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 and certification and degree programs through the doctoral level are fully accredited by the State Department of Education, the Southern Association of Colleges for Teacher Education, 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 in 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 administrations are cordially invited to make full use of these services in their efforts to employ competent personnel.

General Information
Admission to the College
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 16 hours in a quarter must be obtained from the Associate Dean for Undergraduate Programs. A normal course load in the college is 16-18 hours.

Admission to Teacher Education
All students are required to apply for Admission to Teacher Education Program prior to their first quarter prior to student teaching. All students must have a 2.2 cumulative grade point average and a 2.2 UTK average in order to be admitted to Teacher Education. In addition, students must have a 2.2 cumulative G.P.A. and a 2.2 UTK average at the end of the quarter immediately preceding the student teaching quarter.

Admissions and Retention Committee as one factor to be used in reaching a decision regarding continuance of the student in the Teacher Education Program.

Procedure Conduct. At the point of a student's application for admission to Teacher Education, any record established by the student in the Office of Student Conduct will be reviewed by the Admissions and Retention Committee. Additional information may be sought when deemed appropriate. In addition, this review will be repeated the quarter prior to student teaching. Primary consideration will be given to the implications of misconduct for persons who will be working as teachers of youngsters. (5) Field Experience. Students will be required to have a field experience prior to being admitted to Teacher Education. (6) Basic Achievement Test. Students are required by State Department of Education to pass tests in reading, language, and math.

Applications should be filed in 212 Claxton Education Building.

State Board of Education
Effective November 1978, the Tennessee State Board of Education requires that all students preparing for a teaching career in Tennessee must pass a standardized test of
basic skills (mathematics, reading, and language) prior to admission to teacher education programs. The University of Tennessee will administer such tests each quarter to allow students planning to enter teacher education programs to fulfill this certification requirement of the State Board of Education.

Admission to Student Teaching
Application for all student teaching programs must be filed no later than January 1 of the academic year preceding the actual experience. For example, a student plans to student teach during the 1980-81 academic year, application must be made by January 1, 1980. Applications for student teaching may be completed at approximately five times during each quarter. A schedule of the application deadlines 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 at the appropriate time regardless of their status in the process of admission to the Teacher Education Program.

Before admission to the student teaching quarter, the student must have fulfilled the following requirements:

(1) Full admission to the Teacher Education Program no later than the quarter preceding student teaching (i.e., all conditions relative to admission satisfied).

(2) Completion of the professional core courses (Education 3010, 3020, 3030) and Early Childhood Education (NCATE).

(3) Completion of field experiences required in the program curriculum.

(4) Completion of at least 90 percent of course work in the endorsement area(s).

(5) Completion of the special methods courses at The University of Tennessee.

(6) Completion of the Student Teaching Seminar in the September semester (non-credit).

(7) 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 2.0.

The 15-hour teaching experience is evaluated on a satisfactory-no credit basis and the hours are included in the University program requirement of a 2.0 in the last 45 hours work.

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 geographic locational desires by 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 of far 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 Associate Dean for Undergraduate Programs, 212 Claxton Education Building. Approved petitions are forwarded to the Dean of Admissions for final approval, and filing in the Records Office.

Recommendation for Certification
The application for a professional teacher’s certificate should be completed early in the final quarter before graduation. 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 a 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 2.0.

(2) A minimum performance of student teaching experience.

(3) A minimum cumulative 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 by the Committee on Standards and Admissions.

Graduate Programs
The College of Education, through the Graduate School, offers programs leading to the Master of Science degree, the Master of Education degree, the Master of Arts in 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 programs 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 specializations in all teacher education curricula. In addition, approved concentrations may be developed 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 kindergarden-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 service courses (3510, 3520, 3530, 3540, 4140, 4150, 4370, 4330, 4750).

Endorsement as a librarian requires 27 quarter hours in library science. At the undergraduate level, only a minor in 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 20 hours in non-directed electives taken on a Satisfactory-No Credit basis in the total hours required for graduation. S/N/C may not be used in required courses or controlled electives, except where the course is offered on an S/N/C basis (such as student teaching and field experiences). An area of major concentration must be completed and 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. Kindergarten¹ through Grade 8

**GENERAL EDUCATION**
- **89 hours**
- **Communications (12 hours)**: English1010-20 and English1032 or English1021 or English1022 (English 1019 may be required for some students); Speech2011 or Speech2021 or any speech elective.
- **Health and Physical Education (18 hours)**
  - P.E. and health electives (8 hours); Physical Activity Elective (10 hours) plus 12 hours of elective physical education.
- **Natural Science (20 hours)**
  - Biology1210-20-30 or Botany1110-20; Chemistry1110-20; or Earth Science1110-20 (plus 15 hours of electives in one or a combination of two of the above). Special Education (3 hours) is required, including one additional quarter of student teaching.
- **Recommended series or combinations:**
  - Physics1410-20-30 or Geology1510-20 or Astronomy2110-20
  - 3000 or 4000 level courses

**SPECIALIZED COURSES**
- **12 hours**
  - Biomedical Science
  - Clinical Science
  - Computer Science
  - Educational Psychology
  - English Education
  - Foreign Language
  - Health Science
  - Mathematics Education
  - Music Education
  - Physical Education
  - Special Education

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

#### ELEMENTARY EDUCATION COURSES
- **36 hours**
  - Educ.C & I 3010, 3020, 3030
  - Educ.C & I 3521-22-233

**AREAS OF CONCENTRATION**
- **12 hours**
  - Teaching Reading
  - Elementary Language Arts
  - Early Childhood Education

**SPECIALIZED COURSES**
- **12 hours**
  - Professional Education
  - Art Education
  - Physical Education

**FOUNDATIONS COURSES**
- **15 hours**
  - Math: Math 1510, Math 1511, Math 1512, Math 1513, Math 1514, Math 1515
  - Science: Science 1510, Science 1511, Science 1512, Science 1513, Science 1514

**ELECTIVES**
- **10 hours**

#### I.2. Joint Elementary- Mathematics Education Certification

**Mathematics + 3-5 Degree**
- **90 hours**
  - Math 1510, Math 1511, Math 1512, Math 1513, Math 1514, Math 1515
  - Math 1520, Math 1521, Math 1522, Math 1523, Math 1524, Math 1525

**Core Requirements**
- **14 hours**
  - Math 1510, Math 1511, Math 1512, Math 1513
  - Math 1520, Math 1521, Math 1522, Math 1523

**Electives**
- **6 hours**

**TOTAL MINIMUM REQUIRED**
- **122 hours**

### II. Curricular for Secondary Education (7-12)

**GENERAL EDUCATION**
- **70 hours**
  - Communications (13 hours)
  - Mathematics (9 hours)
  - Health and Physical Education (9 hours)

#### A. Biological science, a physical science, or a specific course possibilities.

#### B. Physical Science (8-12 hours)
- **12 hours**
  - Chemistry2110-20 or Geology1510-20 or Astronomy2110-20
  - Science 1510, Science 1511, Science 1512, Science 1513

#### C. Biological science, a physical science, or a specific course possibilities.

#### D. Health and Physical Education (9 hours)
- **12 hours**
  - Health and Physical Education Elective (12 hours)

#### E. Literature (4 hours)
- **12 hours**
  - English1010-20 and 1031 or 1032 or 1033

#### F. Language Arts (12 hours)
- **12 hours**
  - English1010-20 and 1031 or 1032 or 1033
  - Speech2311

#### G. Mathematics (9 hours)
- **9 hours**
  - Mathematics2110-20-30

#### H. Special Education and Rehabilitation (15 hours)
- **15 hours**
  - Special Education and Rehabilitation2110-20-30
  - Psychology3010, Psychology3020, Psychology3030, Psychology3040, Psychology3050, Psychology3060, Psychology3070, Psychology3080

**TYPICAL MINIMUM REQUIRED**
- **158 hours**

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¹ Kindergarten preparation requirements are concentrated in Early Childhood Education.

² Assumes attendance to Teaching Education Program.

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#### III. Curricular for Secondary Education (7-12)

**GENERAL EDUCATION**
- **70 hours**
  - Communications (13 hours)
  - Mathematics (9 hours)
  - Health and Physical Education (9 hours)

**AREAS OF CONCENTRATION**
- **12 hours**
  - English Language Arts
  - Foreign Language
  - History
  - Mathematics

**SPECIALIZED COURSES**
- **36 hours**
  - Special Education

**TEACHING SUBJECT AREAS AND ELECTIVES**
- **71 hours**

**TOTAL MINIMUM REQUIRED**
- **198 hours**

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¹ Kindergarten preparation requirements are concentrated in Early Childhood Education.

² Assumes attendance to Teaching Education Program.
A. English Education
1. **English Education**
   a. 45 quarter hours in English, including three in English language (3300, 4330, 4430, 4440, 4810, 4830). Nine of the 45 hours may be in speech, provided the student is not majoring in speech.
   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.
2. Foreign Language Major and Minor
   a. 45 quarter hours (if less than 24 quarter hours of the minor is 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.
3. **Mathematics**
   a. Mathematics and Physical Sciences (75 hours)
      i. 27 quarter hours in mathematics including at least one course in algebra and one in geometry and calculus and at least 12 quarter hours in courses numbered 3050 or above at least one course in algebra and one in geometry.
      ii. 24 quarter hours in physics, chemistry, and/or mathematics beyond introductory level, upper-division history, literature, foreign language.
   b. Related Sciences—12 hours in each of two of the following subjects: biology, chemistry, geology, physics.
   c. Electives—12 additional hours in physical sciences and/or mathematics.

Endorsements: Mathematics and Physical Sciences (72 hours)

1. **Mathematics**
   a. Mathematics (36 hours)—includes at least one course in algebra, analytic geometry and calculus and at least 12 quarter hours in courses numbered 3050 or above, at least one course in algebra and one in geometry.
   b. Related Sciences—12 hours in each of two of the following subjects: biology, chemistry, geology, physics.
   c. Electives—12 additional hours in physical sciences and/or mathematics.

2. **Related Sciences**
   a. Related Sciences—12 hours in each of two of the following subjects: biology, chemistry, geology, physics.
   b. Electives—12 additional hours in physical sciences and/or mathematics.

F. Social Science Education

1. **Social Science Education**
   a. Broad fields: Social Studies (Major 72 hours)
      i. Certification includes economics, geography, history, political science and sociology.
      ii. 18 quarter hours in each of the following: 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. 4 quarter hours in economics, including 2110-20 and 2120-20.
   e. 7 additional quarter hours in the above-listed or related fields.

2. **Natural Science Education**
   a. Broad fields: Natural Science (Major 72 hours)
      i. Certification includes biology, chemistry, geography, history, political science and sociology.
      ii. 18 quarter hours in each of the following: 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. 4 quarter hours in economics, including 2110-20 and 2120-20.
   e. 7 additional quarter hours in the above-listed or related fields.

Program 8
Specified subject major (45 hours plus 72 hours for minors)

Minors, a minor is defined as 27 quarter hours in a single studio area, e.g., biology, history, French, psychology, art, music, and so on. A minor does not meet the 27 hour requirement in all cases.
College of Education

105

TEACHING AREAS AND ELECTIVES ..................85-110 hours

Concentration in Vocal Music (Voice Principal)

a. 25 quarter hours in Music Education : 1101-20

b. 60 hours in music : 1111-21-31 ; 1113-23-33 ; piano or organ 22

C. Teaching Areas and Electives ...........70 hours

Elementary Physical Education

GENERAL EDUCATION ..........38 hours

English 1010-20, 1031 or 1033 ; speech 2011-20

Social Sciences (8 hours)

Psychology 2500 ; at least 12 additional hours

Electives (20 hours)

3090, 3151 ; 2040-50-60 or 3060-61-62 ; 4 hours selected from 3075 or 4000 or 4005.

M. Minor in Coaching

Physical Education 2040-50-60, 2070, 3070, 3080-90-100 ; 4 hours selected from 3070 and/or 3072 ; 6 hours selected for endorsement or specialization.

H. Concentration in Recreation

GENERAL EDUCATION ..........38 hours

Psychology 2500 ; at least 12 additional hours

Electives (20 hours)

Selective admissions to Teacher Education Program.
TOTAL MINIMUM REQUIRED ..........209 hours

J. Major in School Health Education

GENDER EDUCATION ........................................87 hours
Communications (12 hours) .................................
English 1010-20 and 1032; Speech 2311.
Health and Physical Education (11 hours)...........
School Health 330; School Health 3210.
Physical education electives (4)...........................

HUMANITIES (16 hours) ....................................
English—any 4 hours from literature, philosophy, religious studies, or foreign language above the introductory level (8 hours).
Mathematics (3 hours) ........................................
Elective (Math 2110 and Elementary Education).

NATURAL SCIENCES (16 hours) ..........................
Biology (5-6 hours); psychology (5-6 hours); or science electives from anthropology, economics, geography, political science, or sociology (5-6 hours).

CORE PROFESSIONAL EDUCATION ...........................
8 hours
Elective: Ed. C 13010* and 3019*.

SPECIALIZED PROFESSIONAL EDUCATION ..........42 hours
Large Area Area Courses (2)..........................
Ed. C 2350 and 3390; and three elective hours.
Mathematics Methods (5 hours) ..........................
5 hours

SPECIAL EDUCATION PROGRAMS ..........................
42 hours

SPECIAL EDUCATION CURSES ...........................
38 hours
Social Studies Electives (18-20 hours).

SPECIAL EDUCATION STUDENT TEACHING ...........
15 hours
Special Education Special 4690, 4681, 4682.

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

 enjoys admission to Transfer Education Program.

K. Concentration in General Special Education and Elementary Education

GENDER EDUCATION ........................................88 hours
Communications (12 hours) ...............................
English 1010-20 and 1032 or 1033; Speech 2311 or 2312 or any speech elective. Some students may be required to take English 1019 based on placement scores.

Health and Physical Education (11 hours) ..........................
School Health 330; School Health 3210.
Physical education electives (4)...........................

HUMANITIES (16 hours) ....................................
English—any 4 hours from literature, philosophy, religious studies, or foreign language above the introductory level (8 hours).

Mathematics (3 hours) ........................................
Elective (Math 2110 and Elementary Education).

NATURAL SCIENCES (16 hours) ..........................
Biology (5-6 hours); psychology (5-6 hours); or science electives from anthropology, economics, geography, political science, or sociology (5-6 hours).

CORE PROFESSIONAL EDUCATION ...........................
8 hours
Elective: Ed. C 13010* and 3019*.

SPECIALIZED PROFESSIONAL EDUCATION ............39 hours

SOCIAL STUDIES .................................18 hours

SPECIALIZED PROFESSIONAL EDUCATION ............39 hours

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

K. Major in Nature and Driver Safety Education

GENDER EDUCATION ........................................88 hours

HUMANITIES (16 hours) ....................................
English—any 4 hours from literature, philosophy, religious studies, or foreign language above the introductory level (8 hours).

Mathematics (3 hours) ........................................
Elective (Math 2110 and Elementary Education).

NATURAL SCIENCES (16 hours) ..........................
Biology (5-6 hours); psychology (5-6 hours); or science electives from anthropology, economics, geography, political science, or sociology (5-6 hours).

CORE PROFESSIONAL EDUCATION ...........................
8 hours
Elective: Ed. C 13010* and 3019*.

SPECIALIZED PROFESSIONAL EDUCATION ............39 hours

SPECIAL EDUCATION PROGRAMS ..........................
42 hours

SPECIAL EDUCATION STUDENT TEACHING ...........
15 hours
Special Education Special 4690, 4681, 4682.

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

 enjoys admission to Transfer Education Program.
C. Concentration in the Hearing Impaired

ADMISSION TO THE PROGRAM FOR TEACHERS OF THE HEARING IMPAIRED

In addition the following requirements for admission to Teacher Education, Special Education students in the program for hearing the 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. A cumulative grade point average of 2.8 is required.

c. A candidate’s personal aptitude for teaching in a Special Education setting as indicated by practice experiences.

d. Personal interview and career planning.

3. A candidate’s personal aptitude for teaching in Special Education as indicated by practice experiences; writing sample; the Committee will grant full, or provisional, acceptance based on the above criteria. The Committee will consider:

- An applicant’s personal aptitude for teaching in Special Education as indicated by practice experiences.

- A writing sample.

- An interview with the Committee.

- Career planning.

4. Concentration in the Hearing Impaired

In addition the college requirements for admission to Teacher Education, Special Education students in the program for teaching the hearing impaired will follow these procedures.

5. File application for admission to the program.

6. The Program Screening Committee will review all applications quarterly. The following criteria will be considered:

a. A cumulative grade point average of 2.8 is required.

b. A candidate’s personal aptitude for teaching in Special Education as indicated by practice experiences.

c. Personal interview and career planning.

7. A candidate’s personal aptitude for teaching in Special Education as indicated by practice experiences; writing sample; the Committee will grant full, or provisional, acceptance based on the above criteria.

8. Personal interview and career planning.

9. Concentration in the Hearing Impaired

In addition the college requirements for admission to Teacher Education, Special Education students in the program for teaching the hearing impaired will follow these procedures.

10. File application for admission to the program.

11. The Program Screening Committee will review all applications quarterly. The following criteria will be considered:

a. A cumulative grade point average of 2.8 is required.

b. A candidate’s personal aptitude for teaching in Special Education as indicated by practice experiences.

c. Personal interview and career planning.

12. A candidate’s personal aptitude for teaching in Special Education as indicated by practice experiences; writing sample; the Committee will grant full, or provisional, acceptance based on the above criteria.

13. Personal interview and career planning.

14. Concentration in the Hearing Impaired

In addition the college requirements for admission to Teacher Education, Special Education students in the program for teaching the hearing impaired will follow these procedures.

15. File application for admission to the program.

16. The Program Screening Committee will review all applications quarterly. The following criteria will be considered:

a. A cumulative grade point average of 2.8 is required.

b. A candidate’s personal aptitude for teaching in Special Education as indicated by practice experiences.

c. Personal interview and career planning.

17. A candidate’s personal aptitude for teaching in Special Education as indicated by practice experiences; writing sample; the Committee will grant full, or provisional, acceptance based on the above criteria.

18. Personal interview and career planning.

19. Concentration in the Hearing Impaired

In addition the college requirements for admission to Teacher Education, Special Education students in the program for teaching the hearing impaired will follow these procedures.

20. File application for admission to the program.

21. The Program Screening Committee will review all applications quarterly. The following criteria will be considered:

a. A cumulative grade point average of 2.8 is required.

b. A candidate’s personal aptitude for teaching in Special Education as indicated by practice experiences.

c. Personal interview and career planning.

22. A candidate’s personal aptitude for teaching in Special Education as indicated by practice experiences; writing sample; the Committee will grant full, or provisional, acceptance based on the above criteria.

23. Personal interview and career planning.
C. Industrial Education

<table>
<thead>
<tr>
<th>Option 1: Concentration in Fine and Industrial Arts</th>
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</thead>
<tbody>
<tr>
<td>GENERAL EDUCATION (18 hours)</td>
</tr>
<tr>
<td>Health and Physical Education (9 hours)</td>
</tr>
<tr>
<td>Humanities (15 hours)</td>
</tr>
</tbody>
</table>

TOTAL MINIMUM REQUIRED: 186 hours

[1] Requires admission to Teacher Education Program.

**Departments of Instruction**

**Art and Music Education**

**Professors:**
- C. R. Ball (Head), Ph.D.; Pestroy, Ed.D.; Whitworth, J. H.; Jones, Emeritus
- Ed. C. Columbus, W. J.; Zehl, Ed. Dr.
- Northcutt, B. W.; McDonald, Ed. D.

**Associate Professors:**
- O. H. O. Jones, Ed. D.; St. Louis State Teachers;

**Northern Illinois University**
- P. J. Johnson, Ed. D.; Indiana; M. O. Moore, Ph.D., Michigan; J. J. Perrone, Ed. D. M.

**Art Education (141)**

1511 Field Experiences in Teaching Art (5) Field experiences in which students perform tasks related to teaching and to teacher roles. UNC may be repeated for credit.

2100 Introduction to Art Education in the Schools (5) Art grades 1 through 12; growth and development, objectives, motivation, evaluation. Experiences with media: 1 hr. and 2 labs.

2110 Drawing, Painting, and Design Activities in Elementary School (5) Prereq: 2101, 1 hr and 2 labs.

2140 Introduction to Art Education in the Schools (5) Art grades 1 through 12; growth and development, objectives, motivation, evaluation. Experiences with media: 1 hr. and 2 labs.

2115 Crafts in the Elementary School (5) Prereq: 2110; 1 hr. and 2 labs.

2160 Art in Secondary School Program (5) Program planning: materials and equipment; relation to other school experiences. Classroom observation. Prereq: req. in art education. 1 hr. and 2 labs.

3511 Field Experiences in Teaching Art (5) Experiences in which students pursue tasks related to teaching and to teacher roles. UNC may be repeated for credit.


3520 Textiles in School Program (5) Exploration of weaving, stitching, batik, and silk screen printing.

4120 Designing of Teaching Aids in Art School Program (5) Design and preparation of charts, exhibits, slides, films, and other teaching aids for art grades one through twelve. Prereq: 2101 or consent of instructor. 1 hr. and 2 labs.

4130 Three-Dimensional Design in School Program (5) Exploration of wood, wire, metal, plastic, and other sculptural materials. Prereq: 2101 or consent of instructor. 1 hr. and 2 labs.

4190 Lettering, Posters, and Displays in School Program (5) Design and layout; techniques and production. Prereq: 2101 or consent of instructor. 1 hr. and 2 labs.

4190 Appreciation of the Arts in School Program (5) Prereq: 2101 or consent of instructor. 1 hr. and 2 labs.

4360-70 Problems in Art Teaching (3, 5, 7) Prereq: Consent of instructor.

**Theatre and Dance Education**

Dept. of Instruction

**Art and Music Education**

**Professors:**
- C. R. Ball (Head), Ph.D.; Pestroy, Ed.D.; Whitworth, J. H.; Jones, Emeritus
- Ed. C. Columbus, W. J.; Zehl, Ed. Dr.
- Northcutt, B. W.; McDonald, Ed. D.

**Associate Professors:**

**Art Education (141)**

1511 Field Experiences in Teaching Art (5) Field experiences in which students perform tasks related to teaching and to teacher roles. UNC may be repeated for credit.

2100 Introduction to Art Education in the Schools (5) Art grades 1 through 12; growth and development, objectives, motivation, evaluation. Experiences with media: 1 hr. and 2 labs.

2110 Drawing, Painting, and Design Activities in Elementary School (5) Prereq: 2101, 1 hr and 2 labs.

2140 Introduction to Art Education in the Schools (5) Art grades 1 through 12; growth and development, objectives, motivation, evaluation. Experiences with media: 1 hr. and 2 labs.

2115 Crafts in the Elementary School (5) Prereq: 2110; 1 hr. and 2 labs.

2160 Art in Secondary School Program (5) Program planning: materials and equipment; relation to other school experiences. Classroom observation. Prereq: req. in art education. 1 hr. and 2 labs.

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3520 Textiles in School Program (5) Exploration of weaving, stitching, batik, and silk screen printing.

4120 Designing of Teaching Aids in Art School Program (5) Design and preparation of charts, exhibits, slides, films, and other teaching aids for art grades one through twelve. Prereq: 2101 or consent of instructor. 1 hr. and 2 labs.

4130 Three-Dimensional Design in School Program (5) Exploration of wood, wire, metal, plastic, and other sculptural materials. Prereq: 2101 or consent of instructor. 1 hr. and 2 labs.

4190 Lettering, Posters, and Displays in School Program (5) Design and layout; techniques and production. Prereq: 2101 or consent of instructor. 1 hr. and 2 labs.

4190 Appreciation of the Arts in School Program (5) Prereq: 2101 or consent of instructor. 1 hr. and 2 labs.

4360-70 Problems in Art Teaching (3, 5, 7) Prereq: Consent of instructor.
Music Education (707)

The curriculum in music education provides for five areas of concentration: vocal music (voice principal); instrumental music (voice principal); elementary music education (voice principal); and instrumental music.

1010-32 Choral Laboratory (1, 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. SNC may be repeated for credit.

3430-35-36 Seminar in Music Education (3, 3, 3)
Primarily for elementary education majors. Prereq: Approval of the instructor. May be repeated for credit.

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

4350-6070 Problems In Art Music Teaching (3, 3, 3)

5110 Seminar in College Teaching (3)

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

5220 Administration and Supervision of School Music Education (3)

5240 Evaluation Procedures in Music Education (3)

5260 Music for Early Childhood (3)

5270 Studies of Music for Children in Primary Grades (3)

5310-20-30 The Talent Education Program of Schools (3) Procedures, techniques, curriculum, counseling, administration, and equipment, community relations. Prereq: Two years of music theory; coreq: 3511.

5320 Advanced Choral Literature and Conducting (3)

5410 Advanced Band Literature and Conducting (3)

5420 College and University Law-Constitutional Rights and Responsibilities of Students (3)

5440 College and University Law-Tort Liability and Risk Management (3)

5510 Governance of Colleges and Universities (3)

5520 Fiscal Problems in Higher Education (3)

5600 Program Planning in Continuing and Higher Education (3)

5620 The Community-Junior College (3)

5655-6970 Practicum in Continuing and Higher Education (1, 1, 1, 1)

59507080 Seminar in Continuing and Higher Education (3, 3, 3, 3)

5960-7080 Practicum in Continuing and Higher Education (3, 3, 3, 3)

5965 Seminar in Continuing and Higher Education (3)

5980 Advanced Seminar in Program Planning (3)

(See also course listings under the Departments of Curriculum and Instruction, Educational Administration and Supervision, and Educational Psychology and Guidance.)

Curriculum and Instruction

Professors


Associate Professors

C. J. Cagle, Ed.D., Georgia; C. A. Chance, Ph.D., Ohio State; C. L. Fawer, Ph.D., Illinois State; D. J. Maddox, Ph.D., Ohio State; D. J. Marmo, Ph.D., Illinois State; D. F. Morgan, Ph.D., Ohio State; W. L. Russell, Jr., Ed.D., Missouri

Assistants

H. E. Enlow, Ph.D., Illinois State; K. J. Hill, Ph.D., Ohio State; H. C. Klar, Ph.D., Ohio State; R. P. Künneke, Ph.D., Ohio State; E. M. Miller, Ph.D., Florida; C. E. Rosevear, Ph.D., Ohio State; T. K. Ryan, Ed.D., Ball State; W. W. Wyeth, Ed.D., Missouri

Graduate Assistants


Graduate Assistantship:

5110 Seminar in College Teaching (3)

5120 Comparative Teaching Procedures in Music Education (3)

5940 Continuing Education (3)

5950 Continuing Education (3)

5960-7080 Seminar in Continuing and Higher Education (3, 3, 3, 3)

5965 Seminar in Continuing and Higher Education (3)

5980 Advanced Seminar in Program Planning (3)

(See also course listings under the Departments of Curriculum and Instruction, Educational Administration and Supervision, and Educational Psychology and Guidance.)

Graduate

5000 Thesis

5092 Non-Thesis Graduation Completion (9-15)

5110 Seminar in College Teaching (3)

5360-7880 Problems in Continuing and Higher Education (1, 1, 1, 1, 1)

5410 College and University Law—The Legal Environment (3)

5420 College and University Law—Constitutional Rights and Responsibilities of Students (3)

5440 College and University Law—Tort Liability and Risk Management (3)

5450 Instruction in Higher Education (3)

5460 Adult Development (3)

5470 The Curriculum of Undergraduate Education (3)

5510 Governance of Colleges and Universities (3)

5520 Fiscal Problems in Higher Education (3)

5650 Program Planning in Continuing and Higher Education (3)

5660 The Community-Junior College (3)

5695-6970 Practicum in Continuing and Higher Education (1, 1, 1, 1, 1)

5700-7080 Seminar in Continuing and Higher Education (1, 1, 1, 1, 1)

5940 Continuing Education (3)

5950 Continuing Education (3)

5960-7080 Seminar in Continuing and Higher Education (3, 3, 3, 3)

Continuing and Higher Education (267)
3300 Teaching Arithmetic in the Elementary School (3) Goals, methods, materials, and evaluation. Undergraduate credit only. Prereq: Educ. Psych. 2430 or equivalent. Admission to Teacher Education.

3310 Books and Related Materials for Children (3) (Same as Library and Information Science 310.)

3312-13 Field Experiences in Teaching: Elementary (1, 1) Field experiences in which stu-dents perform tasks related to teaching and to teacher roles. May be taken repetitively or con-currently by consent of instructor. Prereq: before student teaching. Prereq: 3311—Educ. Psych. 2430 or equivalent; 3312—admission to Teacher Educa-tion. S/N/C.

3320 Books and Related Materials for Young People (3) (Same as Library and Information Science 320.)

3521-22-23 Field Experiences in Teaching: Secondary (1, 1, 1) Field experiences in which stu-dents perform tasks related to teaching and to teacher roles. May be taken repetitively or con-currently by consent of instructor. S/N/C.

3551-52-53 Field Experiences in Teaching: Social Foundations (1, 1, 1) (For description see 3550.)

3561 Teaching Speech, Language, and Drama, Grades 7-12 (9) For description see 3563.

3562 Teaching of Modern Foreign Languages: Oral Communication Skills, Grades 7-12 (3) For description see Educ. C & I 3563. This course and Educ. C & I 3560 are required for certification in foreign languages. Must be taken concurrently with 3563.

3563 Teaching of Modern Foreign Languages: Reading, Literature, Grammar, and Composition, Grades 7-12 (3) For description see Educ. C & I 3563. This course and Educ. C & I 3560 are required for certification in foreign languages. Must be taken concurrently with 3560.


3656 Teaching Reading, Literature, and Listening, Grades 7-12 (3) For description see 3652. Both the course and Educ. C & I 3650 are required for certification in mathematics.

3702 Teaching Science in the Elementary School (3) Goals, methods, materials, and evaluation. Undergraduate credit only. Prereq: Educ. Psych. 2430 or equivalent. Admission to Teacher Education.


3823 Teaching of Mathematics: Geometry and Analysis, Grades 7-12 (3) For description see Educ. C & I 3650. Both this course and Educ. C & I 3650 are required for certification in mathematics.
4364-66-78 Problems in Teaching Language Arts (3, 3, 3)
4355-65-79 Problems in General Curriculum (3, 3, 3)
4358-66-78 Problems in Instructional Materials (3, 3, 3)
4357-67-77 Problems in Teaching Foreign Languages (3, 3, 3)
4359-69-79 Problems in Teaching Conservation (3, 3, 3)
4361 Problems in Early Childhood Education (2) May be repeated for a total of 9 hrs. Six hrs can be taken concurrently.
4400 Problems in improvement of Instruction (1-3) Special conferences, workshops, or inservice programs designed for improvement of instruction. May be repeated. Maximum credit is 9 hrs. SNC.
4410 Educational Sociology (3) Same as Sociology 4140.
4430 Practicum in Teaching in the Elementary School (3) Participation in actual experience as a school classroom teaching designed for students who have obtained degrees in areas other than elementary education, and who have obtained degrees and certification in areas other than this. Application must be filed with student teaching office at least one quarter prior to registration for practicum. Prereq: 3280-70-80, 3500, 3720 or equivalents and admission to Teacher Education.
4460 Teaching in Kindergarten: Overview (3) Relations of kindergarten to total elementary program, goals, historical settings and current developments.
4461 Teaching in Kindergarten: Program Development (3) Curriculum planning and organization, classroom management. Prereq. Admission to Teacher Education.
4482 Elementary School Teaching in Missions (3, 3) Missions focusing on various aspects of educational problems in foreign countries. Prereq. Student teaching. May be repeated. SNC.
4520 Home and School Relations (2) Study of need and techniques for closer relations between the home and school at both elementary and secondary levels. Prereq. Senior standing.
4530 Current Educational Problems (3) Programs, methods, and materials in environmental and Science Education (3) Instructional strategies, teaching methods, curricular programs, and issues in environmental and science education.
4710 Student Teaching, Grades 7-12 (Application for student teaching must be filed not later than final quarter of junior year. Students should hold themselves available to do this work in off-campus centers. Must be taken with 4720. Prereq: 3200-20-30, Edu-Psych 3810, appropriate special methods courses, minimum grade point average of 2.0. Undergraduate credit only. SNC.
4720 Student Teaching, Grades 7-12 (Cooperative practicum and field training in teaching practices; evaluation of teaching performance; completion of required course work. Must be taken with 4710. Undergraduate credit only. SNC.
4740 Utilization of Instructional Media (3) Introduction to the basic communication process, need for instructional media, instructional development, selection and utilization of media and basic software production techniques. (Same as Libr. Information Science 4750 and Vocational-Technical Education 4750.)
4810 Student Teaching in the Elementary School (Application for student teaching must be filed not later than final quarter of junior year. Students should hold themselves available to do this work in off-campus centers. Must be taken with 4820. Prereq: 3200-20-30, 3500-70-80, 3530, 3720, Edu-Psych 2460, Library Service 5110, minimum grade point average of 2.0. Undergraduate credit only. SNC.
4820 Student Teaching in the Elementary School (3) Must be taken with 4810. Undergraduate credit only. SNC.
4840 Introduction to Data Processing in Education (3) Analysis of current activities in field of educational data processing; emphasis on computer, administrative, and research opportunities in education, using modern electronic data processing methods and machines.
4849 Student Teaching in Elementary School (K-3) Application filed not later than second quarter of first year with placement at least one quarter prior to quarter of graduation. Prereq: Edu-C 3350, 3720 or 3530, 3560, 4450. CFS 3120, 3210, SNC.
4851 Student Teaching in Elementary School (K-3) Application filed not later than second quarter of first year with placement at least one quarter prior to quarter of graduation. Prereq: Edu-C 3350, 3720 or 3530, 3560, 4450. CFS 3120, 3210, SNC.
4860 Programmed Learning (3) Basic learning principles and techniques of programmed instruction. Application of these principles and techniques of programmed instruction and programming. 2 lecture and 1 lab. Prereq: Psychology 2130, Edu-Psych 3720, or consent of instructor. (Same as Psychology 4860.)
GRADUATE
Graduate instruction in the Department of Curriculum and Instruction provides opportunities to improve the effectiveness of educational service in a number of areas.
5000 Thesis
5002 Non-Thesis Graduation Composition (3-15)
5004 Seminar in Elementary School Language Arts (3)
5070 Seminar in Interpersonal Education (2)
5100 History of Education (3)
5120 Principles of Education (3)
5140 Comparative Philosophy of Education (3)
5141 Pragmatism in Education (3)
5142 The Existential Student (3)
5143 Supervised Readings in Philosophy of Education (3)
5150-60-70 Seminar 1-1-3, 1-3-3
5159-60-9200 Educational Specialist Research and Thesis (2, 2, 3)
5151 Seminar in International Education: Arts and Humanities (2, 2, 3, 3)
5211 Instructional Strategies in Elementary School Social Studies (3)
5220 Supervised Readings in Elementary Education (2)
5222 Comparative Philosophy of Education (3)
5235 Diagnosis and Remediation of Arithmetic Difficulties (3)
5240 Creative Thinking and Expression in Elementary School (3)
5250 Secondary School Instruction (3)
5270 The Elementary School Curriculum (3)
5320 Teaching Language Arts in the Elementary School (3)
5341 Teaching Social Studies in the Elementary School (3)
5370 Teaching Science in the Elementary School (3)
5390 Teaching Social Studies in the Elementary School (3)
5391 Programs and Materials in Teaching Elementary Social Sciences (3)
5394 Seminar in Teaching Elementary Science (3)
5410 The Teaching of Mathematics in the Elementary School (3)
5420 Methods and Materials for Teaching Critical Reading (3)
5430 Programs and Materials for Reading Instruction (3)
5450 Trends and Issues in Reading Teaching (2)
5500 Teaching Reading to the Linguistically Different Learner (3)
5507 Assessment and Correction of Classroom Language Arts Difficulties (3)
5510 Curriculum Development and Evaluation (3)
5520-70 Curriculum Development in the Local School (3, 3)
5565 Mathematics Laboratories in Elementary School (3)
5576 Diagnosis of Remedial Reading Problems (3)
5581 Remediation of Remedial Reading Problems (3)
5602 Developmental Reading Practice (3)
5630 Remedial Reading Practice (1)
5631 Organization and Administration of Reading Programs (3)
5641 The High School Curriculum (5)
5650 Curriculum Laboratory for High Schools (3)
5651 Curriculum Planning and Development (3)
5660 Educational Statistics (3)
5680 Problems in Direction and Supervision of Student Teaching (3)
5690 Practicum in the Individualization of Instruction (3)
5695 Newer Trends in Elementary Education (3)
5690-90 Curriculum Laboratory for Elementary Education (3)
5697 Curriculum Laboratory for Early Childhood Education (3)
5698 Teacher-Parent-Community Relations (3)
5699 Design of Instructional Media (3)
5701 Advanced Production of Audiovisual Software (3)
5682 Evaluation of Instructional Media (3)
5683 Administering Instructional Media Programs (3)
5694 Utilization of Educational Television and Radio (3)
5695 Research in Instructional Media (2)
5697 Practicum Experience in Instructional Media (3)
5710 Techniques of Research in Education (3)
5720 Classroom Observation and Analysis (3)
5790 Career Development. Workshop 1-0-6
5800 Seminar in Cooperative Curriculum Research (3)
5820 Seminar in the Teaching of Mathematics (3)
5825 Teaching Mathematics in the Middle and Junior High School (3)
5830 Seminar in Mathematics Education (3)
5835 Teaching Mathematics in the Senior High School and Community College (3)
5841 Trends and Issues in Early Childhood (3)
5843 Problems in Education: Early Childhood (3)
5845 Seminar in Early Childhood Education (3)
5845 Mathematics in Early Childhood Education (3)
5846 Social Studies and Science in Early Childhood Education (5)
5920 Seminar in Research and Theory in Teaching Mathematics in the Elementary School (3)
5921 Psychology of Reading (3)
5930 Methods and Materials for Teaching Critical Reading (3)
5934 Programs and Materials for Reading Instruction (3)
5935 Trends and Issues in Reading Teaching (2)
5938 Teaching Reading to the Linguistically Different Learner (3)
5937 Assessment and Correction of Classroom Language Arts Difficulties (3)
5939 Curriculum Development and Evaluation (3)
5960-70 Curriculum Development in the Local School (3, 3)
5965 Mathematics Laboratories in Elementary School (3)
5976 Diagnosis of Remedial Reading Problems (3)
5981 Remediation of Remedial Reading Problems (3)
5982 Developmental Reading Practice (3)
5983 Remedial Reading Practice (1)
5984 Organization and Administration of Reading Programs (3)
5941 The High School Curriculum (5)
5950 Curriculum Laboratory for High Schools (3)
5950 Curriculum Planning and Development (3)
5960 Educational Statistics (3)
5963 Problems in Direction and Supervision of Student Teaching (3)
5966 Practicum in the Individualization of Instruction (3)
5965 Newer Trends in Elementary Education (3)
5960-90 Curriculum Laboratory for Elementary Education (3)
5967 Curriculum Laboratory for Early Childhood Education (3)
5968 Teacher-Parent-Community Relations (3)
5969 Design of Instructional Media (3)
5971 Advanced Production of Audiovisual Software (3)
5982 Evaluation of Instructional Media (3)
5963 Administering Instructional Media Programs (3)
5964 Utilization of Educational Television and Radio (3)
5965 Research in Instructional Media (3)
5967 Practicum Experience in Instructional Media (3)
5970 Techniques of Research in Education (3)
5972 Classroom Observation and Analysis (3)
5970 Career Development. Workshop 1-0-6
5980 Seminar in Cooperative Curriculum Research (3)
5982 Seminar in the Teaching of Mathematics (3)
5985 Teaching Mathematics in the Middle and Junior High School (3)
5968 Seminar in Mathematics Education (3)
5985 Teaching Mathematics in the Senior High School and Community College (3)
5986 Problems in Education: Early Childhood (3)
5985 Seminar in Early Childhood Education (3)
5985 Mathematics in Early Childhood Education (3)
5986 Social Studies and Science in Early Childhood Education (5)

Graduate Programs in Education (501)

5846 Language Arts in Early Childhood Education (3)
5890-60-70 Problems in Education: English (3, 3, 3)
5891-61-71 Problems in Education: Mathematics (3, 3, 3)
5892-62-72 Problems in Education: Social Studies (3, 3, 3)
5893-63-73 Problems in Education: Science (3, 3, 3)
5894-64-74 Problems in Education: Language Arts (3, 3, 3)
5895-65-75 Problems in Education: General Curriculum (3, 3, 3)
5896 Problems in Education: Instructional Materials (3, 3, 3)
5897-67-77 Problems in Education: Foreign Languages (3, 3, 3)
5898-68-78 Problems in Education: Instructional Materials (3, 3, 3)
5899 Field Experience (1-6)
5900 Seminar in the Teaching of English in the Secondary School (3)
5901 Linguistics and the Teacher of English (3)
5902 Teaching Composition in the High School (3)
5903 Teaching Fiction in the Secondary School (3)
5904 Teaching the Mass Media in the 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 Forest (3)
5912 Play Production in Secondary School (4)
5913 Reflective Thinking: The Method of Education (3)
5920 Teaching Natural Science (3)
5921 Teaching Science in Science and Environmental Education (3)
5927 Teaching the Social Studies (3)
5928 Projects, Programs, and Materials in Social Studies (3)
6000 Doctoral Research and Dissertation
6015 Studies in English Education (3)
6020 Seminar in Teaching the Social Studies (3)
6023 Research and Theory in Teaching Reading (3)
6027 Seminar in Reading and Language Arts (3)
6030 Seminar in Curriculum and Instruction (1, 1, 1)
6060 Philosophy of Methodology in the Elementary School (3)
6080 Advanced Seminar in Philosophy of Education (3)
6081 The Dynamics of Educational Change (3)
6082 Advanced Studies in Early Childhood Education (3)
6090 Advanced Studies in Elementary School Language Arts (3)
6100 Advanced Educational Statistics (3)
6101 Interpretation of Data (3)
6120 Theory and Evaluation in Curriculum Planning (3)
6130 Studies in Curriculum Theory and the Structure of Knowledge (3)
6140 Curriculum Workshops in Instructional Improvement (3)
6150-65-75 Problems in Curriculum and Instruction (3, 3, 3)
6170 Problems in Mathematics Education (3)
6180 Principles of Educational Leadership (3)
6190 Internship (1-6)

Educational Administration and Supervision (292)


GRADUATE

5000 Thesis
5002 Non-Thesis Graduation Completion (3-15)
5100 Internship in Educational Administration (3)
5101 Introduction to Educational Administration (3)
5110-40-500 Educational Specialist Research and Thesis (3, 3, 3)
5200 Philosophy and Theory in Educational Administration (3)
5203 Seminar in the Behavioral Sciences for Educational Administrators (3)
5290 The Politics of Education (3)
5210 School Administration and Civil Rights Issues (3)
5220 Local District Level Administration (3)
5430 Building Level Administration (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)
5520 Introduction to Educational Planning (3)
5540 Tennessee School Law (3)
5560 Research for Educational Administrators (3)
5580 Seminar in Communication Skills for Educational Administrators (3)
5711 Problems in Educational Administration and Supervision: College Education (3)
5712 Problems in Educational Administration and Supervision: Higher Education (3)
5713 Problems in Educational Administration and Supervision: State School Administration (3)
6984 Specialized Seminar: Preparation Programs (3)
6990 Specialized Doctoral Seminar in Politics of Education (3)
6991 Specialized Seminar: Theory (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)

6000 Case Studies in College Student Personnel Practice (3)
6001 Career Development: Career and Educational Decision Making (3) Assists students in identifying where they are in their lives in relation to where they would like to be in terms of their values, skills, interests, and goals. Emphasis is on the development of career decision-making process.
6002 Professional Self-Development (1) Emphasizes personal and professional development needs of students.
6003 College and Career Development (3) Emphasizes role of family in career decision making.
6004 Career Development: Techniques of Assessment (3) Develops and practices the assessment of students.
6005 Advanced Topics in Employment and Career Development (3) Covers advanced and current topics in employment and career development.
6006 Internship in Career Development (3) Provides students with an opportunity to apply concepts learned in classroom and laboratory sessions.
6007 Advanced Internship in Career Development (3) Provides students with an opportunity to apply concepts learned in classroom and laboratory sessions.

College of Education 113

Part two: Faculty

1000 Career Development: Career and Educational Decision Making (3) Assists students in identifying where they are in their lives in relation to where they would like to be in terms of their values, skills, interests, and goals. Emphasis is on the development of career decision-making process.
2430 Child Study (3) Child learning and development. Individual study of children's ages 5-12. Prerequisites: Psychology 2500 or equivalent course, or Department of Educational Psychology and Guidance 11-6. Two-hour laboratory experience arranged.
2440 General Evaluation Procedures for Public Schools (1, 1) Introduction to educational psychology and guidance.
4110 Psychology of Sex Role Development (3) Study of individuals groups of children, sex roles, and problems of their relationship to one's self. Prerequisites: Psychology 2500 or equivalent course.
4210 Social Psychology (3) Study of individuals groups of children, sex roles, and problems of their relationship to one's self. Prerequisites: Psychology 2500 or equivalent course.
4310 Social Psychology (3) Study of individuals groups of children, sex roles, and problems of their relationship to one's self. Prerequisites: Psychology 2500 or equivalent course.
4440 General Evaluation Procedures for Public Schools (1, 1) Introduction to educational psychology and guidance.
5050 Developmental Psychology (6) Study of children from birth to adolescence. Emphasis on development of self-concept and self-esteem. Prerequisites: Psychology 2500 or equivalent course.
5060 Group Approaches with Students (3) Study of group approaches for working with students. Prerequisites: Psychology 2500 or equivalent course.
5070 Seminar in Elementary School Guidance (3) Seminar on principles and procedures of elementary school guidance.
5090 Practicum in College Student Personnel (3) Seminar on principles and procedures of college student personnel.
5100 Developmental Psychology (6) Study of children from birth to adolescence. Emphasis on development of self-concept and self-esteem. Prerequisites: Psychology 2500 or equivalent course.
5111-12-13 Seminar in Current Issues in School Psychology (1, 1, 1) Seminar on current issues in school psychology.
5112 Social Psychology (3) Study of individuals groups of children, sex roles, and problems of their relationship to one's self. Prerequisites: Psychology 2500 or equivalent course.
5120 Human Development (3) Study of individuals groups of children, sex roles, and problems of their relationship to one's self. Prerequisites: Psychology 2500 or equivalent course.
5130 Educational Psychology (3) Increasing effectiveness of teaching. Prerequisites: Psychology 2510 or equivalent course.
5150 Social Psychology (3) Study of individuals groups of children, sex roles, and problems of their relationship to one's self. Prerequisites: Psychology 2500 or equivalent course.
5160 Mental Health (3) Study of individuals groups of children, sex roles, and problems of their relationship to one's self. Prerequisites: Psychology 2500 or equivalent course.
5170 Implementation and Evaluation (3) Development of evaluation procedures for educational programs. Prerequisites: Psychology 2500 or equivalent course.
5180 Social Psychology (3) Study of individuals groups of children, sex roles, and problems of their relationship to one's self. Prerequisites: Psychology 2500 or equivalent course.
5190 Social Psychology (3) Study of individuals groups of children, sex roles, and problems of their relationship to one's self. Prerequisites: Psychology 2500 or equivalent course.
5210 Interpreting Published Articles: Statistics (3) Interpretation of research literature. Prerequisites: Psychology 2500 or equivalent course.
5220 Interpreting Published Articles: Research Design (3) Interpretation of research literature. Prerequisites: Psychology 2500 or equivalent course.
5250 Personal and Skill Development of the College Student (3) Development of communication skills and social relationships; enhancement of self-concept and understanding of others; and assistance in developing effective study skills. Prerequisites: Psychology 2500 or equivalent course. Two-hour laboratory experience arranged.
5260 Group Dynamics (3) Study of group dynamics and group interaction. Prerequisites: Psychology 2500 or equivalent course.
5270 Group Theory and Research In Human Learning (3) Study of group dynamics and group interaction. Prerequisites: Psychology 2500 or equivalent course.
5310 Career Development: Occupational and Educational Resources (3) Study of career development and educational resources. Prerequisites: Psychology 2500 or equivalent course.
5320 Advanced Child Study (3) Study of methods of studying individual children. Prerequisites: Psychology 2500 or equivalent course.
5330 Theory and Research In Human Learning (3) Study of methods of studying individual children. Prerequisites: Psychology 2500 or equivalent course.
5340 Group Dynamics (3) Study of methods of studying individual children. Prerequisites: Psychology 2500 or equivalent course.
5350 Group Approaches with Students (3) Study of group approaches for working with students. Prerequisites: Psychology 2500 or equivalent course.
5360 Career Development: Constitutional Rights and Responsibilities of Students (3) Study of career development and educational resources. Prerequisites: Psychology 2500 or equivalent course.
5370 Case Studies in College Student Personnel (3) Study of case studies in college student personnel.
5380 College and University Law—Constitutional Rights and Responsibilities of Students (3) Study of college and university law.
5390 Field Work in School Psychology (1-2) Study of college and university law.
5400 Counseling Practicum (3) Study of college and university law.
5410 Counseling Theories and Techniques (3) Study of college and university law.
5420 College and University Law—Constitutional Rights and Responsibilities of Students (3) Study of college and university law.
5430 Advanced Social Psychology (3) Study of college and university law.
5440 Human Development (3) Study of college and university law.
5500 Social Psychology (3) Study of college and university law.
5510 College and University Law—Constitutional Rights and Responsibilities of Students (3) Study of college and university law.
5520 Career Development: Occupational and Educational Resources (3) Study of career development and educational resources. Prerequisites: Psychology 2500 or equivalent course.
5530 College and University Law—Constitutional Rights and Responsibilities of Students (3) Study of college and university law.
5540 Counseling Practicum (3) Study of college and university law.
5550 Counseling Theories and Techniques (3) Study of college and university law.
5560 The College Student (3) Study of college and university law.
5570 Case Studies in College Student Personnel (3) Study of case studies in college student personnel.
5580-60-70 Special Topics and Problems in Educational Psychology and Guidance (1-6, 1-4, 1-6) Special topics and problems in educational psychology and guidance.
5590 Career Development: Occupational and Educational Resources (3) Study of career development and educational resources. Prerequisites: Psychology 2500 or equivalent course.
5600 Social Psychology (3) Study of college and university law.
5610 College and University Law—Constitutional Rights and Responsibilities of Students (3) Study of college and university law.
5620 Counseling Practicum (3) Study of college and university law.
5630 Advanced Counseling Practicum (3) Study of college and university law.
5640 Counseling Theories and Techniques (3) Study of college and university law.
5650 Career Development: Occupational and Educational Resources (3) Study of career development and educational resources. Prerequisites: Psychology 2500 or equivalent course.
5660 Counseling Practicum (3) Study of college and university law.
5670-80-90 Practicum in School Psychology (1-6) Practicum in school psychology.
5680 Counseling Theories and Techniques (3) Study of college and university law.
5690 Counseling Practicum (3) Study of college and university law.
5700 Counseling Theories and Techniques (3) Study of college and university law.
5710 Counseling Theories and Techniques (3) Study of college and university law.
5720 Career Development: Occupational and Educational Resources (3) Study of career development and educational resources. Prerequisites: Psychology 2500 or equivalent course.
5730 College and University Law—Constitutional Rights and Responsibilities of Students (3) Study of college and university law.
5740 Counseling Practicum (3) Study of college and university law.
5750 Counseling Theories and Techniques (3) Study of college and university law.
5760 Counseling Practicum (3) Study of college and university law.
5770 Counseling Theories and Techniques (3) Study of college and university law.
5780 Counseling Practicum (3) Study of college and university law.
5790 Counseling Theories and Techniques (3) Study of college and university law.
5800 Counseling Practicum (3) Study of college and university law.
5810 Counseling Theories and Techniques (3) Study of college and university law.
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5890 Counseling Theories and Techniques (3) Study of college and university law.
5900 Counseling Theories and Techniques (3) Study of college and university law.
5910 Counseling Theories and Techniques (3) Study of college and university law.
look at problems related to use and abuse of drugs. SNC

3800 Foundations of Health Science (3) Indepth study of current issues relating to personal health and contemporary health problems, i.e., mood modifying products, consumer health, international health, personal health practices, reciprocal relations involving man, disease, and environment. (Same as School Health 3000)

3910 First Aid and Emergency Care (4) Theory and practice of first aid and emergency care. Instruction in medical and first aid. Course leads to Red Cross Certification in Advanced First Aid and Emergency Care. (Applicants must be at least 16 years of age and must pass certification.) (Same as School Health 3210)

3110 Communicable and Noncommunicable Diseases (3) Modern concepts of diseases; etiology of those communicable and chronic diseases problems including prevention and control. Prevoc. One year of biological science and one course in bacteriology.

3020 Sanitation (3) History of sanitary awakening,  disease producing relationships and controls of water, sewage, refuse; milk, food and other foods, air, soil; sanitation of homes, swimming pools, industrial plants, markets, restaurants, camps, and public bathing places. Healthful school living as affected by buildings and grounds, lighting, heating, ventilation, and sanitation controls, and safety provisions. Prevoc. One year of biology science as one course in microbiology. (Same as School of Medicine 2511)

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

3120 Community Health Problems—Alcoholism (3) Explores problems of alcoholism regarding overall health of community. Emphasis placed on factors making alcoholism a serious public health problem. Various types of educational programs to control the disease covered.

4100 Community Health Problems—Suicide (3) Explores problems of suicide regarding overall health of community.

4140 Urban and Industrial Health (3) Health problems created by a high density population, problems of the urban health care delivery system, management, supervision and the industrial worker, control of occupational health and safety, pollution and other occupational health, and other conditions to industries.

4220 Communications for Better Health (3) Selective study of communications in health enterprises. Emphasis on techniques of transmitting current and new information to practitioners, consumers, and the public at large. Emphasis on modern health teams, among health agencies, and use of mass media for transmitting health information.

5070-80-90 Field Practice and Seminar in Public Health (1-3, 1-3, 1-3) Grade practice in public health under supervision of public health profession. SNC.

4790-10-20 Field Practice in Public Health (3, 3, 3) Field practice in public health under supervision of public health profession. SNC.

4780 Workshop in Public Health Education (2) For teachers, nurses, case workers, social workers, 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.

4000-4100 Problems in Public Health Education (1, 1, 1) Individual identification and study of current problems in public health education. Extensive reading of literature required.

4500 Non-Thesis Graduation Proposal (3, 3, 3)

4501-30-50 Workshop in Public Health (3, 3, 3, 3, 3)

1300-40-50 Practicum in Guidance, Counseling, and Recreative Services (3, 3, 3)

6310 Fieldwork in School Psychology (3) Survey of major consumer health and safety programs for all students in physical education, dance, and recreation. Also provides activities for special groups, e.g., handicapped children.

6525 Fieldwork in Health Education (3)

6910 Special Topics Seminar (3)

6950-42-43 Practicum in Guidance, Counseling, and Personnel Services (3, 3, 3)

9645-46-47 Teaching Practicum in Educational Psychology and Guidance (3, 3, 3)

6950 Counseling Supervision (3)

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 and service courses in health and personal health.

Health and Safety Education


Public Health (839)

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

2100 Seminar in Human Sexuality (2) Problems and responsibilities of being male and female. SNC.

2050 Seminar in Drug Use and Abuse (2) Intensive
3190 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 coaching for high school and college coach. Prereq: Consent of instructor.

3210 History and Principles of Physical Education (2) Principles from basic sciences of anatomy, biochemistry, physiology, psychology, and sociology as they relate to health, physical education, and human development.

3220 Physical Fitness Activities (2) Teaching of calisthenics, conditioning activities, and weight training with emphasis on physical fitness concepts including muscular development of the body.

3230 Team Sports (2) Instruction, practice, and student teaching in selected team sports.

3250 Athletic Training Techniques (2) Theory and practice in the prevention and care of basic athletic injuries.

3260 Practicum for Physical Education Majors (1-3) Observation and limited teaching, coaching, and leadership experiences in physical education with emphasis on practical teaching, planning, and supervision. Must be repeated. Maximum 3 credits. EDC 650.

3270 Applied Anatomy and Kinesiology (2) Bones, joints, ligaments, and muscles involved in movement, reaction of joints and muscular mechanism to body development and efficiency.

3280 Buntie and Tumbleton: Instruction, practice, student teaching and lesson planning stressed with focus upon safety techniques.

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

3440 Physical Education in the Elementary School (3) Movement experiences appropriate for elementary school children designed to develop learning and teaching a developmental program.

3450 Conceptual Bases for Study of Human Movement Behavior (2) Biophysical, psycho-social forces causing humans to move as they do. Prereq: 1011 or 1012.

3455 The Teaching of Swimming and Lifesaving (2) Correct and safe methods of teaching rescue technique for both beginner or senior lifesaving with additional practice in teaching of swimming.


3510 Human Growth and Motor Development (3) Three-year period, teaching and learning, including physical education majors and minors or with consent of instructor.

3515 Advanced Physical Education (2) Emphasis on basic points, male technique, and partnering. May be repeated. Maximum credit 6 hrs. Prereq or consent of instructor.

4000 Intermediate Advanced Ballet Technique (2) Emphasis on form and content of dance vocabulary. Prereq. Must be repeated. Maximum credit 4 hrs. Prereq: 4000. Available to dance majors and minors or with consent of instructor.

4005 Advanced Ballet Technique (2) Emphasis on classical variations and partnering. May be repeated. Maximum credit 6 hrs. Prereq: 4000. Available to dance majors and minors or with consent of instructor.

4100 Advanced Modern Technique (2) Development, integration, and synthesis of previous dance vocabulary or advanced practice and principles. Prereq. May be repeated. Maximum credit 6 hrs. Prereq: 3020. Available to dance majors and minors or with consent of instructor.

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

4205 Production of Choreography (2) Application of choreographic and dance production, experimental, design, and creative activity experiences. Prereq or coreq. 3062, 4020.

4900 Special Project (1-3) Prereq: Approval of instructor.

4110 Adapted Physical Education (2) Classification of atypical children who require modified programs in physical education, emphasis on the factors for required or special physical education classes.

4120 Administration of Physical Education (3) Selected topics in administration and organization problems related to physical education programs in schools. Emphasis placed on leadership aspects and administrative problems in administration of physical education programs.

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 (2) Methods and materials for grades 1-6. 3 hrs and 1 lab.

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

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

4250 Folk and Square Dance (2) Materials and methods for public schools and colleges, and special emphasis placed on safety, progression, and teaching techniques. Open to men and women.

4255 Men's Gymnastics (2) Development of skills on hand rings, horizontal bar, and floor exercise; special emphasis placed on progressions, safety, and teaching techniques. Open to men and women.

4256 Women's Gymnastics (2) Development of skills on balance beam, uneven bars, parallel bars, and side horse vaulting; special emphasis placed on progressions, safety, and teaching techniques. Open to men and women.

4260 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.

4300 The Coaching and Judging of Women's Gymnastics (2) Appreciation of techniques used in the coaching and judging of women's gymnastics according to the rules of the United States Gymnastics Federation. National exams and ratings will be given. Both men and women are encouraged to take this course. Prereq: 2734 or 4440.

4500 Methods of Teaching Dance (2) Individual work with analysis and criticism. Prereq: Senior standing and approval of instructor.

4870 Motor Behavior: A Theoretical Perspective (2) Examine motor behavior from an information processing perspective and applies current research to support theoretical base. Prereq: Senior or graduate standing or consent of instructor.

4900 Motor Behavior Laboratory (2) Provides a beginning experience in methodology and instrumentation for assessing factors related to or affecting motor learning and performance. Prereq: Coreq or consent of instructor. Prereq: PE 4140 and/or PE 3352 or consent of instructor.

GRADUATE

0000 Thesis

0006 Thesis Graduation Completion (3-15)

5110 Advanced Physical Education (3)

5130 Methods in Physical Education (3)

5140 Advanced Philosophy of Sport (3)

5150 Systematic Philosophic Analysis of Sport (3)

5160 Principles and Philosophy of Physical Education (3)

5220 Readings in Physical Education (3)

5380 Supervisory Problems in Physical Education (3)

5310 Analysis of Basic Motor Skills (3)

5340 Research Techniques in Physical Education (3)

5350 Psychology of Sport (3)

5360 Lifting Behavior and Skill Acquisition (3)

5410-20 Specialization Study in a Selected Field (1-10, 1-3, 1-5)

5500 Advanced Kinesiology

5510 Selected Topics in Anatomy (3)

5530 Physical Rehabilitation (3)

5560 Physical Activity and Health (3)

5600 Applied Physiology (3)

5610 Advanced Exercise Physiology (4)

5620 Experimental Techniques in Applied Physiology (3)

5630 Socio-Psychological Dimensions of Physical Activity (3)

5910-20-30 Problems and Projects in Physical Education (1-3, 1-3, 1-3)

4140 Wrestling (2) Theoretical and practical work for prospective teaching. Emphasis on safety procedures.

4330 Women's Gymnastics (2) Development of skills on balance beam, uneven bars, parallel bars, and side horse vaulting; special emphasis on progressions, safety, and teaching techniques. Open to men and women.

4440 Men's Gymnastics (2) Development of skills on hand rings, horizontal bar, parallel bars, and long horse vaulting. Special emphasis placed on safety, progressions, and teaching techniques. Open to men and women.

4460 Motor Behavior Laboratory (2) Provides a beginning experience in methodology and instrumentation for assessing factors related to or affecting motor learning and performance. Prereq: Coreq or consent of instructor. Prereq: PE 4140 and/or PE 3352 or consent of instructor.
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.

6010 Seminar in Physical Education (1)
2725 Field Hockey (2)
2719 Equitation Elementary (2)
2717 Bowling Advanced (2)
2716 Bowling Intermediate (2)
2715 Bowling Elementary (2)
2713 Ballet Advanced (2)
2712 Ballet Intermediate (2)
2711 Ballet Elementary (2)
2708 Badminton Intermediate (2)
2702 ARC Water Safety Instructor Training (2)

...education planned in accordance with their...
4110 Education of the Brain-Injured Child (3) Nature of brain-injured child, skills for identifying educational, physical, and emotional characteristics; special educational techniques.

4150 Education Problems of Hospitalized and Homebound Children (3) Nature of health factors and disabilities affecting learning; techniques and theories of development and improvement for the physically handicapped child. Prereq: Speech 4190.

4200 Practicum in Speech Development of Hearing Impaired Children (3) Practice in planing activities and techniques for use in developing speech improvement activities into the curriculum. Prerequisite: Speech 4190.

4201 Communication Processes for the Hearing Impaired (3) Various communicative skills required for hearing impaired persons; speech and language development, dialects, and variations in the use of language, and its relation to other forms of communication. Observation practicality. Student must acquire a degree of proficiency in use of manual coding.

4241 Communication Processes for the Hearing Impaired (3) Various communicative skills and techniques used by the hearing impaired; role of speech and language development in the development of auditory abilities; role of hearing level; interpretation of audiograms; selection and use of hearing aids; use of appropriate services for hearing impaired individuals. Prereq: Spec. Ed. 4230.

4250 Nature of Hearing Impairments (3) Basic principles of hearing; causes and treatment of deafness; types of hearing loss; modes of communication; issues of speech and hearing; nature and causes of hearing loss; audiology and speech pathology.

4251 Introduction to the Psychology and Education of Learning Disabilities (3) Prerequisite: Speech 4190. Analysis of exceptions of educational and psychological situations in which learning and behavior difficulties occur. Initiation of behavior changes and supportive techniques to normal academic achievement for the pupil. Prereq: Phonology 4160 or consent of instructor.


4381 Teaching the Reading of Hearing Impaired Children (3) Readiness activities, developmental approaches, theories, and specialized materials for curricula in teaching the hearing impaired.

4400 Appraisal of Speech and Language Disorders (3) Same as Audiology and Speech Pathology 4040.

4470 Clinical Practice in Audiology (1-6) (Same as Audiology and Speech Pathology 4450).

4480 Eye Problems Encountered by the Teacher (3) Eye anatomy and hygiene; common diseases and conditions; observation and participation in direct treatment and educational adjustment of pupils with special visual needs. Prereq: Consent of instructor.

4510 Introduction to the Clinical Practice of Speech Pathology (3) (Same as Audiology and Speech Pathology 4510).

4520 Introduction to Clinical Practice in Speech Pathology (3) (Same as Audiology and Speech Pathology 4520).

4530 Clinical Practice in Speech Pathology (1-6) (Same as Audiology and Speech Pathology 4530).

4540 Clinical Practice in Speech Pathology (1-6) (Same as Audiology and Speech Pathology 4540).

4570 Clinical Practice in Audiology (1-6) (Same as Audiology and Speech Pathology 4570).

4610 Nature and Characteristics of Learning and Behavior Disorders (3) Forms of academic and socially disturbing behavior, degrees of severity, possible causes, and relationships to each other. Review of social, academic, and environmental factors.
means of communication in technology. Ortho-
graphy and multi-view drawing, conventional prac-
tices, and techniques involved in radiography, me-
gelogy of metal-working industries. Involves processes in machining, foundry, sheetmetal, and fabrication.

1642 General Metals (3) Basic course dealing with cutting tool materials, properties of ferrous and non-
ferrous metals, and application of principles in machine shop theory and practice in using basic machine tools. Undergraduate credit only.

1645 Shop Organization and Management (3) Understanding of preventive maintenance, maintenance, and calibration of instru-
ments and power equipment used in industrial edu-
cation.

1650-40 Machine Tool Processes (3) Introduction to the function, care, set-up, operation, and applications of various machine tools. Prereq: 1642.

1660 Machine Tool Processes (3) Process of the function, care, set-up, operation, and applications of various machine tools. Prereq: 1642.

1670-80-81 Machining of Metals (3, 3, 3) Introduction to machine shop theory and practice in using basic machine tools. Undergraduate credit only.

3110 History and Philosophy of Industrial Educa-
tion (3) History and philosophy of the development of industrial education.

3120-30-31 Shop Programmes in Cooperative In-
dustry Training (3, 3, 3) Principles of organization, function, and machine processes.

3300 Shop Organization and Management (3) Understanding of preventive maintenance, maintenance, and calibration of instru-
ments and power equipment used in industrial edu-
cation.

3300-30 Materials and Methods for Teachers of Shop and Related Subjects (3, 3) Principles of organization, function, and machine processes.

3340 School Shop Safety (3) Principles of organization, function, and machine processes.

3510 Development and Utilization of Advisory Committees (3) Philosophy and rationale for use of advisory committees; their selection, organizati-
on, implementation and utilization.

3612 Automotive Mechanics (3) Advanced labora-
ory experience in tune-up, overhauls, transmissions, and the suspension system. Prereq: 1610.

3621 Industrial Graphics (3) Auxiliary views, sec-
tions, conventional practices, fasteners, dimension-
ing, working drawings, and machine drafting. Prereq: 1620.

3632 Industrial Electricity and Equipment Control (3) Involves construction and application of industri-
al and electrical equipment. Prereq: 1610.

3633 Industrial Electricians and Equipment Control (3) Involves construction and application of industri-
al and electrical equipment. Prereq: 1610.

3640 Advanced General Metals (3) Provides expe-
rience in areas of hot and cold forming of metals, molding and stamping finishing, tool grinding, heat treatment, fabrication, and precision measurement. Prereq: 2641.

3651 Plastic Processing (3) Plastics production equipment and related product design and process ing of plastics. Prereq: 2652 and 1681.

3673 Graphic Arts Reproduction Processes (3) Graphic arts skills in printing and duplicating tech-
niques for offset and other modern graphic communica-
tion.

4702-75-76 Tool and Machine Design (3, 3, 3, 3) Tool and machine design, calculations, design systems, and designing procedures. Undergraduate credit only.

4900 Numerical Control (3) Teaching, manual pro-
duction, and application of numerical control, automatic programming language, and use of automatic pro-
cessor-controlled equipment. Undergraduate credit only.

4910 Foremanship Training by the Conference Method (3) Techniques of laboratory operation. Prereq: Consent of instructor.

5200-50-51 Machine Design (3, 3, 3) Machine design, design calculations, design systems, and designing procedures. Undergraduate credit only.

5410 Improving Teachers in Service (3) Undergraduate credit only.

5430 Vocational School Administration and Man-
agement (3) Advanced methods of teaching skills and technical information (3)


5450-60-70 Problems in Industrial Education (3, 3, 3) Problems in industrial education.
The engineer applies mathematical and scientific knowledge in planning economical ways of providing materials and energy in forms that are useful to mankind. 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.

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 as an engineering curriculum jointly with the physics department, first introduced into the curriculum in 1838. In 1877 civil engineering was first recognized as a curriculum. The first mechanical course appeared as an engineering curriculum in 1838. In 1877 civil engineering was first recognized as a curriculum. The first mechanical course appeared as an engineering curriculum in 1838. In 1877 civil engineering was first recognized as a curriculum. The first mechanical course appeared as an engineering curriculum in 1838. In 1877 civil engineering was first recognized as a curriculum. The first mechanical course appeared as an engineering curriculum in 1838. In 1877 civil engineering was first recognized as a curriculum. The first mechanical course appeared as an engineering curriculum in 1838.
and Polymer Engineering, and Mechanical and Aerospace Engineering. In addition to classrooms and instructional laboratories, it provides modern facilities for various types of research.

Berry Hall. This building is used by the Department of Civil Engineering and the Engineering Experiment Station.

Tau Beta Pi National Headquarters

The college is honored to have the National Headquarters of Tau Beta Pi, the National Engineering Honor Society, located on our campus. This honor was earned in part through the untiring efforts of R.G. "Red" Matthews, who served as secretary-treasurer for the organization from 1905 to 1947. The suite of offices, located in Gentry Hall, is occupied by Mr. R.H. Nagel, secretary-treasurer, and his staff.

Chi Epsilon National Headquarters

The college is also honored to have the National Headquarters of Chi Epsilon, the National Engineering Honor Society, housed on our campus. This honor was earned in part through the efforts of Tom Conklin, who served as secretary-treasurer for the organization. The suite of offices, located in Gentry Hall, is occupied by Mr. R.H. Nagel, secretary-treasurer, and his staff.

Cooperative Engineering Program

The five-year Cooperative Engineering Program offers the student an opportunity to combine significant experience in industry with academic study. Cooperative work assignments differ from part-time or summer employment in that they involve regularly scheduled cycles of full-time academic quarters alternated with full-time work quarters—usually six months of academic effort and six months of industry join together to offer a broader and richer preparation for graduate employment and for life in general than 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 contacts, 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 it is of great significance in total education and effectiveness.

Admission to the Cooperative Engineering Program is open to any student in the college (or in agricultural engineering in the College of Agriculture) who is in good standing, whose record indicates capability and dependability, and who is acceptable to a co-op employer. In general, work periods begin at the end of the second or third quarter of the freshman year and continue for seven alternating work and school cycles.

Applicants must be able to schedule a minimum of five such cycles before the beginning of their senior year in order to qualify for co-op placement. Academic schedules for co-op students are shown elsewhere in this section. A brochure with further details may be obtained from the Office of the Coordinator, Cooperative Engineering Program, College of Engineering.

Binary Program

A binary program in engineering is available. The college has 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 branches of engineering.

Institutions cooperating with The University of Tennessee in offering this Liberal Arts-Engineering 3-2 Binary Plan include:
- Belmont College, Nashville, Tennessee
- Bethel College, McKenzie, Tennessee
- Carson-Newman College, Jefferson City, Tennessee
- David Lipscomb College, Nashville, Tennessee
- East Tennessee State University, Johnson City, Tennessee
- King College, Bristol, Tennessee
- Knox College, Knoxville, Tennessee
- Maryville College, Maryville, Tennessee
- Middle Tennessee State University, Murfreesboro, Tennessee
- Southwestern University, Memphis, Tennessee
- Tennessee Wesleyan College, Athens, Tennessee
- Union University, Jackson, Tennessee

Questions about courses to be taken in preparation for transfer to The University of Tennessee 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. 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 and professional practice is offered in aerospace, civil, electrical, environmental, industrial, mechanical, and nuclear engineering. Information concerning graduate programs is given in the Graduate Catalog.

M ASTER OF SCIENCE PROGRAM

The station is organized to conduct research underlying engineering practice and the advancement of the field’s resources and industries insofar as funds available will permit. Inquiries from industries concerning technical questions which interest them are welcomed. The station may also make special arrangements with any person or company to study a technical question within the capacity of its resources, and to report the results exclusively to the company requesting the study. In such cases, the whole expense will be carried by the parties requesting the investigation.

Bulletins are published from time to time giving the requirements of the college and the heads of departments in allied scientific fields may assist in determining policy and procedures. Members of the faculty of the college are available for consultation and advice in technical matters.

The space institute is also available for the conducting research engineering practice and the advancement of the institute’s resources and industries insofar as funds available will permit. Inquiries from industries concerning technical questions which interest them are welcomed. The institute may also make special arrangements with any person or company to study a technical question within the capacity of its resources, and to report the results exclusively to the company requesting the study. In such cases, the whole expense will be carried by the parties requesting the investigation.

The maximum number of hours which can be taken by an undergraduate without special

College of Engineering

administration of the program is provided by an Engineering Administration Committee consisting of representatives from participating departments in the College of Engineering and Business Administration, and an engineer appointed by the dean of engineering. Further information is provided 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.

Engineering Experiment Station

F. H. Perleman, Director

The management of the Engineering Experiment Station is vested in the president of the University, the dean of engineering, the director, and the associate director.

An advisory committee consisting of the heads of departments of the college and the heads of departments in allied scientific fields may assist in determining policy and procedures. Members of the faculty of the college are available for consultation and advice in technical matters.

The space institute is also available for the conducting research engineering practice and the advancement of the institute’s resources and industries insofar as funds available will permit. Inquiries from industries concerning technical questions which interest them are welcomed. The institute may also make special arrangements with any person or company to study a technical question within the capacity of its resources, and to report the results exclusively to the company requesting the study. In such cases, the whole expense will be carried by the parties requesting the investigation.

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The maximum number of hours which can be taken by an undergraduate without special

Curricula in Engineering

NATIONAL ACCREDITATION

The engineering programs at institutions of higher learning have been accredited by the Engineers Council for Professional Development (ECPC), an organization formed by many engineering societies. Currently, accredited engineering curricula at UTC include aerospace, agricultural, chemical, civil, electrical, engineering science, industrial, mechanical, and nuclear engineering. Professional programs are also accredited in civil, chemical, electrical, and mechanical.

COURSE LOAD

The maximum number of hours which can be taken by an undergraduate without special

Questions about courses to be taken in preparation for transfer to The University of Tennessee may be directed to the dean of engineering.

M ASTER OF SCIENCE PROGRAM

The station is organized to conduct research underlying engineering practice and the advancement of the institute’s resources and industries insofar as funds available will permit. Inquiries from industries concerning technical questions which interest them are welcomed. The institute may also make special arrangements with any person or company to study a technical question within the capacity of its resources, and to report the results exclusively to the company requesting the study. In such cases, the whole expense will be carried by the parties requesting the investigation.

Curricula in Engineering

NATIONAL ACCREDITATION

The engineering programs at institutions of higher learning have been accredited by the Engineers Council for Professional Development (ECPC), an organization formed by many engineering societies. Currently, accredited engineering curricula at UTC include aerospace, agricultural, chemical, civil, electrical, engineering science, industrial, mechanical, and nuclear engineering. Professional programs are also accredited in civil, chemical, electrical, and mechanical.

COURSE LOAD

The maximum number of hours which can be taken by an undergraduate without special
permutation is 19 hours. The dean of engineering must give permission to take 20 hours or more.

DROP DEADLINE
All students (whether engineering majors or not) enrolled in undergraduate courses taught within the College of Engineering may, on their own initiative, withdraw from a course within six calendar days from the first day of class (through the day preceding the add deadline for the course). Withdrawal from any such course for any reason after the sixth day must be in accord with official late drop procedures (see page 25).

GPA COMPUTATION
All grades are to be computed in the grade point average, except up to 12 hours of repeatable grades for which the last grade shall count (see page 16). This computation is applied to all courses taken by an undergraduate engineering student, regardless 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.

Inspection Trip. 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 credits should be initiated by the student or the major department.

Transfer credit will not be accepted from the head of the department into which the student proposes to transfer following the evaluation of transfer credits by the Admissions Office.

C. Program for B.S. and B.S. Degree. Upon approval by the dean of 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 12 quarter credit hours. The prevailing University regulations shall apply (see page 27).

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

Correspondence Courses. A student should check with the 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 Studies Electives. The college assumes an obligation to include in the core of the engineering curriculum those areas whereby students gain greater insight into their interactions with society, both personally and professionally. For this purpose, a part of each engineering curriculum is devoted to humanities and social studies electives. Broadly stated, these electives have a three-fold need: to provide an expanded perspective to the human aspects of the time practice of engineering; to enrich the student's knowledge of the world in which he or she lives—its culture, behavior patterns, history, and governance; and to provide a basis for the appreciation of and the ability to deal with complex interactions between technology and society in the contemporary world. Engineers are now working with new complex forces that demand a consciousness of the social and political implications of their work. They are interacting with the public in explaining their work as the public demands greater participation in the decision-making process concerning the utilization of technology. Because of the significance of this technology-society interplay, engineering students are encouraged to seriously consider their selection of required electives in this area.

Students are urged to plan a non-technical electives program which will enhance their own interests and objectives. It is recognized that, just as engineers show individual preference for concentration in one of the areas of engineering, they differ in their interests in the many areas of the humanities and social sciences. However, these subjects should be pursued with sufficient depth in terms of courses to permit a reasonable level of comprehension of the selected areas. In order to increase the effectiveness of this interest and to meet ECPD accreditation guidelines, the Humanities and Social Studies Electives Committee of the college evaluates and approves the selection of required electives from this list of 13 coherent groups of courses identified in three broad areas as follows:

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

Area II. Society-Its Culture, History, and Literature
A. 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 follow are selected by the committee with revises as course offerings and needs change. They are recommended as satisfying the non-technical (humanistic-social) electorate requirement in the various curricula of the college. However, the structure and permissible courses of the non-technical elective content of each engineering curriculum is 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 adviser prior to registering for elective courses. 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
A. Governance and Political Science
Business Law 4110
Economics 3340
Geography 3810
History 3795, 4311-21, 4370, 4380
Political Science 2510-20, 3545-65, 3935, 3955, 3965, 3970-75, 3980, 3990, 4025-35, 4040-45, 4650-65, 4860-65, 4940
Sociology 3030, 3430, 4330, 4350
IB. Economics
Geography 2110-20-30, 2119-28-38, 3110, 3120, 3230, 3240, 3250
Geography 2110-20-30, 3140
Geology 2120
Management 4280
IC. Sociology and Psychology
Geography 3000, 3600, 3660
Journalism 4410
Psychology 2530, 3170, 3230, 3590, 3645, 4560, 4580
Sociology 1510, 1520, 3030, 3150, 3160, 3170, 3180, 3230, 4330, 4580
ID. Human Values
Geography 3000
History 4640-50-60
Philosophy 2110, 2111-21-31- 41, 3111-12, 3440, 3690, 3910
Religious Studies 2610, 3650, 3660- 10-20, 3740
Area II. Society-Its Culture, History, and Literature
IA. Fine Arts (Note: More than 8 quarter hours may be taken in the performing arts—dance, music, chorus, etc.)
Art 1510-25, 355, 3736, 3745, 3746, 3756
English 3640, 4311-12-20-30
Music Xxxx Ensemble
Music 1210-20, 1340, 2139-20-25-30, 3380, 4210, 4220, 4241-50, 4260-70
Theatre 1510-25, 3253-54
IB. American Studies
American Studies 3010
Art 3375, 3376, 3716, 3746
Black Studies 2010-20, 3550-60, 4830
English 2530, 2540, 2540-50, 3010- 20-30, 3060, 3180, 3190, 3340, 4550- 60, 4620, 4625-51
Geography 3430, 3460, 3690, 3910, 3940, 3950, 3960, 3980, 4420
History 1950-60, 2350, 2510-20, 3610- 20, 3670, 4260, 4820, 4820, 4840-50- 60
Music 1210-20-30, 1340, 2310-20- 30-40, 3630
Philosophy 1510-20, 3111-12, 3315, 3440, 3445-46
Political Science 3601-32-03-04
Religious Studies 3510-20, 3560, 3740
Speech 4911-21
Theatre 2563-63
University Studies 3010

RC. History

Geography 4240
Religious Studies 2511, 3121-31

RD. Literature

Classics 2710-20, 3210-30-31
Comparative Literature 2010
English 2510-20-30-40, 2590-70-80, 2690, 3010-20-30, 3070-80, 3160, 3940, 4010-20, 4050-60, 4310-20-30-40, 4620, 4651-52, 4720-30
German 3210-20-30
Psychology 4680
Religious Studies 3710
Russian 3210-20-21-30

RE. Anthropology

Anthropology 3510-20, 30-30, 3410, 3940, 3710, 3880, 4420
Asian Studies 2510-30
Geography 1910, 3690
History 1950-60, 4250-60-70, 4640-50-60

Area III. Technology and Society

Agricultural Economics 4330
Anthropology 4430
Botany 3090
Geography 3490, 3520-30, 3690, 3910
Journalism 4410
Political Science 4940
Psychology 4670
Public Health 3320

RII. Technology Assessment

Biology 3130

Botany 3090
Economics 3040, 4260
Economics 2110-20-30, 3430, 3490, 4240
Geology 2310, 3610
Philosophy 3720, 3740-50, 3770, 4710
Psychology 4900
Religious Studies 3740
Rural Sociology 4450
Sociology 3061, 4110, 4330
University Studies 3010, 4100

IIIC. History

Communication

Broadcasting 3650 or Journalism 2210
Journalism 3110, 3710-20, 4410
Philosophy 2510-20
Sociology 3010
Speech 2311, 2331, 3011, 3021

IIID. Literature

Economics 4260
Forestry 3750
Geography 2110-20-30, 3490
Geology 2310
University Studies 3010, 4110

American History Requirement.

Engineering students, regardless of national origin, graduating in August 1978 or thereafter, 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-social studies electives. 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.

CURRICULA, TABULAR VIEW

In the following pages are given the course requirements for the various engineering curricula. With no deficiencies in entrance requirements and with careful scheduling of courses, students should complete the regular curricula in four academic years, or the cooperative curricula in five years. In the following tabulations, the numbers immediately following the names of the courses refer to the description of the course under "Departments of Instruction." The numbers in the columns indicate the number of quarter hours of credit applicable to each course. Non-technical electives are the same as humanities-social studies electives.

Aerospace Engineering

Freshman

Math 1840-50-60 4, 4, 4
Chemistry 1110-20-30 4, 4, 4
English 3210-30-40 3, 3, 3
Economics 3240, 4260 4, 4, 4
Psychology 1410-20 3, 3, 3
Basic Engineering 1310-20-30 3, 3, 3
Basic Engineering 1410 2

Sophomore

Aero. Eng. 3400 1
Aero. Eng. 3040-50-60 3, 3, 3
Mech. Eng. 2540-50-60 3, 3, 3
Materials Eng. 2540-50-60 3, 3, 3
Eng. Sci. & Mech. 3311, 3760 3
Maj. Eng. 2110 3
Software Engr. 3150 3
Computer Science 3100 3

*Humanities/social studies electives...

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

Junior

Aero. Eng. 3490 1
Aero. Eng. 3511-30-40 3, 3, 3
Aero. Eng. 3040-50-60 3, 3, 3
Mech. Eng. 3410 3
Mech. Eng. 3440 3
Mech. Eng. 3810 3

*Humanities/social studies electives

Engineering students may participate in the RUTC Program. Advanced RUTC 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. No RUTC course can be used as a humanities-social elective. Individual departments determine the appropriate 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.
Biomedical Engineering

Available in Engineering Science Degree Program

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<thead>
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<th>Course</th>
<th>Hours Credit</th>
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<tr>
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<td>Engineering Science</td>
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Sophomore

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<tr>
<td>Industrial Engr. 4320</td>
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Junior

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<tr>
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Senior

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Elec. engr. Tech. electives | 3 3 3 |

Technical electives | 3 6

TOTAL: 203 hours

Chemical Engineering

Freshman

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<td>Graphics 1410-20</td>
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Sophomore

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<td>Chemistry 2100-24-45</td>
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<td>Math 2360-50-80</td>
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Junior

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Senior

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Elec. engr. Tech. electives | 3 3 3 |

Technical electives | 3 6

TOTAL: 203 hours

Electrical Engineering

Freshman

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Senior

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Elec. engr. Tech. electives | 3 3 3 |

Technical electives | 3 6

TOTAL: 203 hours
### Computer Engineering
- Elect. Engr. 4450: 3
- Elect. Engr. 4580: 3
- Elect. Engr. 4610: 3
- Elect. Engr. 4780: 2
- Elect. Engr. 4820: 3
- Math 4710 or 4810: 3
- Elect. Engr. 4100: 3
- Elect. Engr. 4320: 3
- Elect. Engr. 4540: 3
- Economics 3110: 3
- Humanities/social studies electives: 4 4 4

#### TOTAL: 203 hours

### Electronics and Instrumentation
- Elect. Engr. 4580-60, 4700: 3 3 3
- Elect. Engr. 4460: 3
- Elect. Engr. 4410: 3
- Elect. Engr. 4320: 3
- Elect. Engr. 4480: 3
- Elect. Engr. 4850: 3
- Elect. Engr. 4820: 3
- Economics 4110: 3
- Humanities/social studies electives: 4 4 4

#### TOTAL: 205 hours

### Bioscience Option
- Biology 1210-20-30: 4 4 4
- Chemistry 2250: 4
- Elect. Engr. 4650: 3
- Zoology 3060-3089: 4 4 4
- Math 1840-50-60: 4 4 4
- Mathematics 2840-50-60: 4 4 4
- Physics 2310-20-30: 3 3 3
- Physics 3190-20: 4 4 4
- Electronics and Instrumentation: 4 4 4

#### TOTAL: 206 hours

### Engineering Physics

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#### TOTAL: 196 hours

### Engineering Science

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#### TOTAL: 196 hours

### Industrial Engineering

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#### TOTAL: 203 hours

### Mechanical Engineering

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<td>Industrial Engineering 4200: 3 3 3</td>
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#### TOTAL: 206 hours

### Mathematics

- Math 4000-50-60: 3 3 3
- Math 4010-20-30: 3 3 3
- Math Electives: 3 3 3

#### TOTAL: 99 hours

### Humanities/social studies electives
- Minimum of 19 hours

### Industrial Engineering
- Graduates in mechanical engineering, mathematics, or physics as approved by the department.
### Metallurgical Engineering

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- Not required in the cooperative program.
- A 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.

### Nuclear Engineering

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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 Agricultural Engineering

(See College of Agriculture Section)

#### Cooperative Curriculum in Chemical Engineering

**Students Working Spring and Fall Quarters—Group A**

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<th>Summer</th>
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**Students Working Summer and Winter Quarters—Group B**

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*Note: A minimum of one-half (1/2) quarter hours of the humanities/social studies electives must be taken from one single area of the humanities and social studies electives.*
## Cooperative Curriculum in Civil Engineering

### Students Working Spring and Fall Quarters—Group A

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### SECOND YEAR

- **Total:** 201 hours

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### Students Working Summer and Winter Quarters—Group B

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**Total:** 201 hours

*Humanities/social studies courses approved by the department.

*Mechanical engineering 3202 or 3211 may be substituted.

*Technical electives must be approved by the student’s adviser 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.

*Math/science courses approved by the department.

*Economics courses approved by the department.
## Cooperative Curriculum in Electrical 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: 203-206 hours
Cooperative Curriculum in Engineering Physics

**Students Working Spring and Fall Quarters—Group A**

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**Students Working Summer and Winter Quarters—Group B**

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*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.

*Physics 1318-28-38 is recommended for qualified majors.

*Students not pursuing graduate studies may substitute Physics 3710-20-30.


*From engineering, mathematics, computer science, physics, chemistry, or astronomy.

*Electronics and Electromagnetics students may substitute Physics 3170-20-30-30.

### Cooperative Curriculum in Engineering Science

**Students Working Spring and Fall Quarters—Group A**

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**TOTAL:** 196 hours

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**Students Working Summer and Winter Quarters—Group B**

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**TOTAL:** 196 hours

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1. *Humanities/social studies courses approved by the department.
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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TOTAL: 206 hours

Students Working Summer and Winter Quarters—Group B

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TOTAL: 206 hours
Cooperative Curriculum in Mechanical Engineering

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*Humanities/social studies electives: minimum of 19 hours required.
Mechanical engineering electives: select courses in mechanical or aerospace engineering not otherwise required.
Technical electives: upper-division courses in engineering, mathematics, or physics as approved by the department.
Cooperative Curriculum in Metallurgical Engineering

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Students Working Summer and Winter Quarters—Group B

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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.
### Cooperative Curriculum in Nuclear Engineering

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| Nuc. Engr. 4220 | 3  | 3      |        |        |
| Nuc. Engr. 4230 | 3  | 3      |        |        |
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**TOTAL: 198 hours**

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### Students Working Summer and Winter Quarters—Group B

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#### Fourth Year

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#### Fifth Year

| Nuc. Engr. 4210 | 3  | 3      |        |        |
| Nuc. Engr. 4220 | 3  | 3      |        |        |
| Nuc. Engr. 4230 | 3  | 3      |        |        |
| Tech. elect. | 3  | 3      |        |        |

**TOTAL: 198 hours**
4100 History of Engineering (4) History of technology and engineering with emphasis on identifica-
tion of developments in major areas such as transportation, communication, energy, manufac-
turing, design, and materials. Relationship to social and political structures of historical periods. Open
to all students.

4200 Technology Forecasting and Assessment (4) Procedures and problems in forecasting of conse-
quencies of existing and new technologies; assessment of and decisions on use of these technologies.
Social, political, economic, and technical implications and policy formulation with attention to
acceptance, implementation, and control of technology. Open to all students.

4300 The Interaction Between Science and En-
gineering (4) Historical and current examples of
interactions between science and engineering—
patterns at mutual stimulation and of distinction.
Open to all students.

Chemical, Metallurgical, and Polymer Engineering

Chemical Engineering

1320 Basic Thermodynamics (4) Introduction to
thermodynamics, fluid statics, and mechanics.
simple harmonic motion. Prereq.: Math 1310; coreq.:
Math 1850. Impulse-momentum, work-energy; introduction to
vectors; particle kinetics using Newton's laws, conserved
variables, work-energy; introduction to singular harmonic motion.
Prepay: 1310; coreq Math 1850. 4 hrs and 1 lab hr.

1410 Engineering Computations (3) Familiarization
and introduction to the university computing sys-
tem for problems. BASIC language. Prepay: Math
1410. 2 hrs plus open lab computation.

Graphics (443)

Professor: J. Hinton

Basic Faculty

S. M. Thomas, M.S.
Tennessee; M. A. Wright*, Ph.D. Wisconsin.

Associate Professor:

J. F. Fellers

Syracuse; W. W. Thomas, Jr. (Emeritus), B.S.

Tennessee; W. H. Crawford*, Ph.D. Cincinnati; J. F. Fellers,

Ph.D. Illinois.

Assistant Professor:

S. D. Houghton, J. M. Yoshimura, B.S.

Pennsylvania; C. D. Lubin, M.S.

Pennsylvania; H. W. Hsu, Ph.D. Wisconsin; S. H. Jury

B.S. Pennsylvania; J. W. Prados (Vice President for

Chemical, Metallurgical, and Polymer Engineering

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vectors; particle kinetics using Newton's laws, conserved
variables, work-energy; introduction to singular harmonic motion.
Prepay: 1310; coreq Math 1850. 4 hrs and 1 lab hr.

1410 Engineering Computations (3) Familiarization
and introduction to the university computing sys-
tem for problems. BASIC language. Prepay: Math
1410. 2 hrs plus open lab computation.

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variables, work-energy; introduction to singular harmonic motion.
Prepay: 1310; coreq Math 1850. 4 hrs and 1 lab hr.

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and introduction to the university computing sys-
tem for problems. BASIC language. Prepay: Math
1410. 2 hrs plus open lab computation.

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Prepay: 1310; coreq Math 1850. 4 hrs and 1 lab hr.

1410 Engineering Computations (3) Familiarization
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1410. 2 hrs plus open lab computation.

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Math 1850. Impulse-momentum, work-energy; introduction to
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variables, work-energy; introduction to singular harmonic motion.
Prepay: 1310; coreq Math 1850. 4 hrs and 1 lab hr.

1410 Engineering Computations (3) Familiarization
and introduction to the university computing sys-
tem for problems. BASIC language. Prepay: Math
1410. 2 hrs plus open lab computation.

Graphics (443)

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Associate Professor:

J. F. Fellers

Syracuse; W. W. Thomas, Jr. (Emeritus), B.S.

Tennessee; W. H. Crawford*, Ph.D. Cincinnati; J. F. Fellers,
4250 Heat Transfer (4) Differential and overall en-
ergy balance, properties of fluids, fouling, heat transfer elements, buoyancy and convection, radiation, Prereq: 3420 or equivalent. 3 hrs or 2 hrs and 1 lab.

4310 Heat and Mass Transfer (3) Heat and mass transfer in fixed beds: applications include absorption, ion exchange, crystallization. Prereq: 3450.

4520 Process Modeling, Simulation, and Control of Chemical Processes (5) Development of process models, experimental process identification, proc-
ess simulation, control system design and non-
conventional feedback control, advanced control concepts. Prereq: 3620 or equivalent. 3 hrs and 2 labs.


4750 Microbiological Process Engineering (Ap-
lication of chemical engineering principles and de-
design concept to microbiological processes; con-
struction of mathematical models for microbial processes, computer simulation, conventional and non-
conventional feedback control, advanced control concepts. Prereq: 3450 or equivalent. 3 hrs and 2 labs.

4781-483-487 Topics In Chemical Bioengineering (3, 3, 3) Problems of interest in chemical engineering problems. Prereq: Consent of instructor.
terials, nuclear fuel materials, and interaction of radiations with solids to produce changes in engineering properties. Suggested for nuclear and mechanical engineers.

3170 Engineering Materials VII (3) Extension of 2110 to biomedical applications of materials. Engineering materials in biomedical applications: dental; corrosion; failure; tissue integration. Prereq: 2110 or equivalent. 3 hrs and 1 lab. 3 hrs and 1 lab.

3210 Plastic Deformation (4) Phenomenon and theory of plastic deformation of metals. Plasticity concepts of crystallography and mechanical behavior of metals. Prereq: 2110 or equivalent. 3 hrs and 1 lab.

4240 Engineering Materials Design (3) Property and design of metallic, plastic, and ceramic materials. Prereq: 3110 or equivalent. 3 lab.

4740 Mechanical Metallurgy 1 (3) Ductile and brittle behavior, plasticity, fracture, cleavage, fatigue, hardness, strength, stiffness, castings, weldability, and fatigue. Prereq: 3120 or 3230. 3 hrs and 1 lab.

4770 Mechanical Metallurgy III (3) Failure plastic strain, plastic stress-strain relations. Principles of fracture: forging, swaging, extrusion, rolling, deep drawing. 3 hrs and 1 lab. Prereq: 4720 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)

5060 Mechanical Behavior of Solids and Structures (3)

5070-55 Advanced Topics in Materials Science (3, 3, 3)

5080 Doctoral Research and Dissertation

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)

5170-80 Plastic Deformation (3, 3)

5210-20 Welding Metallurgy (3, 3)

5310 Solidification and Crystal Growth I (3)

5410-20 Advanced X-Ray Diffraction (3, 3, 3)

5510 Applied Properties of Solids (3, 3)

5540 Electron Microscopy I and II (3, 3)

5610-20 Reaction Engineering (3, 3)

5620-30 Solidification and Crystal Growth II and III (3, 3)

5710 Optical Properties of Solids (3, 3)

5810 Mechanical and Physical Properties of Crystals I (3)

5820 Mechanical and Physical Properties of Crystals II (3)

5870 Diffusion in Anisotropic Polymers (3)

Polymer Engineering (605)

4230-40 Project Laboratory (3, 3) Laboratory investigation of polymer engineering problem. Written report required for each quarter.

4910 Applied Polymers Science (3) First course in physical properties of polymers. Polymer structure, crystalline and glass transitions, physical properties of amorphous and crystalline polymers, crystallization kinetics, and chemical properties are discussed. Prereq: Senior standing in engineering or science. Not for graduate credit by polymer engineering majors.

4920 Polymer Engineering II (3) Rheological properties of polymer melts and solutions, viscoelasticity; unit operations of fiber, plastics, and rubber industries: dimensional analysis and scale-up, flow through dies and pipelines, screw extrusion, spinning of fibers and filaments, extrusion, injection molding, and injection molding of engineering or science. Not for graduate credit by polymer engineering majors.

4930 Principles of Fiber Textile Engineering (3) Chemical and crystalline structure of common fibers; spinning, weaving, and knitting; finishing. 3 lab.

5230 Mechanical Behavior of Solid Polymers (3)

5310 Polymer Solution Properties and Characterization (3)

5410 Rheology and Polymer Processing (3)

5620 Advanced Methods in Polymer Processing (3)

5630 Advanced Mechanical Behavior of Polymers (3)

5640 Advanced Industrial Polymer Chemistry (3)

5650-70 Recent Advances in Polymer Science and Engineering (3, 3, 3)

Civil Engineering

Civil and Environmental Engineering

Civil and Environmental Engineering


Associate Professors:


BACHELOR OF SCIENCE PROGRAM

The curriculum in civil engineering is designed to provide training in fundamental engineering sciences, certain non-technical subjects and basic subjects in various civil engineering fields to serve as a basis for entrance into civil engineering practice, and/or for graduate study. By use of technical electives (27 hours maximum), a student can specialize as primary or secondary areas of study in construction, environmental engineering, structures, transportation, or water resources. Primary specialization will be shown on student’s transcript.

Students are required to maintain a cumulative grade point average of at least 2.00 in all civil engineering and environmental engineering courses taken at The University of Tennessee, Knoxville, and used to satisfy the graduation requirements.

MASTER OF SCIENCE AND MASTER OF ENGINEERING PROGRAMS

Graduate programs in civil engineering and environmental engineering leading to the degree of Master of Engineering are offered to graduates of recognized undergraduate curricula. The general requirements for the masters' degrees are stated in the Graduate Catalog.

DOCTORAL PROGRAM

A Doctor of Philosophy degree is offered to the degree of Doctor of Philosophy with a major in civil engineering. Major fields of study include environmental engineering, structural engineering, transportation, construction management, and water resources.

The general requirements for the doctoral degree are stated in the Graduate Catalog.

Civil Engineering (254)

2340 Land Surveying (3) Principles of surveying; accuracy in surveying measurements; analysis of errors; control systems and control points, mapping and as-built areas. Prereq: Math 1890.
2350 Presentation and Discussion of topics related to civil engineering.
2320 Design of Framed Structures (3) Selection of normal beams; design of compression and tension members and plates (I-U). Prereq: 4410 or registration therein.
3110 Physical Properties of Soils (3) Introduction to soils as a construction material, properties of soils, effects of engineering physical properties of soils, effects of physical properties of soils, 2 hrs of lecture and 1 lab. Prereq: Eng. Mech. 3110 and 3120.
3115 Introduction to the physical properties of soils, effects on construction; introduction to topics related to civil engineering.
3300 Transportation Engineering (3) Emphasis on transportation problems and perspectives, both rural and urban; use of the planning process to establish existing traffic patterns, modeling of demand, proposing alternatives and their evaluation and implementation. Prereq: Junior standing.
3930 Transportation Engineering (3) Introduction to design, construction, maintenance, and operation of a variety of transportation modes, their guidelines and terminals. Prereq: Junior standing.
4710 Materials of Construction (3) Mechanical properties of specific construction materials, behavior of materials and structures under load, ferrous and nonferrous metals, cements, concrete, asphalt, and wood. 2 lectures and 1 lab. Prereq: Engr. Mech. 3310.
4110 Concrete Design (3) Reinforced concrete columns and beams, use of standard procedure. Prereq: 4110 and 4110.
4230 Foundations and Substructures (3) Foundation explorations: design of deep and shallow foundations. Prereq: 3110.
4320 Legal and Ethical Aspects of Engineering (3) Legal principles underlying engineering work, laws of contracts, torts, agency, real property; problems of professional registration and ethics.
4240 Structural Design (3) Plastic theory, eccentric connections, industrial building design, timber design. Two 3-hour periods. Prereq: 3350 and 4110.
3320 Seminar I, Seminar II (1) Selected topics dealing with historical, military, and professional aspects of civil engineering. Prereq: Senior standing.
4140 Deflections and Statically Indeterminate Structures (3) Deflections, forces, moving loads; use of influence lines; lateral forces due to earthquake and wind. Prereq: 3710 and 3710. or Current College.
4420 Analysis of Frame Structures (3) Maximum and minimum strength of frames. Use of computer methods for solution of civil engineering problems. Prereq: 4410.
4430 Construction Methods and Equipment (3) Fundamental operations in construction: selection, procurement, and use of concrete, cost estimates. Prereq: Senior standing.
4460 Land Surveying (3) Procedures of locating properties; evaluation of survey data; procedures to describe property, to create land divisions, and to prepare plats; laws of land surveying. Prereq: Equivalent.
4510-20 Advanced Structural Design (3,3) Plastic design in steel in 6501, design of typical structures in 6502 and 4110 for 4230.
4540 Airport Planning and Design (3) Emphasis on airport master planning, included for consideration will be zoning and location, environmental, economics, and lighting; and on the land side are included terminal layout and design, and ground access systems and parking. Prereq: 3600, 3610.
4440 Traffic Engineering (3) Characteristics of vehicle, driver and roadway and their interaction; traffic studies: basic considerations of traffic circulation and control: elements of urban transportation planning studied. Prereq: Senior standing.
4630 Highway Engineering I (3) Integration and application of various engineering principles and techniques to process of planning, locating, and design of highway facilities through comprehensive team project. 1 lecture and 2 labs. Prereq: 4500.
4650 Airport Planning and Design I (3) Integration and application of airport master planning procedures for purpose of selection and design of an airport facility through comprehensive team project. Includes environmental evaluation of design. 1 lecture and 2 labs. Prereq: 4500.
4790 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: 3110.
4820 Asphalt and Bituminous Concrete (3) Properties and tests of asphalt and asphaltic mix, mix design and bituminous concrete. Emphasis on use of asphalt in transportation construction projects. 2 lectures and 1 lab. Prereq: 3710.
4731-72 Earthquake Resistant Structures I, II (4,4) (Same as Architecture 4731-32.)
4860 Introduction to Civil Engineering Systems (3) Methods of modeling civil engineering systems and their specific application to problems of transportation, construction, environment, and quality. Prereq: Senior standing or consent of instructor.
4940 Airside and Structural Materials I, II (Same as Architecture 4560 and Engineering Science 4560)
4880 Civil Engineering Systems Design and Management (3) Computer-aided analysis and design concepts within a civil engineering context: discrete, time and/or abnormal use of optimal engineering principles in engineering practice. Prereq: Civil Engineering 4940.
4910-30 Special Topics (3,3) Problems relating to interaction of various engineering departments in civil engineering. Prereq: Consent of instructor.

GRADUATE

5000 Thesis (9) The thesis is a comprehensive report of the student's research or investigation and is accepted as part of the student's program by the faculty of the College of Engineering.
5000-52 Thesis Graduation Completion (3-15) 5110-20 Statically Indeterminate Structures I, II (3,3) 5410 Laterally Statically Indeterminate Structures (3) 5160 Methods for Construction of Structures (3) 5160 Analysis and Design of Plate Structures (3) 5150 Matrix Formulation of Structural Problems (3) 5170 Structural Dynamics (3) 5140 Statically Indeterminate Structures (3) 5000-20 Structural Statics Analysis (3) 5080 Structural Analysis (3) 5200 Pavement Design (3) 5300 Advanced Properties of Materials: Cement and Concrete (3) 5240 Advanced Properties of Materials: Bituminous Substances and Mixes (3) 5241 Pavement Construction and Transportation (3) 5100-30 Engineering Practice (3) 5320-36 Construction Practice Applied to Administration (3) 5420 Structural Model Analysis (3) 5430-45 Construction Management I, II, III (3, 3, 3) 5480-70 Construction Estimating I, II, III (3)
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 electrooptics engineering, and systems and networks. All of these areas except the bioelectric engineering option are continued into the M.B. 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.

The DOCTORAL PROGRAM

Graduate work leading to the Master of Science degree may be completed during one academic year of full-time study or the degree may be obtained in two or three years of study in the evening.

Graduate assistants and scholarships are available. Graduate assistants may obtain the master's degree in one calendar year.

Course 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 is offered. The department of electrical engineering offers a program in the engineering science doctoral program.

General policies of the Graduate School, catalog, examination, and admission to candidacy requirements are explained in the Graduate Catalog. 144
4470 Plasma II (3) Magnetohydrodynamics. Prereq: 3190.


4540 Antennas and Propagation (3) Dipole and linear antennas, arrays and simple waveguides. Antenna systems (e.g. laser lightscattering, optical data processing, holographic interferometry).

4550 Antennas and Propagation (3) Principles devoted to selected electro-optic instrumentation both spatial recording media (e.g. photographic lenses, coherent and incoherent imaging. Engineer-to-audio instrumentation for linear and digital circuits. Prereq: 3830. 3 hrs including project laboratory.

4560 Analog Signal Processing Circuits for Electronic Instrumentation (3) Use of operational amplifiers, instrumentation amplifiers, and other integrated circuits in signal processing. Design examples such as active filters, amplifiers, attenuators, function generators, active radiators, and synchronous demodulators. Analysis of interfacing problems between transistors and signal processors. Prereq: 3830. 3 hrs including project laboratory.

4610 Analog-Digital Systems (3) Principles of analog computing components. Applied to analog computing to include problem setup and testing. Characteristic of analog multipliers, dividers, and analog-to-digital and digital-to-analog conversion functions. Prereq: 3660. 3 hrs including project laboratory.

4640 Sequence Machine and Digital System Design (3) Design aspects of process control, state machine, and characteristic of one- and two-dimensional sequential circuits. Theory of asynchronous and synchronous design. Applications of small computer systems, input-output techniques. Prereq: 3660. 3 hrs including project laboratory.

4680 Electric Amplifiers (3) Feedback amplifier principles. Wideband linear amplifiers. Audio and radio-frequency power amplifiers. Prereq: 3660. 3 hrs including project laboratory.

4720 Digital Integrated Electronics (3) Comparators, logic gates, flip-flops, registers, counters, memories, analog switches. A/D and D/A converters. Prereq: 3680, 3690. 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.


4800 Electrical-Mechanical Systems Control (3) Characteristics and analysis of electro-mechanical devices used in mechatronic systems, and mechanisms, Dynamic behavior of electro-mechanical systems. Applications in industrial process control. Prereq: 3660 and 3720.

4820 Introduction to Pattern Recognition (3) Role of pattern recognition within frameworks 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 proble- ms. Prereq: Either 3660 or Statistics 3450 and Computer Science 1510. (Same as Computer Science 4820.)


4950 Advanced Direct Electrical Energy Conversion I (3) Introduction to design and analysis of direct current systems using frequency domain techniques. Real-time digi- tal filtering techniques; application of digital comput- ers in closed-loop feedback systems.

4995-50 Advanced Electromagnetics I, II, III (3, 3, 3) Electromagnetic principles for linear and digital circuits. Prereq: 3660. 3 hrs including project laboratory.


5120 Network Analysis (3) Nature and characteristic of one- and two-dimensional sequential circuits. Theory of asynchronous and synchronous design. Applications of small computer systems, input-output techniques. Prereq: 3660. 3 hrs including project laboratory.

5230 Advanced Electrical Machinery Applications (3) Advanced Electrical Machinery Applications (3) 5260 Modern Transform Methods (3) 5250 Advanced Electrical Machinery Applications (3) 5270 Modern Systems Theory I (3) 5280 Modern Systems Theory II (3) 5290 Modern Systems Theory III (3)

5310 Basic Requirements for Plasma Fusion (3) 5320 Diagnostics for Fusion (3) 5350 Properties of Quantum Devices (3) 5360 Application of Quantum Electronic Devices (3) 5370 Advanced Direct Electrical Energy Conver- sion I (3) 5380 Advanced Direct Electrical Energy Conver- sion II (3) 5390 Advanced Direct Electrical Energy Conver- sion III (3) 5420 Fault and Load Flow Studies (3) 5430 Power System Stability and Control (3) 5440 Selected Topics in Power Systems (3) 5450-55-60 Advanced Analog Electronics (3, 3, 3) 5460 Thick Film Hybrid Microcircuits (3, 3, 3, 3) 5480 Advanced Electrical Switching Circuits (3, 3, 3) 5481-55 Design Logic and Finite Automata Theory (3, 3) 5482 Introduction to Switching Theory and Logic Design (3, 3) 5580 Digital System Architecture (3) 5585 Introduction to Digital Computer and Analog Systems (3) 5586-50 Electronics Communications Systems (3, 3) 5587-50 Pattern Recognition (3, 3) 5588 Introduction to Artificial Intelligence (3) 5710 Random Process Theory for Engineers (3, 3) 5720-30 Prediction, Filtering and Detection Theory (3, 3) 5740 Digital Processing of Signals (3) 5750-60 Radar Systems Analysis (3, 3) 5770 System Identification (3) 5800 Power Transmission Lines (3) 5810-10 Electromagnetic Fields (3) 5830 Linear Antennas and Antenna Arrays (3) 5840 Antenna Arrays (3) 5850 Microwave Electronics (3) 5860 Microwave Electromagnetic Wave Propagation (3) 5870 Microwave Networks (3) 5890 Advanced Antenna Theory (3) 5895-90 Special Topics in System Methods (3) 5920-80 Advanced Antenna Theory I, II, III (3, 3, 3) 5925-80 Special Topics in Quantum Electronics (3, 3, 3) 5940-50 Advanced Antenna Theory I, II, III (3, 3, 3) 5960-10 Electromagnetic Conduction in Gases and Plasma Physics (3, 3) 5960-10 Introduction to Microwave Networks (3, 3, 3) 6660 Electromagnetic Diffraction and Scattering (3, 3) 6750-30-10 Network Synthesis (3, 3, 3) 6750 Detection Theory (2) 6760 Coding Theory (2)
The biomedical engineering elective group affords a concentration on the application of such mathematical techniques as numerical analysis and similitude for the solution of practical engineering problems. As such, heavy emphasis is placed on the use of digital computing.

The environmental sciences elective group introduces the student to some of the areas of knowledge and the special skills involved in environmental engineering efforts aimed at solving real-world environmental and ecological problems. This program gives the necessary background to students wishing to pursue graduate research studies in the field of environmental science.

The engineering synthesis elective group provides students an opportunity for a broad engineering education and offers the student an opportunity to study significant areas of engineering or the lifesciences. With this program, the student can choose to use this program as a foundation for the study of professional graduate programs, as a terminal degree, or as a foundation for interdisciplinary study.

The basic engineering sciences curriculum provides an opportunity for the student to select from the engineering science areas blocks of the engineering science courses recognized by the American Society for Engineering Education such as (1) mechanics, (2) electrical science, electric and magnetic fields, circuits, and waveforms, (3) thermodynamics and statistical mechanics, (4) materials science, (5) information science, (6) transfer and interaction problems such as energy and momentum transfer. Other modern engineering fields which may be studied in the engineering science option are numerous and relate to both the basic and environmental sciences. It is not expected that a student need be interested in all the engineering sciences but will structure a course plan to provide depth in some of the engineering sciences.

Because of the large number of elective courses to be selected in the engineering science degree program, the student should develop an overall philosophy in the selection of courses which will result in the student becoming a well-rounded engineer. The student should also consult with the academic advisor concerning the optional courses to be chosen in the upper-division years.

Before the end of the sophomore year, the student should indicate which science area informs the student of the anticipated load and the subarea of interest. The student should select his or her major advisor at the time of registration.

Throughout the engineering science program, the student is required to develop, in concert with a graduate advisor, a course plan for the upper-division years. The optional courses to be selected in the engineering science area will be determined by the student, the academic advisor, and the faculty in consultation with the student.

The student is required to maintain a minimum grade point average of 2.5 on a 4-point scale. The student is also required to enroll in a course in the engineering science area each term during the upper-division years. The student must pass all courses with a grade of C or better. The student is also expected to develop and sustain a research project in the student's area of specialization that will be presented in the form of a written and oral presentation. The student is also required to complete a minimum of 120 upper-level quarter hours for this degree.
7400 Fracture Mechanics (3)  
5550 Fracture Mechanics (3)  
5490-50 Thermal Stresses (3,3)  
5430 Thermal Stresses (3)  
5440 Theory of Linear Viscoseelasticity (3)  
5550 Fracture Mechanics (5)  
5600-40 Photoelasticity (3,3)  
5710-20 Advanced Dynamics (3,3)  
5700 Vibrations of Continuous Media (3)  
5790 Orbital Mechanics (3)  
5860 Introduction to Continuum Mechanics (2)  
5840 Perturbation Methods in Mechanics (3)  
5860 Introductory Finite Element Methods (3)  
5910 Special Topics in Engineering Mechanics (3)  
6670 Doctoral Research and Dissertation  
6100-20 Advanced Topics in Fluid Mechanics and Convective Transfer (3,5)  
6140 Advanced Finite Element Methods in Fluid Mechanics and Convective Transfer (3)  
6230-40 Theory of Turbulence (3,3,3)  
6210 Theory of Plates (3)  
6320 Analysis and Design of Thin Shell Structures (3)  
6203 Theory of Elastic Stability (3)  
6340 Plasticity (3)  
6160 Photoelasticity (3)  
6170 Impact and Stress Waves in Solids (3)  
6900 Non-Linear Viscoseelasticity (3)  
6910 Energy Methods (3)  
6910 Special Topics in Engineering Mechanics (3)  

Engineer Physics  
Professor W. M. Bugg (Head): Physics staff as shown on page 218.  

The curriculum in engineer physics is designed to provide students with the educational requirements for professional work in various fields of applied science which are based upon a thorough knowledge of physics. The first two years are concerned with fundamental courses in engineering, science, and mathematics. In the upper division, the curriculum allows some choice of courses in engineering and in physics depending upon the interest of the student. The undergraduate program is a complete, professional program, equipping the student for entry into a variety of work in industry and research. The program also leads to graduate work in either physics or engineering.  
The courses in the engineer physics curriculum are shown in tabular form on page 217. Descriptions of the physics courses are found on page 218.
5710, 5720) science. Basic courses and open to graduates in engineering or work plus a 3-hour project is also available and a thesis is required. The program is open and determined with the approval of student and determined with the approval of industrial engineering at the graduate level. 

18 hours of course work covering topics in traditional areas of manufacturing, management, aerospace systems, research and development, banking, health care delivery, industrial engineers in an unlimited range of fields, including, among others, retail distribution, transportation, and determining standards. Laboratory work included. Prereq: 2310 and 3610.

3620 Work Methods and Design (3) Job analysis, job evaluation, design of work-place layouts, flow charting, activity chart and measurement using a predetermined time system. Prereq: 3430 and Computer Science 3150.

5030 Computer Applications and Analysis Methods in Industrial Engineering (3) Use of digital computer in problem solving involving matrix operations, deterministic and stochastic simulations, large scale data base manipulation, and general optimization techniques. Prereq: 2320 and Math 1650.

4310 Seminar (1) Discussions, lectures, and tripsto industrial work situations. Prereq: 3630.

4200 Production Facilities Design (4) Design of production facilities including materials handling, layout, service areas, inventory control, and design of industrial communication-control systems. Prereq: Math 2860 and Engr. Sci. 2720.

4010 Production Systems Design (3) Theory and applications of production planning, scheduling and control. Prereq: 4000 or equivalent or industrial production systems; design of production facilities as an option. Prereq: 4000.


4050 Material Requirements Planning System Design (3) Theory and applications of forecasting, production, production control, materials, and production system design and implementation. Design of the material requirements process as an integrated system. Prereq: 3510-20.

4070 Production Systems Design (3) Theory and applications of production planning, scheduling, and control. Prereq: 4000 or equivalent, industrial production systems; design of production facilities as an option. Prereq: 4000.

4080 Forecasting Methods in Industrial Engineering (3) Application of forecasting techniques to the selection of the production planning and control process for forecasting, production, production control, and planning and control processes. Prereq: 4000.

4100 Project Control with CPM and PERT (3) A study of project planning and control based primarily on "critical path" techniques, including resource allocation, time-cost trade-off algorithms, multi project control, and computer programs. Prereq: 3430.

4180 Materials Handling (3) Analysis and planning for the overall problem of moving, packaging, and storing materials and goods and services. In particular, this course covers the material handling of materials and goods and services. Prereq: Math 2860 and Engin. Sci. 2720.


5200 Production Facilities Design (4) Design of production facilities including materials handling, layout, service areas, inventory control and design of industrial communication-control systems. Prereq: 4000 or equivalent or industrial production systems; design of production facilities as an option. Prereq: 4000.

4230 Scheduling Systems (3) Performance measures for job shop and flow shop scheduling, including both deterministic and stochastic models, as well as non-deterministic and stochastic models. Prereq: 4000.

4250 Work Measurement Applications (3) Application of learning curves, queuing theory, standard data methods, and incentive systems to the design of industrial work situations. Prereq: 3430.

4100 Quality Control (3) Application of statistical methods to control quality of manufactured parts and techniques of inspection. Prereq: 3430.


5420 Introduction to Operations Research (3) Introduction to mathematical programming and its applications. Topics covered include scheduling, linear programming, and dynamic programming. Prereq: 3430 and Computer Science 3150.

5300 Methods in Industrial Engineering (3) Use of digital computer in problem solving involving matrix operations, deterministic and stochastic simulations, large scale data base manipulation, and general optimization techniques. Prereq: 2300 and Math 1650.

4140 Quality Control (3) Application of statistical methods to control quality of manufactured parts and techniques of inspection. Prereq: 3430.

5520 Introduction to Operations Research (3) Introduction to mathematical programming and its applications. Prereq: 3430 and Computer Science 3150.

4200 Production Facilities Design (4) Design of production facilities including materials handling, layout, service areas, inventory control and design of industrial communication-control systems. Prereq: 4000 or equivalent or industrial production systems; design of production facilities as an option. Prereq: 4000.

4250 Work Measurement Applications (3) Application of learning curves, queuing theory, standard data methods, and incentive systems to the design of industrial work situations. Prereq: 3430.

4100 Quality Control (3) Application of statistical methods to control quality of manufactured parts and techniques of inspection. Prereq: 3430.

5520 Introduction to Operations Research (3) Introduction to mathematical programming and its applications. Prereq: 3430 and Computer Science 3150.
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item such as Methods Time Measurement, Basic Mo-
Time Study, or Work Factor. Theory and appli-
cation. Pre: 3502.
4610 Human Factors in Work Design II (3) Human
capabilities and limitations affecting work place
layout, working environments, design of tools and
equipment, and communications and response in
man-machine systems. Pre: 3600, 3636, or con-
sent of instructor.
4830 Health Systems Engineering (3) Hospital
management systems and in which they may be
improved through application of modern indus-
trial engineering principles and techniques. Pre: 3600.
4840 Industrial Plant Problems Analysis (3) Indus-
trial problems, application of industrial engineering,
field assignment in local industry, problem defini-
tion, analysis, and presentation. Pre: 3630, 3440,
3910, 3520, 4352, 4860.
4880 Industrial Systems Analysis (3) Matrices and
linear vector spaces for industrial systems models.
Laplace and Z transform techniques and applica-
tions. General system description and modeling.
Applications to industrial processes and systems.
Pre: 3510, 3520, Math 1080.
4870 Mini-Computer Applications in Industrial En-
gineering (3) Introduction to computer hardware
and man-computer interfaces; emphasis on small
computers as an element of larger system; applica-
tions and limitations of small computers in solving
industrial engineering problems. Pre: Senior
standing.
4910-20-30 Special Industrial Engineering Topics
(3, 3, 3) May be repeated for credit. Pre: Consent of
Instructor.
4950 Industrial Safety (3) Development of organi-
sations and limitations of small computers in solving
industrial engineering problems. Prereq: Senior
5910-20-30 Special Topics in Industrial Engineer-
ing (3, 3, 3)

4140 Energy Conversion Systems (3) Laws governing energy transformations; selected design and layout problems. Prereq: Senior standing.


3620 Mechanics of Machinery-Vibrations (3) Free and forced vibrations of single and multiple degree of freedom vibratory systems. Prereq: Senior standing.

4630 Fluid Flow (3) Development of continuity, momentum, and energy principles for fluid systems; applications to mechanical and aerospace engineering problems. Prereq: Math 2650, coreq: 3331.


4450 Lubrication (3) Hydrodynamic theory of lubrication of sliding bearings; application of Navier-Stokes equations to film and finite bearings, analytical and numerical solutions; applications to design. Prereq: 4420, Aerospace Engr. 3611.


4801 Manufacturing Processes (3) Comparison of machining methods; plastic production; metalworking; electrical discharge machining; laser welding; and ultrasonic welding. Prereq: 3650, 3690.

4802 Tool Design (3) Principles underlying tool and die design; metal cutting; production systems; dies, jigs, and molds; metalworking; hand and power tooling. Prereq: 3650 or 3690.

4803 Numerical Control Processing (3) Applications of digital computers to machine tool control. Machine tool control languages and computer utilization; Automatic tool change systems; numerical control programming; Computer Science 3150.

4824 Manufacturing Engineering Systems Design (3) Design of complete manufacturing systems for wide variety of products and processes; selection of future and present manufacturing processes; selection of manufacturing systems; Computer Science 3150; Mechanical Engineering 3690 and Computer Science 3150.

4310 Seminar (1) Discussion of topics related to engineering; includes inspection trips to industrial plants and exhibits. Prereq: Senior standing.

4320 Seminar (1) Presentation and discussion of topics related to engineering. Prereq: Senior standing.


4301 Seminar (1) Discussion of topics related to engineering; includes inspection trips to industrial plants and exhibits. Prereq: Senior standing.

3630 Mechanics of Machinery-Kinematica (3) Machines, link mechanisms, and analytic mechanical methods; instantaneous centers; velocities; accelerations. Prereq: Math 2820, Computer Science 3150.

3620 Mechanics of Machinery-Dynamics (3) Applications of Newton's laws to work, energy, and power. Prereq: Math 2650, Math 2660; coreq: 3331.


3935 Engineering Analysis (2) Advanced analysis techniques for problems of aerospace and mechanical engineering, using approximate and exact mathematical methods. Prereq: Computer Science 3150.


4150 Energy Conversion Systems (3) Operating and design characteristics of new technology energy conversion systems, selected direct conversion techniques. Prereq: 3330, 4420.

4180 Energy Conversion Systems (3) Economic and technical properties of power plants for public utilities or industrial applications; solar energy utilization. Prereq: 4140 and Ind. Engr. 4520.

4170 Turb-Machinery (3) Basic principles of turbo-machinery; systematic methods of analysis, design, performance evaluation. Prereq: Aerospace Engr. 3511.

4160 Energy Production and Utilization (3) Thermodynamic constraints on energy production; optimization of new energy sources; energy conservation schemes. Prereq: Senior standing in engineering.

4220 Environmental Noise (3) Basic principles of noise suppression in industrial and community environments. Prereq: Senior standing in engineering or consent of instructor.

4401 Seminar (1) Discussion of topics related to engineering; includes inspection trips to industrial plants and exhibits. Prereq: Senior standing.

Mechanical Engineering (650)


5120 Conduction Heat Transfer (3) Heat transfer by conduction for one-dimensional problems; Fourier's law; one-dimensional transient and steady-state problems; solution for simple geometries. Prereq: Math 2820.

5220 Microscopic Thermodynamics (3) Thermodynamics of states of matter; thermodynamic processes; entropy; irreversibility; chemical phenomena in internal combustion and bearing systems. Prereq: 3312, 4420, or consent of instructor.

5810 Internal Combustion Engines (3) Thermodynamical phenomena in internal combustion and propulsion engines. Combustion, detonation, autoignition; analysis of internal combustion engines using ideal and real fluids. Prereq: 3330, 3440.

5430 Research in Mechanical Engineering (1-3-15) Supervised research. Prereq: 4120 and 4520.

5410-20-30 Research in Mechanical Engineering (1-3-15) Supervised research. Prereq: 4120 and 4520.

5110 Conduction Heat Transfer (3) Heat transfer by conduction for one-dimensional problems; Fourier's law; one-dimensional transient and steady-state problems; solution for simple geometries. Prereq: Math 2820.

5120 Conduction Heat Transfer (3) Heat transfer by conduction for one-dimensional problems; Fourier's law; one-dimensional transient and steady-state problems; solution for simple geometries. Prereq: Math 2820.

5110 Conduction Heat Transfer (3) Heat transfer by conduction for one-dimensional problems; Fourier's law; one-dimensional transient and steady-state problems; solution for simple geometries. Prereq: Math 2820.

5220 Microscopic Thermodynamics (3) Thermodynamics of states of matter; thermodynamic processes; entropy; irreversibility; chemical phenomena in internal combustion and bearing systems. Prereq: 3312, 4420, or consent of instructor.

5810 Internal Combustion Engines (3) Thermodynamical phenomena in internal combustion and propulsion engines. Combustion, detonation, autoignition; analysis of internal combustion engines using ideal and real fluids. Prereq: 3330, 3440.

5430 Research in Mechanical Engineering (1-3-15) Supervised research. Prereq: 4120 and 4520.

5410-20-30 Research in Mechanical Engineering (1-3-15) Supervised research. Prereq: 4120 and 4520.

5110 Conduction Heat Transfer (3) Heat transfer by conduction for one-dimensional problems; Fourier's law; one-dimensional transient and steady-state problems; solution for simple geometries. Prereq: Math 2820.

5120 Conduction Heat Transfer (3) Heat transfer by conduction for one-dimensional problems; Fourier's law; one-dimensional transient and steady-state problems; solution for simple geometries. Prereq: Math 2820.

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