Engineering technology emphasizes hands on learning and the practical aspects of engineering. It stresses the understanding and application of established engineering principles to the design, fabrication, and testing of electronic and mechanical products and systems. Engineering technology is a creative blend of the physical sciences, engineering knowledge, methods, and technical skills.

Engineering technology courses emphasize the application of engineering principles to analyze and solve practical engineering problems. Many courses have laboratories and laboratory experience is an integral part of the learning process in the program.

The primary goal of the department is to provide integrated educational opportunities to students whose technological interests and aptitudes are application-oriented. The department fosters applied research, creative design, and service activities, which involve students and faculty. Graduates of the department programs are highly sought after, and are recognized by industry for their practical problem solving skills.

Programs and Areas of Specialization

The department offers Associate of Engineering Technology and Bachelor of Science degrees in Electronics and Computer Engineering Technology and Mechanical Engineering Technology. The B.S. degrees in Engineering Technology require four years of full-time study and do not require a minor. The AS degrees require two years of full-time study.

The department also offers minors in Engineering Technology and Computer Integrated Manufacturing.

Admission to the Programs

The minimum requirement for admission is that students are eligible to enroll in MATH 1302 and RHET 1311. As soon as students meet those requirements, it is important that they declare a major and be assigned a faculty advisor in order to graduate in a timely manner. Students intending to major in Engineering Technology may be advised by department faculty advisors before meeting the Department’s minimum requirements.

Scholarships, Co-op, Internship, and Other Employment Opportunities

The department offers a limited number of merit scholarships for continuing students in each program area. Scholarships are offered on the basis of academic record. Cooperative experience (Co-op) and internship arrangements with local industries are also available. The objective is to provide work experience to students within the discipline while allowing the flexibility to pursue a reduced course load. The department makes an effort to accommodate persons with relevant industrial experience or previous college work. Such a student can apply with appropriate support materials to receive academic credit. The number of hours and course equivalencies are to be decided by a faculty advisor and the chair of the department. Credit for some courses may also be earned by departmental examination. The department and the university provide assistance in job placement. Graduates are well accepted by industry because of their knowledge of applied engineering and practical problem solving skills.

Engineering Technology Program Educational Objectives (PEOs)

The Electronics and Computer Engineering Technology and Mechanical Engineering Technology degrees, consistent with the mission of the university and college, provide educational training in engineering technology specialties and prepare the graduates for entry-level positions in industry. The content, depth, and structure of the engineering technology curricula are continually updated and improved based on inputs from the faculty, student body, university and college administration, and industry representatives, so that it can serve the changing needs of its constituencies.
The following program educational objectives have been established for the ECET graduates:

1. The graduates will possess the skills necessary to be productive in their first position in the field and to have successful careers.
2. The graduates will be enabled to achieve increasing levels of leadership and responsibility throughout their careers.
3. The graduates will be enabled to engage in life-long learning.
4. The graduates will demonstrate a respect for diversity and a commitment to professional ethics.
5. The graduates will appreciate the importance of discovery and engage in the development of creative solutions contributing to the well-being and economic development of society.

**Engineering Technology Student Outcomes**

The Student Outcomes for the Mechanical Engineering Technology program and for the Electronics and Computer Engineering Technology can be found on the Engineering Technology web pages at the following address: ualr.edu/engineeringtechnology/assessment/

**Student Professional Societies**

Several opportunities exist for students to interact with peers through student chapters of professional societies such as the Institute of Electrical and Electronics Engineers (IEEE), American Society of Mechanical Engineers (ASME), American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), Society for Women Engineers (SWE), and Tau Alpha Pi, the honor society of Engineering Technology. The Industrial Advisory Council of Engineering Technology consists of members from local industry and provides excellent interaction with industry for students and faculty.

**Minor in Engineering Technology**

The minor in Engineering Technology is available to all UALR students who want to learn about general principles or specific topics in the fields of Mechanical or Electronics & Computer Engineering Technology. Students are required to make a plan with an academic advisor in the department consisting of eighteen credit hours of approved ETME and/or ECET courses in line with their interests. Students interested in the Engineering Technology Minor should contact the Chair of the Department.

**FAA’s Airway Facilities Collegiate Training**

The electronics and computer engineering technology program is an approved site for the Federal Aviation Administration’s (FAA) Airway Facilities Collegiate Training Initiative (AF-CTI). Students selected to participate in the FAA initiative pursue the associate degree program in electronics and computer engineering technology and are required to pass a Basic Electronics Screening Tool (BEST) Test before being hired. For more details, contact the program coordinator of Electronics and Computer Engineering Technology program.

**Electronics and Computer Engineering Technology Program**

Professor David Luneau, Coordinator

The field of electronics and computer engineering technology extends over a wide spectrum of modern applications where knowledge of both electronics and computer hardware/software is equally important. It is essential for many modern industries that graduates work comfortably across the boundaries of both electronics and computers. This curriculum offers a single, unified bachelor’s degree program in electronics and computer engineering technology to prepare students to take on the technological challenges of the 21st century. It provides a strong and comprehensive foundation in both areas, and technical electives are available for students to concentrate in either or both fields depending on their interests. The bachelor’s and associate’s degree programs in electronics and computer engineering technology are accredited by the Engineering Technology Accreditation Commission of ABET, www.abet.org.

The curriculum requires that students develop a strong background in mathematics, science, and communication skills. In addition, students must master a progressively involved sequence of technical courses, which instill a knowledge of theory, analysis, and practical design. The heavy laboratory emphasis with modern and industry standard equipment provides extensive hands-on experience in a variety of fields including analog and digital electronics, computer networks and systems, microprocessors, telecommunications, embedded systems, robotics, PLCs, industrial control, and signal processing.

The electronics and computer engineering technology program enjoys strong support of the industrial community, and an industrial program advisory board provides periodic input to make changes in program offerings to reflect the changing needs of industries. Local companies provide cooperative education assignments for students to receive meaningful industrial experience while earning both academic credit and income to defray their educational expenses.
**Associate of Engineering Technology Degree**

This degree requires two years of study of electronics, computers, science, mathematics, and general academics to prepare students for employment as electronics technicians. Graduates of the program can also apply their credits toward the Bachelor of Science degree in Electronics and Computer Engineering Technology. Two additional years of study are required to meet the requirements for the baccalaureate degree. The Associate of Engineering Technology degree is accredited by the Engineering Technology Accreditation Commission of ABET, http://www.abet.org.

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**Bachelor of Science Degree**

The baccalaureate degree program requires the students to complete two additional years beyond the Associate of Engineering Technology curriculum. Students receive greater depth and breadth of knowledge in the technical field and more mathematics, humanities, and social science courses are included. A number of technical electives are allowed in the curriculum, and students choose the electives to match their career objectives. No minor is required for the degree. The Bachelor of Science degree is accredited by the Engineering Technology Accreditation Commission of ABET, http://www.abet.org.

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**Associate of Engineering Technology in Electronics and Computer Engineering Technology Curriculum**

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<thead>
<tr>
<th>First Semester (15 hours)</th>
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<tr>
<td>ECET 1302 Introductory Experience in Technology and Computers</td>
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<tr>
<td>RHET 1311 Composition I</td>
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<tr>
<td>MATH 1302 College Algebra</td>
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<td>HIST 2311, 2312 American History</td>
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<td>or POLS 1310 American National Government</td>
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<td>ETME 1300 Computer Graphics</td>
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<th>Second Semester (15 hours)</th>
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<tr>
<td>RHET 1312 Composition II</td>
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<tr>
<td>MATH 1303 Trigonometry</td>
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<td>ECET 1404 Circuit Analysis I</td>
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<td>IFSC 1202 Intro to Object Oriented Technology</td>
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<td>PHIL 2320 Ethics and Society</td>
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<th>Third Semester (17 hours)</th>
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<tr>
<td>MATH 1311 Applied Calculus I</td>
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<tr>
<td>PHYS 1321 College Physics I</td>
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<td>PHYS 1121 College Physics I Laboratory</td>
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<td>ECET 2305 Circuit Analysis II</td>
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<td>ECET 2105 Circuits and Simulation Laboratory</td>
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<td>ECET 3308 Robotics and PLCs</td>
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<td>RHET 3316 Writing for the Workplace</td>
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<td>or RHET 3326 Technical Writing</td>
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<td>or MGMT 3380 Business Communication</td>
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<th>Fourth Semester (17 hours)</th>
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<tr>
<td>ECET 2352 Introduction to Digital Systems</td>
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<tr>
<td>ECET 2152 Introductory Digital Laboratory</td>
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<tr>
<td>CPSC 1375 Programming I</td>
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<tr>
<td>CPSC 1175 Introduction to Computer Science Laboratory</td>
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<tr>
<td>PHYS 1322 College Physics II</td>
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<td>PHYS 1122 College Physics II Laboratory</td>
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<td>ECET 2169 Sophomore Design Project</td>
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<tr>
<td>ECET 3405 Electronic Devices I</td>
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**Bachelor of Science Electronics and Computer Engineering Technology**

**General:** 127 [approved exception] total hours, including 45 hours of upper-level courses (3000-4000 level), and 30 hours in residence

**First-Year Colloquium (0-3 hours)**

Required of full-time freshmen entering college for the first time and transfer students with less than 12 hours of credit. (See page 19 for details)

ECET 1302 Introductory Experience in Engineering and Technology

**Standard Core (21 hours)**

See Catalog for Description of Standard Core Course Options, except: Humanities (also satisfies program requirement for ethics):

PHIL 2320 Ethics and Society

**EIT College Core (14 hours)**

**Mathematics (3 hours)**

MATH 1302 College Algebra

**Science (8 Hours)**

PHYS 1321 College Physics I

PHYS 1121 College Physics I Laboratory

PHYS 1322 College Physics II

PHYS 1122 College Physics II Laboratory

**Flex (3 Hours) - satisfied by 3 hours of Mathematics per the State Minimum Core**

MATH 1303 Trigonometry

**Major (92 hours)**

**Additional Math and Science courses (20 hours):**

IFSC 1202 Introduction to Object-Oriented Technology

ETME 1300 Computer Graphics

CPSC 1375 Programming I

CPSC 1175 Introduction to Computer Science Laboratory

CPSC 2376 Programming II

MATH 1311 Applied Calculus I

MATH 1312 Applied Calculus II

PHIL 2320 Ethics and Society (satisfies University Standard Humanities core)

ECET 1302 Introductory Experience in Engineering and Technology
Leadership in corporate America is projected to come from the ranks of technologists who have the breadth of knowledge of design, manufacturing technology, and management skills. UALR’s mechanical engineering technology program provides a strong and comprehensive foundation in these areas and introduces to students the ideas of fabrication processes, management of people and projects, and cost and quality control. The program focuses on fundamental concepts of statics, dynamics, mechanics of materials, and computer two- and three-dimensional graphics of components. The degree program emphasizes product development, design, manufacturing, design of mechanical systems such as thermal power systems, heating, ventilating and air conditioning, and addresses the area of plastics and composites.

The program prepares students for entry-level positions in a variety of career areas in product design, testing, manufacturing, and in plant design and operation. Technical knowledge in the mechanical field is based upon a broad foundation in mathematics, science, and applied science. The program emphasizes applications and extensive hands-on experience in addition to theoretical concepts. In addition to the traditional approach to mechanical design and manufacturing, the program emphasizes computer applications such as computer-aided manufacturing, computer-aided engineering, data acquisition and sensors, robotics, and programmable logic controllers.

UALR’s mechanical engineering technology program enjoys strong support from the industrial community and has a successful cooperative education program with a number of local industries. The cooperative education program allows students to practice in industry, gaining early experience while earning academic credit and income to help with their educational expenses. Students may enroll in the co-op program beginning in their junior year.

The department offers both a two-year associate and four-year bachelor’s degree program. Both are accredited by the Engineering Technology Accreditation Commission of ABET, www.abet.org.
Minor in Computer Integrated Manufacturing

Required Courses
- ETME 1300 Computer Graphics
- ETME 2317 Manufacturing Processes
- ETME 2117 Manufacturing Processes Laboratory
- ETME 3312 Production Systems
- ETME 3328 Computer Aided Manufacturing (CAM)
- ETME 3330 Quality Control
- ETME 4385 Robotics and Automation
- Approved technical elective (3 hours)

Associate of Engineering Technology Degree

The Associate of Engineering Technology is a two-year degree program, which provides students with the background and skill for supporting level positions in the mechanical and manufacturing fields. These include computer graphics, computer aided manufacturing and CNC programming, fluid power, technical sales, and plant maintenance. The Associate of Engineering Technology degree is accredited by the Engineering Technology Accreditation Commission of ABET, http://www.abet.org.

The curriculum requires students to take courses in mechanical, manufacturing, and electronics and computer engineering technology in addition to mathematics, science, and general education. Students must complete the associate degree program before they are allowed to enroll in the baccalaureate program.

The associate degree in mechanical engineering technology majors may take only up to nine credit hours of junior and senior level courses in the program. Associate degree graduates may transfer their credits toward the bachelor’s degree in mechanical engineering technology.

Bachelor of Science in Mechanical Engineering Technology

The baccalaureate degree program requires the students to complete two additional years beyond the Associate of Engineering Technology curriculum. No minor is required for the degree. The Bachelor of Science degree is accredited by the Engineering Technology Accreditation Commission of ABET, http://www.abet.org.

Students receive greater depth and breadth of knowledge in the mechanical field, and take additional courses in mathematics, science, humanities, and social science. Students choose technical electives to meet their career goals.

The bachelor of science curriculum requires completion of the associate degree curriculum detailed previously and the requirements detailed in the chart above.

Bachelor of Science in Mechanical Engineering Technology

General: 125 [approved exception] total hours, including 45 hours of upper-level courses (3000-4000 level), and 30 hours in residence

First-Year Colloquium (0-3 hours)
- Required of full-time freshmen entering college for the first time and transfer students with less than 12 hours of credit. (See page 19 for details)
- ETME 1110 First Year Experience: Introduction to Mechanical Engineering Technology

Standard Core (21 hours)
- See Catalog for Description of Standard Core Course Options, except: Humanities (also satisfies program requirement for ethics):
- PHIL 2320 Ethics and Society

EIT College Core (14 hours)
- Mathematics (3 hours):
- MATH 1302 College Algebra
- Science (8 hours):
- PHYS 1321 College Physics I
- PHYS 1122 College Physics II Laboratory
Bachelor of Science in Mechanical Engineering Technology

(Two Year Program Following the Associate Degree)

Fifth Semester (17 hours)
- ETME 3312 Production Systems
- ETME 3303 Applied Thermal Science
- ETME 3301 Applied Mechanics of Materials
- MATH 1312 Applied Calculus II
- IFSC 1202 Intro to Object Oriented Technology
- HIST 1311 History of Civilization I
  or HIST 1312 History of Civilization II

Sixth Semester (16 hours)
- ETME 3361 Cost Analysis and Estimation
- ETME 3315 Thermal Systems Design
- ETME 3328 Computer Aided Manufacturing
- CHEM 1402 General Chemistry I
- RHET 3316 Writing for the Workplace
  or RHET 3326 Technical Writing
  or MGMT 3380 Business Communication

Seventh Semester (16 hours)
- ETME 4317 Machine Design
- ETME 4321 Computer Aided Engineering
- ETME 4287 Senior Project I
- ETME 3324 Plastics & Composites
- ETME 3311 Mechanical Instrumentation

Eighth Semester (15 hours)
- ETME 4387 Senior Project II
- ETME 3330 Quality Control
- Approved Technical Elective (3 hours)
- Social Sciences (3 hours)

Courses in Electronics and Computer Engineering Technology

ECET 1302 Introductory Experience in Technology and Computers
- A project-based experiential learning course to modern technology through hands-on laboratory activities, team work, and cooperative learning, and problem solving. Introduction to design process and reverse engineering. Five hours of integrated lecture lab. Three credit hours.

ECET 1404 Circuit Analysis I
- Prerequisites: MATH 1302. An introduction to DC (direct current) and AC (alternating current) circuit analysis techniques involving resistors, inductors, and capacitors. Other topics include reactance, AC power factor correction, three-phase circuits, and motors. Three hours lecture and three hours lab. Four credit hours.
ECET 2100 Methods of Engineering Computation
Corequisite: MATH 1303. Use of microcomputers for technical data analysis, manipulation, and reports. Application of the computer to engineering problem solving. One hour lecture and one hour lab. One credit hour.

ECET 2105 Circuits and Simulation Laboratory
Corequisite: ECET 2305. Laboratory experiments to supplement classroom instruction in ECET 2305. Introduction to electronics simulation software and its applications to laboratory exercises. Three hours lab. One credit hour.

ECET 2150 Microprocessor Fundamentals
Prerequisites: a grade of C or greater in ECET 1404, sophomore standing. Study includes number systems, basic types of instructions and addressing modes, and an overview of the functional organization inside a microprocessor. One hour lecture. One credit hour.

ECET 2152 Introductory Digital Laboratory
Corequisite: ECET 2352. Lab exercises to provide practical knowledge of logic devices and their applications. One three-hour lab. One credit hour.

ECET 2169 Sophomore Design Project
Corequisite: ECET 3405; or consent of instructor. Schematic layout through CAD; PCB design to include SMT components; complete fabrication with mechanical consideration, and casing. Both written report and oral presentation are required. Three hours lab. One credit hour.

ECET 2191 Cooperative Education
Prerequisites: sophomore standing in engineering technology and approval of department’s chairperson; cumulative GPA of 2.50; minimum GPA of 2.30 for previous semester. Industrial experience under supervision of faculty advisor to supplement course work. Students who take this course may not take 2291. Requires at least 240 contact hours on the job. One credit hour.

ECET 2291 Cooperative Education
Prerequisites: sophomore standing and approval of department’s chairperson; cumulative GPA of 2.50; minimum GPA of 2.30 for previous semester. Industrial experience under supervision of advisor to supplement course work. Students who take this course may not take 2191. Requires at least 480 contact hours on the job. Two credit hours.

ECET 2300 Numerical Methods for Technologists
Prerequisite: IFSC 1202 or equivalent. Corequisite: MATH 1311. An introductory course in symbolic language programming with application to engineering problems. Related material in numerical methods of solution is presented. Five hours of combined lecture and laboratory. Three credit hours.

ECET 2305 Circuit Analysis II
Prerequisites: grades of C or greater in ECET 1404, MATH 1303. Network theorems applied to the steady-state response of DC (direct current) and AC (alternating current) circuits. The application of complex impedance and phasors to the solution of AC circuits. Transients in RC and RL circuits. Three hours lecture. Three credit hours.

ECET 2330 Electronics and Controls
Prerequisite: a grade of C or greater in ECET 2405. Intended for majors other than electronics and computer engineering technology. Fundamental elements of power electronics needed to understand the operation and maintenance of electronic equipment. Introduction of power semiconductor devices including diodes and thyristors. The electronic control of motors, including variable frequency drives. Controlling the operation of equipment and processes with programmable logic controllers. Two hours lecture, three hours laboratory. Three credit hours.

ECET 2352 Introduction to Digital Systems
Prerequisite: a grade of C or greater in ECET 1404 or equivalent. Introduction to digital circuits and systems. Number systems, Boolean algebra, and applications of basic logic gates; exercises in analysis and design of combinational and sequential logic circuits, including encoders, decoders, multiplexers, flip-flops, registers, and counters. Microprocessor architecture software and programming. Three hours lecture. Three credit hours.

ECET 2405 Electrical Technology
Prerequisite: a grade of C or greater in MATH 1303. Corequisite: PHYS 1322 and 1122. An introductory course in electrical technology for majors other than electronics and computer engineering technology. A review of basic quantities including current, voltage, power, and energy. An introduction to machines and transformers, including direct current motors, induction motors, stepper motors, synchronous generators, and transformers. Three hours lecture, three hours lab. Four credit hours.

ECET 2405 Network Analysis
Prerequisites: a grade of C or greater in ECET 2405. Intended for majors other than electronics and computer engineering technology. Fundamental elements of power electronics needed to understand the operation and maintenance of electronic equipment. Introduction of power semiconductor devices including diodes and thyristors. The electronic control of motors, including variable frequency drives. Controlling the operation of equipment and processes with programmable logic controllers. Two hours lecture, three hours laboratory. Three credit hours.

ECET 3191 Cooperative Education
Prerequisites: junior standing in engineering technology and approval of department’s chairperson; cumulative GPA of 2.50, minimum GPA of 2.30 for previous semester. Industrial experience under supervision of advisor to supplement course work. Students who take this course may not take 3291. Requires at least 240 contact hours on the job. One credit hour.

ECET 3291 Cooperative Education
Prerequisites: junior standing in engineering technology and approval of chairperson; cumulative GPA of 2.50; minimum GPA of 2.30 for previous semester. Work experience related to student objectives under supervision of advisor. Students who take this course may not take 3191. Requires at least 480 contact hours on the job. Two credit hours.
ECET 300 Independent Study
Prerequisite: consent of instructor. Study of assigned topics chosen to develop investigative, analytical, research, or professional skills related to engineering. The student is expected to spend 8 to 10 hours per week on the project. The exact hourly commitment depends on the complexity of the project and is agreed on in advance by the student and the instructor. Three credit hours.

ECET 308 Robotics and Programmable Logic Controllers (PLCs)
Prerequisite: grade of C or greater in ECET 1404 or 2405. A study of operation of PLC’s, including ladder logic programming and interfacing to industrial-type equipment, such as motors. Programming topics include bit addressing, timers, counters, and switches. The application of PLC’s for robotic control will be examined. Two hours lecture, three hours lab. Three credit hours.

ECET 316 Power Systems and Equipment
Prerequisites: grades of C or greater in ECET 2305, MATH 1311. Basic principles of AC power systems analysis, with emphasis on three-phase systems. Load and fault analysis and economic operation. Major equipment items, including motors, generators, transformers, and switching and control equipment. Two hours lecture, two hours lab and recitation. Three credit hours.

ECET 330 Microprocessor Systems
Prerequisite: a grade of C or greater in CPSC 2382 or ECET 2150. Survey of addressing modes and instructions. Some hardware is introduced and electronic signals are related to software statements. Three hours lecture. Three credit hours.

ECET 360 Data Acquisition and Sensors
Prerequisite: grades of C or greater in ECET 2352, 3406, and CPSC 1375; or consent of instructor. A practice-oriented course emphasizes the use of sensors in instrumentation and control and provides an understanding of the techniques of acquisition and manipulation of experimental and sensory data using computer hardware and software to build a coordinated and optimal automated system. Principles of process control using personal computers to provide an inexpensive solution for isolated or small-scale industrial process control are also discussed. Two hours lecture, three hours lab. Three credit hours.

ECET 3405 Electronic Devices I
Requisites: grades of C or greater in ECET 2305 and 2105.
A study of the characteristics and applications of electronic elements including diodes, BJTs, and op-amps. Includes load lines, biasing techniques, single and multistage signal amplifiers, power amplifiers, and transistor switching characteristics. Laboratory exercise also includes computer simulation. Three hours lecture, three hours lab. Four credit hours.

ECET 3406 Electronic Devices II
Prerequisite: a grade of C or greater in ECET 3405. A detailed study of the operational amplifier, including gain considerations and frequency response. Selected applications of the op-amp to instrumentation, control, and active filters; computer-aided analysis is fully integrated into all topics. Other topics include oscillators and timing circuits. Three hours lecture, three hours lab. Four credit hours.

ECET 3409 Signal Analysis
Prerequisites: grades of C or greater in ECET 3406 and MATH 1312. Laplace transform method applied to network analysis, filters, and feedback systems. Fourier series and Fourier transform techniques with application to communication signals. Introduction to Z transform for digital signal processing. The laboratory projects include computer simulation using Matlab. Three hours lecture, three hours lab. Four credit hours.

ECET 4149 Photovoltaics and Renewable Energy Lab
Corequisite ECET 4349. Laboratory experiments and projects to provide practical know-how and training in power electronics necessary to interface renewable energy generators to load and grid. Examine effects of angle of tilt, shading, and irradiance on PV power production. The project will include design of a low power mppt-controlled standalone PV system. Also includes simulation. Three hours lab. One credit hour.

ECET 4199 Special Technical Topics I
Prerequisite: consent of instructor based on relevance of subject matter to student career goals. Designed to meet special needs of students or industry to cover application of technology to specific industrial problems. Meets equivalent of one hour. One credit hour.

ECET 4304 Industrial Controls
Prerequisites: a grade of C or greater in ECET 4407. A detailed study of industrial controls based around microcontrollers. Practical applications are emphasized. Topics include interface devices, such as opto-isolators and solid state relays. Two hours lecture, three hours lab. Three credit hours.

ECET 4306 Data and Computer Communications
Prerequisite: a grade of C or greater in ECET 3409. Discusses principles and practices in data communications with emphasis on the hardware aspects of data communication. Topics include transmission, encoding, decoding, data interfacing, error detection and correction, link control, networking and protocols. Internet working over the Internet. Three hours of lecture. Three credit hours.

ECET 4309 Applied Signal Processing
Prerequisite: grade of C or greater in ECET 3409. A hands-on experience to digital signal processing through laboratory exercises in a computer environment. Sampling theorem, discrete-time signals and systems, DFT, FFT, and digital filters. Two hours of lecture and two hours lab. Three credit hours.
ECET 4349 Photovoltaics and Renewable Energy
Prerequisites: Grade of C or better in ECET 3406 or SYEN 3352; or consent of instructor. Renewable energy system resources including thermal-solar, photovoltaic, wind, geothermal systems, biomass, and other current topics. Focuses on theory of photovoltaics power generation, maximum power point tracking, power electronics and interfacing, microinverters, energy storage, practical applications and design of standalone and grid connected systems. Also includes topics in safety, economics of alternative renewable energy systems compared to conventional systems, and emerging green energy technology. Crosslisted with: SYEN 4349/5349 Three hours lecture. Three credit hours.

ECET 4351 System Design
Prerequisites: grades of C or greater in ECET 3360 and 4450, or consent of instructor. Methods of approaching design problems, software control of hardware, modeling of applications, hardware/software trade-offs in the design process. Students work in teams to solve a substantive design problem. The course integrates at the system level the hardware/software knowledge of the electronics and computer engineering technology major. Three hours lecture. Three credit hours.

ECET 4353 Optical Electronic Devices and Systems
Prerequisites: grades of C or greater in ECET 3406 and 4407. Applications of optoelectronic devices to communications, robotics, and automated manufacturing. Two hours lecture, two hours lab. Three credit hours.

ECET 4354 Computer Hardware Architecture
Prerequisites: grades of C or greater in ECET 3350, 4407. Study of the various hardware designs and their relationship to architecture. Includes an overview of mainframe, supercomputers, and multicomputers. Three hours lecture. Three credit hours.

ECET 4362 Real-Time Systems
Prerequisites: grades of C or greater in ECET 3350 and CPSC 2376 or equivalents. Real-time specification and design techniques, real-time kernels, intertask communication and synchronization, real-time memory management, system performance analysis and optimization. Three hours lecture. Three credit hours.

ECET 4363 Network Technology and Management
Prerequisite: grade of C or greater in ECET 4306. A continuation of the studies of the principles and practices in data communication and includes topics such as switches and switching fabric, frame relay, ATM, and emerging technologies. Protocols and techniques for monitoring and managing computer networks, and computer security issues are discussed. Two hours lecture and two hours lab. Three credit hours.

ECET 4370 Senior Design Project
Prerequisite: grade of C or greater in ECET 4351. Students work independently with a faculty mentor on a design/research problem. The project could be developed through industry collaboration, faculty research, or at the student’s own initiative through literature search. The project requires electronics and computer engineering technology faculty approval, formal oral and written presentation, and demonstration of the project. Students meet with the mentor weekly to discuss their designs. Five hours lab. Three credit hours.

ECET 4399 Special Technical Topics III
Prerequisite: consent of instructor based on relevance of subject to student career goals. Designed to meet special needs of students or industry to cover application of technology to specific industrial problems. Meets equivalent of three hours. Three credit hours.

ECET 4407 Digital System Design
Prerequisites: grades of C or greater in ECET 2300, 2352, 2152, and 3405. Advanced concepts in digital system design to include programmable devices, and state machines using HDL. Laboratory projects include computer simulation. Three hours lecture, three hours lab. Four credit hours.

ECET 4450 Embedded Systems
Prerequisites: grades of C or greater in ECET 3350 and 4407. Techniques for interfacing micros to outside devices. Detailed analysis of bus standards, serial and parallel input/output to peripherals. Laboratory includes the application of interfacing techniques to build a microcomputer and interface it to outside devices. Three hours lecture, three hours lab. Four credit hours.

ECET 4479 Communication Systems
Prerequisites: grades of C or greater in ECET 3409. Spectral analysis of signals; noise; linear modulation and demodulation; AM, SSB, angle modulation and demodulation; phase locked hoops, and digital communication techniques. Three hours lecture, three hours lab. Four credit hours.

ECET 4480 Digital Communication
Prerequisite: a grade of C or greater in ECET 4479. Advanced study of techniques and hardware employed in digital, microwave, satellite, and fiber optic communications. Three hours lecture, three hours lab. Four credit hours.

Courses in Mechanical Engineering Technology

ETME 1110 FYE: Mechanical Engineering Technology
Review of educational goals. Management of time. Balancing work and course load. Use of campus resources. Planning educational and experience goals, including cooperative education, licensing and certification. Role and practice of engineering technology including career paths in Mechanical Engineering Technology. Two-hour lab, 1 credit hour. Course is a graduation requirement but not a degree requirement.
ETME 1300 Computer Graphics
Study of graphics and the types of engineering drawings used in design. Sketching and computer aided design tools are used to create the various types of views needed for design and documentation. Two hours lecture and three hours lab. Three credit hours.

ETME 2117 Manufacturing Processes Laboratory
Corequisite: ETME 2317. Introduction to machine shop equipment and processes; metal fabricating applications, including metal cutting, such as turning, drilling, milling; welding, and measurement and inspection, Course project and the application of Ethics and safety in design and manufacturing. One three-hour lab, One credit hour.

ETME 2191 Cooperative Education
Prerequisites: sophomore standing in engineering technology and approval of department’s chairperson; cumulative GPA of 2.50; minimum GPA of 2.30 for previous semester. Industrial experience under supervision of faculty advisor to supplement course work. Students who take this course may not take 2291. Requires at least 240 contact hours on the job. One credit hour.

ETME 2291 Cooperative Education
Prerequisites: sophomore standing and approval of department’s chairperson; cumulative GPA of 2.50; minimum GPA of 2.30 for previous semester. Industrial experience under supervision of advisor to supplement course work. Students who take this course may not take 2191. Requires at least 480 contact hours on the job. Two credit hours.

ETME 2302 Properties of Materials
Prerequisites: RHET 1311, MATH 1302, or consent of instructor. Physical structure of metals, properties, testing, phase diagrams, and applications. Ferrous metals, metal treatment, nonferrous metals, corrosion, plastics, other engineering materials and applications. Two hours lecture, two hours lab. Three credit hours.

ETME 2303 Computer-Aided Design (CAD)
Prerequisites: a grade of C or greater in ETME 1300 and basic computer skills, or consent of instructor. A study of 2D and 3D computer aided design software used in industry. Detailed and working drawings, and design documentation using CAD. Importing and exporting CAD data is covered as well as various methods of output. Introduction to 3D modeling. Two hours lecture, three hours lab. Three credit hours.

ETME 2310 Applied Statics
Corequisite: MATH 1311. An analysis of force systems applied to rigid bodies at rest. Application of principles on computation of reactions, shears, moments, and forces for simple structures. Centroids and moments of inertia are included. Two hours lecture, two hours lab. Three credit hours.

ETME 2317 Manufacturing Processes
Corequisite: ETME 2117. Traditional manufacturing processes such as casting, forging, cold working; metal removal processes such as turning, milling, drilling, finishing processes, metal joining, and plastics. Manufacturing process laboratory course is available. Three hours lecture. Three credit hours.

ETME 2320 Fluid Mechanics and Power
Prerequisite: a grade of C or greater in MATH 1303. Hydraulics and pneumatics; the flow of water, air, and oil; calibration of metering devices; pipe friction; elementary hydraulic tests; friction and energy loss; and devices for making fluid measurements. Two hours lecture, two hours lab. Three credit hours.

ETME 2333 Advanced Computer-Aided Design
Prerequisites: a grade of C or greater in ETME 2303, or consent of instructor. Graphic design process using an interactive computer-aided design system. Includes sophisticated functions beyond two-dimensional shape and size description and three-dimensional capabilities of CAD/CAM systems in advanced design situations. Calculation and analysis programs are used to improve the students’ design. Students work on design problems related to their chosen field using the CAD system. Two hours lecture, three hours lab. Three credit hours.

ETME 3191 Cooperative Education
Prerequisites: junior standing in engineering technology and approval of department’s chairperson; cumulative GPA of 2.50, minimum GPA of 2.30 for previous semester. Industrial experience under supervision of advisor to supplement course work. Students who take this course may not take 3291. Requires at least 240 contact hours on the job. One credit hour.

ETME 3291 Cooperative Education
Prerequisites: junior standing in engineering technology and approval of chairperson; cumulative GPA of 2.50; minimum GPA of 2.30 for previous semester. Work experience related to student objectives under supervision of advisor. Students who take this course may not take 3191. Requires at least 480 contact hours on the job. Two credit hours.

ETME 3300 Independent Study
Prerequisite: consent of instructor. Study of assigned topics chosen to develop investigative, analytical, research, or professional skills related to engineering. The student spends 8 to 10 hours per week on the project. The exact hourly commitment depends on the complexity of the project and is agreed on in advance by the student and the instructor. Three credit hours.

ETME 3301 Applied Mechanics of Materials
Prerequisites: ETME 2302, a grade of C or greater in ETME 3317 or consent of the instructor. Topics include stress and strain, direct and shearing stresses, torsion, bending, deflection, columns, and riveted, bolted, and welded joints. Three hours lecture. Three credit hours.
ETME 3303 Applied Thermal Science
Prerequisites: PHYS 1321 and ETME 2320. Basic thermal properties and heat transfer modes. Theory, operation, and selection of thermal industrial equipment including engines, turbines, boilers, furnaces, and heat exchangers. Two hours lecture, two hours lab. Three credit hours.

ETME 3305 Industrial Energy Utilization
Prerequisites: ETME 2317, 3303, and ECET 3308, or consent of instructor. Study of the efficient utilization of energy in manufacturing and industrial applications. Components of an energy conservation program, assessments of existing processes, analysis and application of energy conservation techniques. One hour lecture and five hours lab. Three credit hours.

ETME 3306 Solar Energy Systems
Prerequisite: a grade of C or greater in ETME 3303. Analysis of solar energy systems and methods of determining the capacity and functional requirements of system elements in terms of applications. Two hours lecture, two hours lab. Three credit hours.

ETME 3307 Applied Dynamics
Prerequisite: a grade of C or greater in ETME 2310. Topics include scalar treatment of kinematics and kinetics of particles, rigid bodies in planar motion, Newton’s laws, work and energy, impulse and momentum, impact, and vibration. Two hours lecture, two hours lab. Three credit hours.

ETME 3311 Mechanical Instrumentation
Prerequisites: ETME 3301, 3303, ECET 3308, and IFSC 1202, or consent of instructor. Measurement of mechanical phenomena including stress, strain, deflection, temperature, pressure, and flow. Automatic data acquisition and handling. Applications to process monitoring and product testing. Two hours lecture, three hours laboratory. Three credit hours.

ETME 3312 Production Systems
Prerequisites: ETME 2117, ETME 2317, ETME 1300, or consent of instructor. Production systems and applications. System planning for products and services. Operational planning, Just-In-Time (JIT), Total Quality Management (TQM), process control, and system management. System analysis and computer simulation. Facility planning. Three hours lecture. Three credit hours.

ETME 3313 Tool Design
Prerequisites: grades of C or greater in ETME 2117, 2317, MATH 1303. Optimum uses of tool function, geometry, design applications, cutting tools, gages, jigs and fixtures, punch press tools, plastic tools, and special production tools for N/C machines. Two hours lecture, three hours lab. Three credit hours.

ETME 3314 Metallurgy Applications
Prerequisite: a grade of C or greater in ETME 2302. Study of the principles relating crystalline structure to chemical, physical, and electrical properties of metals and alloys. The testing, heat treating, and engineering applications of ferrous and nonferrous alloys are considered. Three hours lecture. Three credit hours.

ETME 3315 Thermal Systems Design
Prerequisite: ETME 3303. Study of air conditioning, refrigeration, steam, fluid, thermal systems, and heat transfer processes for commercial and industrial applications. Emphasis is on systems design, operation, and component selection and specification. Two hours lecture, two hours lab. Three credit hours.

ETME 3318 Industrial and Environmental Safety
Prerequisites: grades of C or greater in ETME 2117, 2317, or consent of instructor. Need and justification for safety in the work place. Legal aspects of safety and the OSHA Act. Environmental requirements and emission standards. Scope of human factors and safety management. Planning and implementation of safety measures to counteract various industrial hazards such as mechanical, electrical, fire, noise, and toxic substance. Three hours lecture. Three credit hours.

ETME 3319 Plant Layout
Prerequisite: a grade of C or greater in ETME 2317. Principles of facilities planning as applied to selection and location of equipment. Batch and continuous flow. Two hours lecture, three hours lab. Three credit hours.

ETME 3322 Project Management
Prerequisite: MATH 1302. Study of project planning and scheduling using the network methods as presented by PERT and CPM. Network planning, solution methods, and practical applications. Probabilistic time estimates, resource leveling, cost optimization, and cost control techniques. Includes application of computer solution methods. Three hours lecture. Three credit hours.

ETME 3323 Materials Handling and Plant Layout
Prerequisite: grade of C or greater in ETME 2317. Production, distribution and service systems, material flow and the role of material handling. Material handling principles, analysis techniques, and equipment planning. Plant layout and design. The course includes the use of various case studies and the application of computer methods. Three hours lecture. Three credit hours.

ETME 3324 Plastics and Composites
Prerequisite: CHEM 1402 or consent of the instructor. Introduction to plastics part design, materials, production methods, tooling, and equipment. Process cost analysis and optimization. Three hours lecture. Three credit hours.
ETME 3328 Computer Aided Manufacturing (CAM)
Prerequisites: grades of C or greater in ETME 2303, 2333, and 2317. A study of the programming standards used in industry to control NC and CNC equipment. G and M codes, as well as specific control commands used in manual program. Computer aided design and manufacturing software to generate part geometry and tool path information. Preparation of final program used by the CNC controllers to machine the designed parts. Two hours lecture, three hours lab. Three credit hours.

ETME 3329 Process Planning
Prerequisites: grades of C or greater in ETME 2117, 2317. Analytical models and techniques as applied to manufacturing processing, cost estimating, tooling, and materials selection. Problems involving manufacturing, planning, and control. Two hours lecture, three hours lab. Three credit hours.

ETME 3330 Quality Control
Prerequisites: grades of C or greater in ETME 2117, 2317; MATH 1302. Statistical foundation for modern quality control. Process control techniques and applications. Product specifications and process capability. Planning and application of acceptance sampling including such plans as the Dodge-Rominger, military standards 105 and 414. Computer application problems. Three hours lecture. Three credit hours.

ETME 3361 Cost Analysis and Estimation

ETME 3417 Statics and Dynamics
Prerequisite or corequisite: MATH 1311, 1451, or equivalent. Engineering mechanics involving the study of both statics and dynamics. The equilibrium of bodies at rest or moving with constant velocity and bodies that have a change of motion. Four hours of lecture. Four credit hours.

ETME 4185 Robotics Laboratory
Prerequisite or corequisite: a grade of C or greater in ETME 4385. Robot set-up and programming using control pendant, programmable controllers, ARMBASIC and AML2 languages. Robot capabilities including positioning accuracy, repeatability, and compliance. Robot manufacturing tasks including sorting, machine loading, and assembly. Vision system and applications. One three-hour lab. One credit hour.

ETME 4287 Senior Project I
Prerequisite: ETME 3301. Corequisite: ETME 4317. Product design/manufacturing cycle. The design process from market research through production and service, concurrent engineering, design evaluation, and ethics in design and manufacturing, project selection and planning for the second phase of the senior project to be completed in ETME 4387. Two hours lecture, One hour lab. Two credit hours.

ETME 4195, 4295, 4395 Technology Internship
Prerequisite: junior standing in Engineering Technology, cumulative GPA of 2.50, minimum GPA of 2.30 for previous semester, approval of assignment by advisor. Professional experience related to student’s discipline under supervision of advisor. Credit hours based on internship work experience hours. One credit hour (ETME 4195) for 80 hour work assignment, two credit hours (ETME 4295) for 160 hour work assignment, or three credit hours (ETME 4395) for 240 hour work assignment. One, two, or three credit hours.

ETME 4199 Special Technical Topics I
Prerequisite: consent of instructor. Designed to meet special needs of students or industry to cover application of technology to specific industrial problems. Meets equivalent of one hour. One credit hour.

ETME 4309 Production Control
Prerequisite: senior standing. Traditional operations research approach to production control and some of its limitations. Modern role of computer in material requirements planning (MRP). Master scheduling, capacity planning, dispatching, and shop floor control. Forecasting, order quantity planning and inventory management, Just-In-Time production. Three hours lecture. Three credit hours.

ETME 4317 Machine Design
Prerequisite: ETME 3301. Basic procedures of engineering machine design from concept to specifications. Material selection, tolerances, variable loads and stress concentrations, combined stresses, shaft design, couplings, bearings, gears, power transmitting elements, brakes, clutches, and welded joints. Emphasis on a logical procedure for the design of a complete machine, its components, their functions and layout. Two hours lecture, three hours lab. Three credit hours.

ETME 4319 Plant Engineering
Prerequisite: ETME 3315 or consent of instructor. A practicum on the design and operation of mechanical systems for commercial and industrial applications. Thermal processes, waste water, ducts, piping, and other mechanical systems. Plant operation and maintenance. Two hours lecture. Two hours lab. Three credit hours.

ETME 4321 Computer Aided Engineering (CAE)
Prerequisites: ETME 2333, and ETME 3301, or consent of instructor. Advanced computer aided analysis, stress analysis, kinematics, computer simulation, advanced design software and applications, project documentation. Two hours lecture, two hours lab. Three credit hours.

ETME 4383 Method-Time Analysis
Prerequisites: grades of C or greater in ETME 2117, 2317; senior standing. Design of work methods; time study, performance rating, work sampling and introduction to predetermined and computerized time-data systems. Applications to incentive plans and measured day work. Participative productivity improvement such as gainsharing and quality circles. Two hours lecture, two hours lab. Three credit hours.
ETME 4384 Die Casting
Prerequisites: grades of C or greater in ETME 2317, 2302. Topics include heat flow, dimensional repeatability, metallurgy, molten metal systems, process control, cost estimating, operating the die casting machine, and safety. Two hours lecture, two hours lab. Three credit hours.

ETME 4385 Robotics and Automation
Prerequisites: ETME 3312; knowledge of computer programming or consent of instructor. Industrial robots, types, and method of control and programming. Automation and application to various industrial processes. Human factors considerations. Robot system planning and justification. Two hours lecture, two hours laboratory. Three credit hours.

ETME 4386 Maintenance Management
Planning, organization, measurement, and control of maintenance activities. The planning, acquisition, and control of replacement parts and maintenance of management information systems. Case studies and project work included. Three hours lecture. Three credit hours.

ETME 4387 Senior Project II
Prerequisites: ETME 3312, 4317, and 4287, or consent of instructor. Design problems obtained from industry, current applied research, or student’s own initiative are researched in advance, and assigned as senior projects. Problems are defined, analyzed, design solved, and a final report presented. Final reports include design calculations, drawings, production plans, and may, depending on the scope of the project, be demonstrated and tested using a prototype. Two hours lecture and three hours lab. Three credit hours.

ETME 4388 Manufacturing Systems Design
Prerequisites: a grade of C or greater in ETME 4170, senior standing. Manufacturing problems obtained from actual industrial situations are assigned to senior students. Each problem is analyzed, designed, and presented orally and in a formal written report by the student. Student reports include drawings, manufacturing plans, cost, and schedule and may be demonstrated by a prototype whenever possible. One hour lecture, three hours lab. Three credit hours.

ETME 4399 Special Technical Topics III
Prerequisite: consent of instructor based on relevance of subject to student career goals. Designed to meet special needs of students or industry to cover application of technology to specific industrial problems. Three credit hours.