

# 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.

## Expected Outcomes

The following outcome objectives have been established by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET) and have been endorsed by the faculty of the Department of Engineering. All students who complete the Bachelor of Science in Engineering Degree will have:

- an ability to apply knowledge of mathematics, science, and engineering
- an ability to design and conduct experiments, as well as to analyze and interpret data
- an ability to design a system, component, or process to meet desired needs
- an ability to function on multi-disciplinary teams
- an ability to identify, formulate, and solve engineering problems
- an understanding of professional and ethical responsibility
- an ability to communicate effectively
- the broad education necessary to understand the impact of engineering solutions in a global and societal context
- a recognition of the need for, and an ability to engage in life-long learning
- a knowledge of contemporary issues
- an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

## Student Organizations

There are currently four 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), and the American Society of Civil Engineers (ASCE). 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 student is still considered a full-time student by the university.

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 specialty 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 which together provide depth of knowledge and design content in the chosen engineering specialty. Upon graduation, the engineering specialty 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 own 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. And, 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 specialty 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 dean of the College of Engineering and Natural Sciences.

In addition to the Bachelor in Engineering degree with a specialty in civil, electrical, industrial, or mechanical engineering, UT Martin offers the first two years of any other engineering discipline in preparation for transfer.

## 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, to receive full admission to the Department of Engineering a student must meet one of the following criteria:

1. a minimum composite score of 21 on the American College Test (ACT) and a minimum mathematics score of 21 on the ACT (or placement in Mathematics 251 Calculus I), OR
2. a minimum of 12 college semester credit hours (sch) at the University of Tennessee at Martin and/or from another accredited institution with a minimum cumulative GPA of 2.50 and grades of C or better in Mathematics 251 Calculus I and English 111 Composition I.

A student who is admitted to the University of Tennessee at Martin as a transfer student must also meet one of the above criteria in order to receive full admission to the Department of Engineering.

Prior to qualifying for full admission to the Department of Engineering, a student who wants to major in engineering is classified as a preparatory engineering student. A preparatory engineering student receives academic advisement from an engineering faculty member. Preparatory engineering students are allowed to take lower-division (numbered 100-299) engineering courses if the student meets the course prerequisites and corequisites. However, preparatory engineering students are not allowed to take upper-division (numbered 300-499) engineering courses.

An engineering student must make a minimum grade of C in all math, science or 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 made a grade of at least a C in Mathematics 251, and may not take Engineering 241 until making minimum grades of C in Mathematics 252, Physics 220, and Engineering 121.

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 (54 Hours)**

Accounting 300 Accounting for Non-Business Students . . . . .	3
Communications 230 Public Speaking . . . . .	3
Chemistry 121 General Chemistry I . . . . .	4
Economics 201 Macroeconomics . . . . .	3
English 111-112 Composition I, II . . . . .	6
Mathematics 251-252 Calculus I, II . . . . .	8
Mathematics 320 Multivariate Calculus . . . . .	4
Physics 220-221 University Physics I, II . . . . .	8
Humanities/Social Sciences Electives . . . . .	15

The 15 hours of humanities and social sciences courses must be chosen to satisfy the University's general education requirements and to provide depth of knowledge in a selected subject area. Twelve hours will be taken to complete the University general education requirements as specified in this catalog. To provide depth in a subject area, the student will choose a course numbered 300 or above from an area represented in the student's previous 100-200 level humanities/social science coursework used to satisfy the general education requirements. The 300-400 level course is selected with the guidance and approval of the student's faculty academic adviser from the Department of Engineering approved elective list which is kept in the dean's office and is available for viewing on the UT Martin Department of Engineering web site.

## Major Field Requirements (51 Hours)

Engineering 111-112 Engineering Methods I, II	4
Engineering 121 Statics	3
Engineering 210 Engineering Design	2
Engineering 220 Strength of Materials	3
Engineering 231 Electronics I	3
Engineering 232 Circuits Analysis I	4
Engineering 241 Dynamics	3
Engineering 310 Engineering Materials	3
Engineering 311 Engineering Applications of Probability & Statistics	3
Engineering 313 Industrial Internship	1
Engineering 315 Engineering Analysis I	3
Engineering 317 Instrumentation and Experimental Methods	3
Engineering 340 Thermodynamics	3
Engineering 341 Fluid Mechanics	3
Engineering 410-411 Senior Research and Thesis	4
Engineering 440 Energy Systems	3
Industrial Engineering 380 Engineering Economy	3

## Specialty Requirements (24 Hours)

### Civil Engineering

Engineering 350	Construction 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 specialty electives (6)*	

### 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 specialty electives (6)*	

### Industrial Engineering

Engineering 316	Engineering Analysis II (3)
Engineering 413	Engineering Management (3)
Engineering 462	Linear Control Systems Design (3)
Engineering 475	Automated Production Systems (3)

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Industrial Engineering 310      Production Management (3)  
 Industrial Engineering 330      Quality Design and Control (3)  
 And approved specialty electives (6)\*

**Mechanical Engineering**

Engineering 316                      Engineering Analysis II (3)  
 Engineering 370                      Vibrations (4)  
 Engineering 462                      Linear Control Systems Design (3)  
 Engineering 472                      Kinematics/Dynamics of Machines (4)  
 Engineering 473                      Machine Design (4)  
 And approved specialty electives (6)\*

\*Specialty electives must be approved by Department of Engineering Curriculum and Degrees Committee.

**Total required for a B.S. in Engineering degree.....129**

**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**

Electrical Engineering 201-202 Circuits I-II (as needed)  
 Engineering 100 Society and Engineering (as needed)  
 Engineering 111 Engineering Methods I (F)  
 Engineering 112 Engineering Methods II (Sp)  
 Engineering 121 Statics (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 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 (Sp)  
 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 Construction Surveying (F)  
 Engineering 351 Basic Structural Analysis (Sp)

Engineering 352 Transportation Engineering (F--odd)  
Engineering 370 Vibrations (F)  
Engineering 381 Human Factors in Engineering (F--even)  
Engineering 410-411 Senior Research/Thesis (F, Sp)  
Engineering 412 Environmental Engineering (as needed)  
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 (Sp--odd)  
Engineering 460 Microprocessors and Computer Organization (Sp)  
Engineering 461 Communication Systems (F)  
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 Systems (as needed)  
Engineering 475 Automated Production Systems (Sp)  
Engineering 490 Special Topics (Title of topic) (as needed)  
Industrial Engineering 310 Operations Management (F, Sp)  
Industrial Engineering 312 Introduction to Management Science (as needed)  
Industrial Engineering 330 Process Control and Improvement (Sp--even)  
Industrial Engineering 380 Engineering Economy (Sp)  
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.*