

# Department of Engineering

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## Faculty

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## Mission

The Mission of the Bachelor of Science in the Engineering Program is to provide relevant high quality undergraduate engineering education in a traditional collegiate atmosphere while serving as engineering resource for West Tennessee. The faculty enhances the engineering profession by conducting applied research and providing public service in their fields of expertise.

## Program Educational Objectives

The following program educational objectives have been adopted by the faculty of the Department of Engineering to meet the criteria established by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET). After graduation from our program, engineers will be able to

1. solve broad-based, complex practical engineering problems which meet the diverse needs of a broad spectrum of employers, while at the same time appreciating the social, economic, and ethical issues in a modern global society.
2. work effectively on multidisciplinary engineering teams, demonstrating clear written and oral presentation skills.
3. serve the engineering needs of West Tennessee and the broader regional, state, national, and global market, by being professionally employed.
4. continue to grow professionally through life-long learning, through activities such as becoming a licensed professional engineer, pursuing graduate study, participating in continuing professional education, and active membership in professional engineering societies.

## Student Organizations

There are currently five student chapters of professional societies in the Department of Engineering: The Institute of Electrical and Electronics Engineers (IEEE), the National Society of Black Engineers (NSBE), the Society of Manufacturing Engineers (SME), the Society of Women Engineers (SWE), the American Society of Civil Engineers (ASCE), and the Society of Automotive Engineers (SAE). Additional professional societies student chapters are under development. Each society has a faculty adviser and engages in activities and projects of common interest to the membership. Students are encouraged to participate in one or more of these organizations for professional growth.

## Cooperative Education Program

The cooperative engineering education (co-op) program is offered as an educational enhancement to the BSE program. To complete the co-op program, a student works full-time in progressive engineering work assignments for at least three semesters (at least one year) prior to the student's senior year.

After completing all the BSE freshman year course work, an engineering student with a cumulative GPA of at least 2.50 may elect to participate in the engineering co-op program. A transfer student must complete at least one full-time academic semester at UT Martin and must have a minimum cumulative GPA of 2.50 to qualify. The co-op student alternates between full-time academic semesters and full-time engineering work assignments until the student has completed at least three work semesters. The full-time work assignments are a planned part of the co-op student's educational program; are with the same employer; and are progressive in complexity, responsibility, and pay. The student's senior year is spent in residence at the university with no further co-op work assignments. During the full-time work semesters, the College of Engineering and Natural Sciences considers the student full-time.

Students enrolling in the co-op program gain the benefits of a planned progression of work experiences, which complements and enriches their engineering studies on campus. Participants gain insight into the engineering work world, are able to apply their insights from the real world to their studies, grow in understanding of their own interests and career objectives, and advance in professional maturity. All co-op work assignments are in paid positions, and students are able to help finance their education while gaining real-world engineering experience.

## **Bachelor of Science in Engineering**

In support of the university's mission, the Department of Engineering offers the Bachelor of Science in Engineering (B.S.E.) with a concentration in one of the following:

- civil engineering (6511)
- electrical engineering (6512)
- industrial engineering (6513)
- mechanical engineering (6514)

Engineering majors learn the common fundamentals of civil, electrical, industrial, and mechanical engineering with emphasis on problem solving, design, and integrated systems, while also taking courses in business, social sciences, and the humanities. During the junior and senior years, the student takes a cohesive set of upper-division engineering courses that together provide depth of knowledge and design content in the chosen engineering concentration. Upon graduation, the engineering concentration is recorded on the student's permanent record, i.e., on the student's final transcript.

Designed for completion in four years (or five years when combined with the cooperative engineering education program), the B.S.E. incorporates the latest guidelines from the professional engineering world as well as the advice and guidance of UT Martin's Department of Engineering Industrial Advisory Board. The B.S.E. degree program draws from classroom, laboratory, and real-world experiences, using the rich resources of the university, faculty, and professional engineering community to prepare students for the engineering world of today and the future.

As a result of the focused efforts of the university, government, and industry partnership that led to its development, the comprehensive B.S.E. program offers an engineering degree that is uniquely relevant to today's students and employers. Graduates are prepared for practice as professional engineers. They have acquired the foundation for maintaining professional competence throughout their careers, and they have the skills and experiences needed to move quickly into leadership roles in today's engineering and management environments.

Students who desire the option of further study at the graduate level are well prepared to continue their engineering education at the master's and doctoral level. Some students may choose to follow

their engineering degree with an M.B.A. degree. Also in today's highly technological world, this comprehensive engineering degree program provides an excellent core, when combined with the appropriate biology and chemistry courses, for a pre-medical curriculum.

All UT Martin engineering students develop a firm foundation in engineering science and in engineering design, with a concentration in civil, electrical, industrial or mechanical engineering. Our students also gain real-world engineering job experience; acquire knowledge in fundamental business concepts; develop an understanding of ethical, political, and societal issues; and build their skills in written and oral communications, teamwork and leadership.

Additional information about the B.S.E. program may be obtained by viewing the Web pages at [www.utm.edu](http://www.utm.edu), select the Academics button, then the Department of Engineering; by sending an e-mail note to [engin@www.utm.edu](mailto:engin@www.utm.edu); or by calling the Department Chair of Engineering.

## **Designation of a Minor**

An engineering student may declare a minor in a non-engineering subject area and have the minor listed on the permanent record under the following conditions:

1. Minors must be officially approved and described in the university catalog. No unofficial minors will be recognized.
2. Courses taken to satisfy the minor may also be used to satisfy engineering degree requirements, provided that the courses would be a part of engineering degree requirements even if no minor were declared.
3. The intention to complete a minor must be declared at the time of application for a degree if the minor is to appear on the final transcript.

## **Admission, Retention and Graduation Requirements**

In addition to the university's admission requirements, in order to be fully admitted to the Bachelor of Science in Engineering degree program, a student must obtain a minimum GPA of 2.00, computed using all attempts in a course, in the following courses: Engineering 121 Statics, Engineering 220 Strength of Materials, Engineering 241 Dynamics, Mathematics 251-252 Calculus I and II, Mathematics 320 Multivariate Calculus, and Physics 220-221 University Physics I and II.

Prior to qualifying for full admission to the B.S.E. degree program, a student majoring in engineering receives academic advisement from an engineering faculty member and is allowed to take any lower-division (numbered 100-299) engineering course if the student meets the course prerequisites and co-requisites and meets the department's prerequisite grade rule. Students who have not gained full admission to the B.S.E. degree program cannot take upper-division (numbered 300-499) engineering or industrial engineering courses with the exception of Engineering 315 Analysis and Engineering 380 Engineering Economy.

An engineering student must earn a minimum grade of C in all math, science and engineering courses that are prerequisites for another course in the curriculum prior to taking the course that requires the prerequisite; e.g., a student may not take Mathematics 252 until the student has earned a grade of at least a C in Mathematics 251, and may not take Engineering 241 until earning minimum grades of C in Mathematics 252, Physics 220, and Engineering 121. Prior to graduation, a grade of C or better must be earned in all math, science and engineering courses used to fulfill degree requirements.

To graduate with a Bachelor of Science in Engineering degree, the student must, in addition to meeting the university's graduation requirements and the curricula requirements specified in the

following section, pass the National Council of Examiners for Engineering and Surveying (NCEES), Fundamentals of Engineering (FE) examination. Engineering students will be required to take the NCEES FE exam at the earliest possible date allowed by the Tennessee State Board of Architectural and Engineering Examiners. Currently this will mean the first semester of the student's senior year. The NCEES FE exam is offered twice each year, in April and October, and may be taken more than once.

### General Education Requirements (51 Hours)

<i>Communications 230 Public Speaking</i> .....	3
<i>Chemistry 121 General Chemistry I</i> .....	4
<i>Economics 201 Macroeconomics</i> .....	3
<i>English 110 or 111, 112 Composition I, II</i> .....	6/7
<i>Mathematics 251-252 Calculus I, II</i> .....	8
<i>Mathematics 320 Multivariate Calculus</i> .....	4
<i>Physics 220-221 University Physics I, II</i> .....	8
<i>Humanities/Social Sciences Electives</i> .....	15

The 15 hours of humanities and social sciences courses must be chosen to satisfy the University's general education requirements. The student will take a two course sequence in the Global Dynamics general education category to provide depth in a subject area.

### Major Field Requirements (50 Hours)

<i>Engineering 101 Engineering Graphics</i> .....	3
<i>Engineering 121 Statics</i> .....	3
<i>Engineering 201 Engineering Methods</i> .....	2
<i>Engineering 220 Strength of Materials</i> .....	3
<i>Engineering 231 Electronics I</i> .....	3
<i>Engineering 232 Circuits Analysis I</i> .....	4
<i>Engineering 241 Dynamics</i> .....	3
<i>Engineering 301 Computer Aided Engineering/Design Tools</i> .....	1
<i>Engineering 310 Engineering Materials</i> .....	3
<i>Engineering 311 Engineering Applications of Probability &amp; Statistics</i> .....	3
<i>Engineering 313 Industrial Internship</i> .....	1
<i>Engineering 315 Engineering Analysis I</i> .....	3
<i>Engineering 317 Instrumentation and Experimental Methods</i> .....	3
<i>Engineering 340 Thermodynamics</i> .....	3
<i>Engineering 341 Fluid Mechanics</i> .....	3
<i>Engineering 380 Engineering Economy</i> .....	3
<i>Engineering 409 Project Management</i> .....	2
<i>Engineering 410-411 Senior Design I, II</i> .....	4

### Concentration Requirements (27 Hours)

#### Civil Engineering

Engineering 350	Elementary Surveying (3)
Engineering 351	Basic Structural Analysis (4)
Engineering 450	Reinforced Concrete Design (4)
Engineering 451	Geotechnical Engineering (4)
Geology 121	Engineering Geology (3)
And approved concentration electives (9)*	

**Electrical Engineering**

Computer Science 221 or 231	Programming Concepts and Problem Solving I (3) or Computer Programming for Engineers (3)
Engineering 316	Engineering Analysis II (3)
Engineering 331	Electronics II (3)
Engineering 332	Circuit Analysis II (3)
Engineering 460	Microprocessors and Computer Organization (3)
Engineering 461	Communication Systems (3)
And approved concentration electives (9)*	

**Industrial Engineering**

Engineering 413	Engineering Management (3)
Engineering 462	Linear Control Systems Design (3)
Engineering 474	Manufacturing Processes (3)
Engineering 475	Automated Production Systems (3)
Industrial Engineering 310	Production Management (3)
Industrial Engineering 330	Quality Design and Control (3)
And approved concentration electives (9)*	

**Mechanical Engineering**

Engineering 370	Vibrations (4)
Engineering 462	Linear Control Systems Design (3)
Engineering 471	Heat Transfer (3)
Engineering 472	Kinematics/Dynamics of Machines (4)
Engineering 473	Machine Design (4)
And approved concentration electives (9)*	

\*Concentration electives must be approved by Department of Engineering Curriculum and Degrees Committees.

**Total required for a B.S. in Engineering degree .....128**

**Minor in Electrical Engineering [Specialty Area]**

A minor in the Electrical Engineering specialty area requires Engineering 231, 232, 331, 332, 460, and Computer Science 221.

**Courses Offered by Department of Engineering**

- Engineering 100 Society and Technology (as needed)
- Engineering 101 Engineering Graphics (F, Sp)
- Engineering 111 Engineering Methods I (F)
- Engineering 112 Engineering Methods II (Sp)
- Engineering 121 Statics (F, Sp)
- Engineering 201 Engineering Methods (F, Sp)
- Engineering 210 Engineering Design (F)
- Engineering 220 Strength of Materials (F, Sp)
- Engineering 231 Electronics I (F, Sp)
- Engineering 232 Circuit Analysis I (F, Sp)

Engineering 241 Dynamics (F, Sp)  
Engineering 301 Computer Aided Engineering/Design Tools (F)  
Engineering 310 Engineering Materials (Sp)  
Engineering 311 Engineering Applications of Probability and Statistics (F)  
Engineering 313 Industrial Internship (F, Sp, Su)  
Engineering 315 Engineering Analysis I (F, Sp)  
Engineering 316 Engineering Analysis II (F)  
Engineering 317 Instrumentation and Experimental Methods (Sp)  
Engineering 331 Electronics II (F)  
Engineering 332 Circuit Analysis II (Sp)  
Engineering 340 Thermodynamics (F)  
Engineering 341 Fluid Mechanics (Sp)  
Engineering 350 Elementary Surveying (F)  
Engineering 351 Basic Structural Analysis (Sp)  
Engineering 352 Transportation Engineering (F)  
Engineering 353 Hydraulics and Hydrology (Sp-even)  
Engineering 361 Digital Signal Processing (Sp)  
Engineering 370 Vibrations (F)  
Engineering 380 Engineering Economy (Sp)  
Engineering 381 Human Factors in Engineering (F-even)  
Engineering 409 Project Management (F)  
Engineering 410 Senior Design I (F)  
Engineering 411 Senior Design II (Sp)  
Engineering 413 Engineering Management (F-odd)  
Engineering 430 Transformers and Rotating Machines (as needed)  
Engineering 440 Energy Systems (F)  
Engineering 450 Reinforced Concrete Design (F)  
Engineering 451 Geotechnical Engineering (Sp)  
Engineering 452 Steel Design (F)  
Engineering 453 Pavement Design and Analysis (Sp)  
Engineering 460 Microprocessors and Computer Organization (F)  
Engineering 461 Communication Systems (Sp)  
Engineering 462 Linear Control Systems Design (F)  
Engineering 463 Electrical Power Systems (as needed)  
Engineering 464 Engineering Electromagnetics (Sp)  
Engineering 471 Heat Transfer (Sp)  
Engineering 472 Kinematics/Dynamics of Machines (F)  
Engineering 473 Machine Design (Sp)  
Engineering 474 Manufacturing Processes (Sp-even)  
Engineering 475 Automated Production Systems (Sp-odd)  
Engineering 490 Special Topics (Title of topic) (as needed)  
Industrial Engineering 310 Operations Management (F, Sp)

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Industrial Engineering 312 Introduction to Management Science (as needed)

Industrial Engineering 330 Process Control and Improvement (Sp-even)

Industrial Engineering 402 Industrial Safety (as needed)

Industrial Engineering 412 Applied Operations Management (as needed)

*Complete course descriptions can be found in the Course Description section of the catalog.*