

Department of Engineering Technology

Chairperson: Professor Brizendine; *Professors:* Byars, Sherlock; *Associate Professors:* Ahmad, Barry, Braun, Carter, Liou, Mobley, Orozco, Priebe, Wang; *Assistant Professors:* Gehrig, Kimble, Kuyath, Murphy, Ramers, Sharer, Watkins; *Visiting Assistant Professor:* Owen; *Professors Emeritus:* Liu.

Engineering and technical education have undergone considerable change in the last 30 years. The complexities of space exploration, nuclear power, communications systems, environmental control, information processing, transportation systems, fire protection and manufacturing have demanded a great increase in the involvement of professional engineers in theoretical and analytical work. This has resulted in a much greater emphasis upon research and development, science, and mathematics in professional engineering curricula. At the same time, after the more complex devices and systems have been engineered, the design, development, and operation require the sophisticated knowledge and skills of what might be called the "applied engineering sciences." Programs dedicated to filling this need exist all over the United States. The aim and content of these programs are distinctly different from professional engineering curricula.

To provide the appropriate distinction from both theoretical-professional engineers and from engineering technicians who are graduated from the two-year community and technical colleges, the designation "engineering technologist" is employed to describe the graduates of four-year applied engineering or "engineering technology" curricula. The Engineering Technology Department is committed to producing competent graduates that satisfy the needs of employers in North Carolina and beyond.

The two-year community and technical college programs in North Carolina and in many other states provide an excellent foundation for matriculation into the four-year baccalaureate engineering technology programs. Therefore, the Engineering Technology Department at UNC Charlotte admits transfer students holding an Associate in Applied Science degree in engineering technology (or similar titles), fire science, or fire protection. Currently, the program is provided as upper-division only but planning is progressing for admission of freshmen and transfers within the lower division.

UNC Charlotte offers four curricula leading to a Bachelor of Science in Engineering Technology (B.S.E.T.) degree: **Civil Engineering Technology** (emphases on General Civil Engineering Technology and on Construction Engineering Technology); **Electrical Engineering Technology** (emphasis on Electronics Engineering Technology and Computer Engineering Technology); **Fire Safety Engineering Technology**; and **Mechanical Engineering Technology**.

UNC Charlotte is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools (1866 Southern Land, Decatur, Georgia 30033-4097; telephone number 404-679-4501) to award baccalaureate, master's, intermediate, and doctoral degrees.

In addition, the Civil, Electrical and Mechanical Engineering Technology programs of study in Engineering Technology are accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (111 Market Place, Suite 1050, Baltimore, MD 21202; telephone number 410-347-7700).

Distance Education Options. In addition to the on campus programs, the BSET programs in **Electrical Engineering Technology** and **Fire Safety Engineering Technology** are offered over the Internet to part time students. Students are required to come to the campus only for an initial orientation and for ELET laboratories. The ELET laboratories are currently offered on a schedule of Saturdays during the summer school sessions. Estimated completion time for these degrees is four years.

ENGINEERING TECHNOLOGY PROGRAM EDUCATION OBJECTIVES AND OUTCOMES

Program Educational Objectives: These are statements that describe the expected accomplishments of graduates during the first few years after graduation.

The Department of Engineering Technology at UNC Charlotte is committed to providing the environment and expertise to ensure that its graduates make substantive contributions in their professional endeavors after graduation, both in the areas of technical proficiency and community involvement. Accordingly, Civil, Electrical, Fire Safety, and Mechanical Engineering Technology program alumni contribute to society as productive technologists and engaged citizens by:

1. Applying general and discipline-specific concepts and methodologies to identify, analyze, and solve technical problems.
2. Articulating technical material in a professional manner to potentially diverse audiences and in a variety of circumstances, employing effective oral and written strategies and techniques.
3. Contributing within team environments, demonstrating ethical, respectful and professional behavior in all associations.
4. Recognizing and appreciating the environmental, societal and fiscal impact of the technical professions in a local, national and global context.
5. Demonstrating an individual desire and commitment to pursue continuous self-improvement and lifelong learning.

Program Outcomes: These are statements that describe what students are expected to know and able to do by the time of graduation. Graduates with a Bachelor of Science in Engineering Technology (B.S.E.T.) degree from UNC Charlotte will be able to:

1. Utilize contemporary and discipline specific tools to acquire data, analyze problems, and implement current and emerging technology into the design of a system or process to satisfy defined criteria and achieve desired results.

2. Participate as a contributing member in the development, refinement and presentation of interdisciplinary and collaborative projects.
3. Engage in the pursuit of the knowledge and skills necessary and consistent with, the expectations of a practicing engineering technologist.
4. Articulate, through oral and written reports and presentations, the viability of creative, logical and realistic solutions to defined problems and projects.
5. Recognize and respect the value of diversity, as well as the significance of ethical and societal issues, while completing assigned business and technical tasks with professional quality and in a timely manner.
6. Analyze and solve complex problems that involve applications in area(s) of specific program expertise, while demonstrating knowledge of mathematical and scientific principles fundamental to those areas defined by each discipline.

The Engineering Technology programs identify, measure, and improve student competencies through assessment and continuous improvement of program outcomes, which are mapped to the TAC of ABET Criterion 1 (a through k) criteria listed below:

TAC of ABET “a through k” Skills

ABET a: Graduates are expected to demonstrate an appropriate mastery of the knowledge, techniques, skills, and modern tools for their disciplines.
ABET b: Graduates are expected to be able to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.
ABET c: Graduates will conduct, analyze, and interpret experiments and apply experimental results to improve processes.
ABET d: Graduates are expected to be able to apply creativity in the design of systems, components, or processes appropriate to program objectives
ABET e: Graduates are expected to be able to function effectively on teams.
ABET f: Graduates are expected to be able to identify, analyze, and solve technical problems.
ABET g: Graduates are expected to be able to communicate effectively.
ABET h: Graduates are expected to be able to recognize the need for and possess the ability to pursue lifelong learning.
ABET i: Graduates are expected to be able to understand professional, ethical, and social responsibilities.
ABET j: Graduates are expected to be able to recognize contemporary professional, societal, and global issues and are aware of and respect diversity.
ABET k: Graduates are expected to have a commitment to quality, timeliness, and continuous improvement.

BACHELOR OF SCIENCE IN ENGINEERING TECHNOLOGY (B.S.E.T.)

Requirements for Admission. A student who has graduated from a community or technical college must meet the following requirements to enter the Engineering Technology program at UNC Charlotte:

1. An Associate in Applied Science degree in one of the following fields: Architectural, Automation, Building

Construction, Civil, Construction, Computer, Controls, Design and Drafting, Electrical, Environmental, Fire Protection, Fire Science, Optical, Electronics, Industrial, Instrumentation, Manufacturing, Mechanical, Robotics, Surveying Technology, or similar title with curriculum acceptable to the Department;

2. An overall grade point average of at least 2.2 (based on the 4.0 system) on all courses taken at the technical institute or community college; and
3. Satisfactory completion of the prerequisite background courses for the program emphasis that the student plans to enter.

There is considerable variance in the contents of technical programs throughout the United States. Should this result in entrance deficiencies, the student can usually remove these deficiencies at a community or technical college prior to admission to UNC Charlotte, or during the first year at UNC Charlotte.

Residence Requirements. A student must earn the last 30 semester hours of credit toward the degree and the last 12 semester hours of work in the major at this University to satisfy residence requirements.

Experiential Learning Requirements. All students graduating after August 1999 must complete at least one experiential course. Experiential courses are practice-oriented courses such as cooperative education, internships, senior design projects, or undergraduate research.

Academic Requirements and Discontinuance Conditions in Engineering Technology. These requirements apply to majors in all programs leading to the B.S.E.T. Degree. These programs are Civil Engineering Technology, Electrical Engineering Technology, Fire Safety Engineering Technology, and Mechanical Engineering Technology. In addition to University and College of Engineering conditions, a student who is admitted to any BSET program without meeting ALL published admission requirements is expected to remove all admission deficiencies within one year. Violators are subject to discontinuance.

Course Requirements. Prerequisite courses for entering the Engineering Technology program, normally taken at a technical institute or community college, are listed on the pages that follow. Courses that must be completed at UNC Charlotte are listed in the Engineering Technology curricula that follow.

Prerequisites for admission to the Civil, Electrical, and Mechanical Engineering Technology Programs. Students must have satisfactorily completed the following subjects in their two-year associate degree program:

English Composition, Technical Writing and/or Public Speaking (*6 semester hours*)

Algebra Trigonometry, Analytic Geometry, Differential and Integral Calculus (*9- 12 semester hours*)

General Physics (with laboratory) (*4 semester hours*)

Physics or Chemistry (with laboratory) (*4 semester hours*) or Geology (*for CIET*)

Humanities or Social Sciences (3-6 semester hours)

Technical Courses in Major Area as listed under Discipline
Specific Prerequisites below (32-38 semester hours)

Total maximum transfer credit from two-year college is 64 semester hours.

Discipline Specific Prerequisites:

Civil

- Computer Aided Drafting
- Surveying
- Statics
- Strength of Materials

Electrical

- Electrical Drafting
- Computer Programming (BASIC, FORTRAN, PASCAL, C, C++, or some high order language)
- D.C. Circuits
- A.C. Circuits
- Digital Circuits
- Semiconductor Circuits
- Communications, Electronics, Control Systems or Microcomputers

Mechanical

- Drafting/Computer Aided Drafting
- Machine Processes
- Statics
- Metallurgy or Engineering Materials
- Kinematics or Mechanisms
- Basic Electrical Circuits or Physics II (Electricity)
- Computer Programming (using a higher level language such as Visual Basic, FORTRAN, or C++)

Prerequisites for admission to the Fire Safety Engineering Technology Program. Students must have satisfactorily completed the following subjects in their two-year associate degree program:

English Composition, Technical Writing and/or Public Speaking (6-9 semester hours)

Algebra (3 semester hours)

Two science courses with a laboratory (8 semester hours)

Humanities and/or Social Sciences (6-9 semester hours)

Computer Literacy Course

Technical Courses in Major Area as listed below (32-38 semester hours)

- Introduction to Fire Protection
- Fire Prevention and Public Education
- Fire Detection and Fire Investigation
- Building Construction
- Inspections and Codes
- Sprinklers and Automatic Alarms
- Fire Protection Law
- Fire Fighting Strategies
- Chemistry of Hazardous Materials
- Hydraulics and Water Distribution

Managing Fire Services

**CIVIL ENGINEERING TECHNOLOGY PROGRAM
General Civil Engineering Technology Emphasis**

Junior Year

ETGR 3071	Engineering Tech. Prof. Seminar (W).....	1
ETCE 3111	Structural Analysis I.....	3
ETCE 3121	Foundations and Earthwork.....	3
ETCE 3151	Soil Testing Laboratory (W).....	1
ETGR 3222	Engineering Economics	3
Directed Electives (see Note a)		3
		<u>14</u>

ETCE 3112	Structural Analysis II.....	3
ETCE 3132	Hydraulics.....	3
ETGR 3171	Engineering Analysis I.....	3
ETCE 3150	Hydraulics & Materials Lab (W).....	1
Directed Electives (see Note a.).....		6
		<u>16</u>

Senior Year

ETCE 3212	Structural Steel Design.....	3
ETCE 3262	Intro to Environmental Engineering.....	3
Major Elective Laboratory (W)		1
ETGR 3272	Applied Numerical Methods	3
CHEM 1251	Principles of Chemistry or GEOL 1200 Physical Geology (both with lab)	4
Major Elective (see Note b.)		3
		<u>17</u>

ETCE 3642	Senior Design Project (W,O).....	2
ETCE 3211	Reinforced Concrete Design.....	3
ETCE 3241	Highway Design & Construction	3
Major Elective (see Note b)		3
Directed Elective (see Note a).....		6
		<u>17</u>

**CIVIL ENGINEERING TECHNOLOGY PROGRAM
Construction Engineering Technology Emphasis**

Junior Year

ETGR 3071	Engineering Tech. Prof. Seminar (W).....	1
ETCE 3111	Structural Analysis I.....	3
ETCE 3121	Foundations & Earthwork.....	3
ETCE 3151	Soil Testing Lab (W).....	1
ETGR 3222	Engineering Economics	3
Directed Electives (see Note a.).....		3
		<u>14</u>

ETCE 3112	Structural Analysis II.....	3
ETCE 3132	Hydraulics.....	3
ETCE 3150	Hydraulics & Materials Lab (W).....	1
ETGR 3171	Engineering Analysis I.....	3
ETCE 3281	Cost Estimating I.....	3
Directed Elective (see Note a.).....		3
		<u>16</u>

Senior Year

GEOL 1200	Physical Geology with Lab.....	4
ETCE 3211	Structural Steel Design.....	3
ETCE 3243	Project Management Technology	3
Major Elective (see Note b.)		3
Directed Elective (see Note a.)		3
		<u>16</u>

ETCE 3211	Reinforced Concrete Design.....	3
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ETCE 3293	Mechanical & Electric Systems for Buildings	3
ETCE 3642	Senior Design Project (W,O).....	2
	Major Elective (<i>see</i> Note b.).....	3
	Directed Elective (<i>see</i> Note a.).....	6
		17

ELECTRICAL ENGINEERING TECHNOLOGY PROGRAM Computer Engineering Technology Emphasis

Junior Year		
ETGR 3071	Engineering Tech. Prof. Seminar (W)	1
ETEE 3133	Linear Networks I.....	3
ETEE 3153	ETEE Laboratory I (W).....	1
ETGR 3171	Engineering Analysis I	3
ETEE 3183	Digital Logic Design	3
	Directed Elective (<i>see</i> Note a.).....	3
		14

CHEM 1251	Principles of Chemistry.....	3
ETEE 3124	Linear Networks II.....	4
ETEE 3156	ETEE Laboratory II (W)	1
ETEE 3285	Assembly Language Programming.....	3
	Directed Elective (<i>see</i> Note a.).....	3
		14

Senior Year		
ETEE 3211	Active Networks I.....	3
ETEE 3255	ETEE Laboratory IIIC (W)	1
ETEE 3281	Computer Design	3
	Major Elective (<i>see</i> Note b.).....	3
	Directed Electives (<i>see</i> Note a.).....	6
		16

ETEE 3212	Active Networks II	3
ETEE 3275	Integrated Circuit Applications	3
ETEE 3286	Microcomputer Applications.....	3
ETEE 3641	Senior Design Project (W, O).....	1
	Major Elective (<i>see</i> Note b.).....	3
	Directed Elective (<i>see</i> Note a.)	3
		16

ELECTRICAL ENGINEERING TECHNOLOGY PROGRAM Electronics Engineering Technology Emphasis

Junior Year		
ETGR 3071	Engineering Tech. Prof. Seminar (W)	1
ETEE 3133	Linear Networks I.....	3
ETEE 3153	ETEE Laboratory I (W).....	1
ETGR 3171	Engineering Analysis I	3
ETEE 3183	Digital Logic Design	3
	Directed Elective (<i>see</i> Note a.)	3
		14

CHEM 1251	Principles of Chemistry	3
ETEE 3124	Linear Networks II.....	4
ETEE 3156	ETEE Laboratory II (W)	1
ETEE 3285	Assembly Language Programming.....	3
	Directed Elective (<i>see</i> Note a.).....	3
		14

Senior Year		
ETEE 3211	Active Networks I.....	3
ETEE 3213	Industrial Electronics.....	3

ETEE 3257	ETEE Laboratory IIIE (W)	1
	Major Elective (<i>see</i> Note b.).....	3
	Directed Electives (<i>see</i> Note a.).....	6
		16

ETEE 3212	Active Networks II.....	3
ETEE 3214	Operational Amplifiers.....	3
ETEE 3222	Automatic Controls	3
ETEE 3641	Senior Design Project (W, O).....	1
	Major Elective (<i>see</i> Note b.)	3
	Directed Elective (<i>see</i> Note a.).....	3
		16

FIRE SAFETY ENGINEERING TECHNOLOGY PROGRAM

Junior Year		
ETFS 3103	Principles of Fire Behavior.....	3
ETFS 3113	Building Fire Safety	3
ETFS 3123	Industrial Hazards & Electricity.....	3
ETGR 3222	Engineering Economics or Acct 2121.....	3
ETFS 3611	Professional Leadership Seminar (W,O)....	1
	Directed Elective (<i>see</i> Note a.)	3
		16

ETFS 3124	Risk Management for Emergency Services	3
ETFS 3144	Active Fire Protection	3
POLS 3119	State Politics	3
PSYC 2171	Introduction to Industrial/Organizational Psychology.....	3
	Directed Elective (<i>see</i> Note a.)	3
		15

Senior Year		
ETFS 3183	Fire Safety Engineering Problem Analysis.....	3
ETFS 3233	Applied Fire Engineering Design and Analysis.....	3
POLS 3121	Urban Politics	3
PSYC 3174	Organizational Psychology	3
	Directed Elective (<i>see</i> Note a.)	3
		15

ETFS 4123	Command & Control of Major Disasters...3
ETFS 4243	Research Investigation (W,O).....3
ETFS 4323	Advanced Fire Service Administration
POLS 3126	Administrative Behavior.....3
	Directed Elective (<i>see</i> Note a.)

MECHANICAL ENGINEERING TECHNOLOGY

Junior Year		
ETGR 3071	Engineering Tech. Prof. Seminar (W).....	1
ETME 3123	Strength of Materials.....	3
ETME 3133	Fluid Mechanics	3
ETME 3152	Stress Analysis Laboratory (W).....	1
ETGR 3171	Engineering Analysis I.....	3
	Directed Elective (<i>see</i> Note a.)	3
		14

CHEM 1251	Principles of Chemistry.....	3
ETME 3113	Dynamics	3
ETME 3143	Thermodynamics	3
ETME 3151	Fluid Mechanics Laboratory (W).....	1
ETGR 3222	Engineering Economics	3

Directed Elective (<i>see</i> Note a).....	3
	16

Senior Year

ETME 3213 Machine Design I.....	3
ETME 3232 Senior Design Project I.....	2
ETME 3252 Thermodynamics Laboratory (W).....	1
ETGR 3272 Applied Numerical Methods.....	3
Major Elective (<i>see</i> Note b).....	3
Directed Elective (<i>see</i> Note a).....	3
	15

ETME 3242 Senior Design Project II.....	2
ETME 3251 Instrumentation Lab (W).....	1
ETME 3163 Instrumentation & Controls.....	3
Major Elective (<i>see</i> Note b).....	3
Directed Electives (<i>see</i> Note a).....	6
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Notes regarding Curriculum Outlines.

a. Directed electives may be major field courses or general education courses. They are chosen jointly by student and advisor to ensure that all graduation requirements are met.

b. Major elective courses must be upper-division courses offered by the William States Lee College of Engineering or courses related to the student's field of specialization and approved by the Department as major electives. Major elective courses are all 3000 level or above courses in the college of engineering plus, upon written approval by advisor, ITCS 2116, STAT 122X, GEOG 3150, OPER 3100, and PSYC 2171.