation of elementary pattern recognition problems. Prereq: Either 3100 and Computer Science 3150, or Statistics 3450 and Computer Science 1510. (Same as Computer Science 4820.)

4830 Digital Image Processing (3) Principal methods of coding, storing, and processing images by means of digital computers. Computational algorithms for image processing, coding, storing, and processing images by means of digital computers. Applications of digital computers to problems of practical significance. Prereq: Computer Science 1410, Computer Science 3150 or 3150, or consent of instructor. (Same as Computer Science 4830.)

4850 Small Computer Systems (3) Basic structure of small computer systems, input-output techniques, interrupt structures, peripheral devices, system software, and assembly language programming. Course project oriented. Prereq: Basic Eng. 1410, Computer Science 1510 or 3150, or consent of instructor. (Same as Computer Science 4850.)

4910-20-30 Special Electrical Engineering Problems (3,3,3) Problems in electrical engineering involving library and experimental research.

GRADUATE

5000 Thesis

5040-50-60 Electrical Engineering Research (3,3,3)

5070-80 Modern Transform Methods (3,3,3)

5110 Introduction to Network Analysis (3)

5120 Network Synthesis and Design (3)

5130 Advanced Network Analysis (3)

5170 Bioengineering Systems I: Models, Systems Analysis, and Simulation (3)

5175 Introduction to Logic Design (3)

5180 Bioengineering Systems II: Bioelectric Phenomena (3)

5190 Bioengineering Systems III: Instrumentation and Analysis (3)

5210-20 Advanced Electrical Machinery (3,3)

5230 Advanced Electrical Machinery Applications (3)

5240-50-60 Control Systems Design I, II, III (3,3,3)

5271 Modern Systems Theory I (3)

5281 Modern Systems Theory II (3)

5291 Modern Systems Theory III (3)

5310 Basic Requirements for Plasma Fusion (3)

5320 Diagnostics for Fusion (3)

5330 Engineering of Fusion (3)

5340 Introduction to Quantum Electronics (3)

5350 Properties of Quantum Devices (3)

5360 Application of Quantum Electronic Devices (3)

5370 Advanced Direct Electrical Energy Conversion I (3)

5380 Advanced Direct Electrical Energy Conversion II (3)

5390 Advanced Direct Electrical Energy Conversion III (3)

5410 Power System Networks (3)

5420 Fault and Load Flow Studies (3)

5430 Power System Stability and Control (3)

5440 Distribution Systems (3)

5460 Selected Topics in Power Systems (3)

5510-20-30 Advanced Analog Electronics (3,3,3)

5540 Thick Film Hybrid Microcircuits (3)

5570-80-90 Advanced Electronic Switching Circuits (3,3,3)

5610-20 Logic Design and Finite Automata Theory (3,3,3)

5615-25 Introduction to Switching Theory and Logic Design (3,3,3)

5630 Digital System Architecture (3)

5635 Introduction to Digital Computer and Analog Systems (3)

5650-60 Electric Communications Systems (3,3,3)

5670-80 Pattern Recognition (3,3,3)

5690 Introduction to Artificial Intelligence (3)

5710 Random Process Theory for Engineers (3)

5720-30 Prediction, Filtering and Detection Theory (3,3,3)

5740 Digital Processing of Signals (3)

5750-60 Radar Systems Analysis (3,3,3)

5770 System Identification (3)

5800 Power Transmission Lines (3)

5810-20 Electromagnetic Fields (3,3,3)

5830 Linear Antennas and Antennas Arrays (3)

5840 Aperture Antennas (3)

5850 Microwave Electronics (3)

5860 Electromagnetic Wave Propagation (3)

5870 Introductory Microwave Networks (3)

5930 Digital Image Processing (3)

5940-50 Advanced Small Computer Systems (3,3,3)

6000 Doctoral Research and Dissertation

6240-50-60 Advanced Systems Theory I, II, III (3,3,3)

6270-80-90 Special Topics in Systems Methodology (3,3,3)

6340-50-60 Special Topics in Quantum Electronics (3,3,3)


6550-10 Electrical Conduction in Gases and Plasma Physics (3,3,3)

6530 Special Topics in Image and Pattern Analysis (3)

6610-20-30 Microwave Networks (3,3,3)

6850 Advanced Antenna Theory (3)

6860 Electromagnetic Diffraction and Scattering (3)

6710-20-30 Network Synthesis (3,3,3)

6750 Detection Theory (3)

6760 Coding Theory (3)

6800-10-20 Advanced Topics in Electronic Instrumentation (3,3,3)

6910-20-30 Advanced Sequential Machine and Automata Theory (3,3,3)

Engineering Administration (See Graduate School.)

Engineering Science and Mechanics


*Space Institute, Tulahoma.

BACHELOR OF SCIENCE PROGRAM

The curriculum in engineering science provides students an opportunity for education...
with breadth in engineering science, mathematics, and physical (or biological) science. Such a program will prepare students for a career in engineering development and research, particularly at the M.S. level, or additional graduate study leading to the master's or the doctoral degrees. The curriculum will provide students a broad engineering education which permits a strong emphasis on engineering principles and basic science.

In the first two years students in the engineering science program study general physical and mathematical sciences. The engineering science program in the upper-division years is essentially an elective curriculum in which the special interests of students can be met which cannot be accommodated in other programs. Examples of special interest elective groups presently available in the engineering science program are biomedical engineering, engineering mechanics, engineering analysis and synthesis, environmental sciences, and engineering materials, and non destructive evaluation. Other elective groups are currently being developed and will be available in the future.

The biomedical engineering elective group provides the basic background for an engineer to contribute to the fields of biology and medicine in such technical areas as the design of research and diagnostic equipment, the development of artificial organs, and the application of the engineering sciences to further the basic understanding of biological systems. With specialization in a study area, the program can emphasize other areas such as the use of computer systems to automate hospital operations, to analyze medical data, and to contribute to the broad area of health care delivery systems. Interested and qualified students may choose to use this program as a background for graduate study in engineering or the life sciences. The program includes the courses required for entrance into most medical schools, including The University of Tennessee Center for the Health Sciences in Memphis.

The engineering mechanics elective group provides a good theoretical background for students wishing to pursue engineering graduate studies. The engineering analysis and synthesis elective group provides a good theoretical background for students who seek preparation for engineering or design activities and whose interests in continuing education (either full-time or part-time) lie at one of the interfaces between engineering science and engineering, or can best be met by interdisciplinary study in engineering. The department's course offerings and research activities are also intended to meet the needs of students who seek preparation for employment in engineering areas requiring specialization in mechanics, or in related interdisciplinary studies such as biomechanics.

General policies of the Graduate School relating to admission, residence, examinations, and research are described in the Graduate Catalog.

Engineering Science and Mechanics (335)

2705 Elementary Statics and Dynamics (3) Resolution and composition of forces; moments, resultants of force systems; free body diagrams and co-planar equilibrium; friction, particle dynamics. (Primarily for transfer students.) Prereq: Math 1850 or equivalent.

2710 Statics (3) Resultants of space force systems; static equilibrium of structural elements and space frames; resultant forces, center of gravity, first and second moments. Prereq: 2705 or Basic Engr. 1310, Math 1860.

2720 Dynamics (3) Absolute and relative kinematics of rigid bodies; kinetics of rigid bodies using Newton's laws, work-energy, and impulse-momentum Prereq: 2705 or Basic Engr. 1320, Math 2820.

2729 Dynamics (3) Absolute and relative kinematics of rigid bodies; kinetics of rigid bodies using Newton's laws, work-energy, and impulse-momentum Prereq: 2705 or Basic Engr. 1320, Math 2840.

3010 Seminar (1) Discussions of engineering professionalism. Field trips and career planning. S/NC.

3110-20-30 Fluid Mechanics (3,3,3) Basic laws of fluids, effects of viscosity and compressibility; empirical analysis: Navier-Stokes equations; boundary-layer concepts, potential flow. Must be taken in sequence. Prereq: 2720 or 3700, Math 2840, coreq for 3110; Mech. Engr. 3311 or equivalent.

3120-20 Mechanics of Materials (3) Concepts of stress and strain, stress-strain relations, and Mohr's circle; stresses and displacements in thin-walled pressure vessels, shafting, determine, indeterminate, and nonhomogeneous beams; column theory. Must be taken in sequence. Prereq Basic Engr. 1316, coreq: Math 2840.

3131 Mechanics of Materials (4) Concepts of stress and strain; stress-strain relations and Mohr's circle; static analysis of nonhomogeneous beams and columns; stress and displacement analysis of axially-loaded members; torsion; bending. Not for departmental graduate credit. Prereq: Basic Engr. 1310; coreq: Math 2840.

3410 Introduction to Biomedical Engineering (4) Introduces the facets and opportunities of biomedical engineering, and provides basic terminology and background knowledge for further courses in the field. Subjects include anatomy, physiology, biocatalysts, mathematical models of body systems, etc. Coreq: Math 2840 or consent of instructor.

3420 Introduction to Clinical Engineering (3) Engineering applications in the clinical/hospital setting; design, description, analysis, and design of health care delivery systems; hospital organization and structure; clinical use of biomedical equipment; principles of safety engineering in the hospital and applicable codes, standards and regulations. Prereq: 3410, Physics 2203, or consent of instructor.

3510 Materials of Engineering (3) Mechanical properties of engineering materials; behavior of materials under load; 3 hrs. or 2 hrs. and 1 lab. Prereq: 3511 and Met. Engr. 2110 or 3110.

3520 Materials Behavior and Chemical Process Equipment Design (3) Same as Met. Engr. 3520.

3700 Dynamics (4) Kinematics of rigid bodies; mass moments of inertia; coulomb friction; kinetics of rigid particular interest to prospective students currently employed in research, development, or design activities and whose interests in continuing education (either full-time or part-time) lie at one of the interfaces between engineering science and engineering, or can best be met by interdisciplinary study in engineering. The department's course offerings and research activities are also intended to meet the needs of students who seek preparation for employment in engineering areas requiring specialization in mechanics, or in related interdisciplinary studies such as biomechanics.