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### Electrical Engineering Technology

#### Mission Statement

The mission of the School of Applied Engineering and Technology is to provide value to our stakeholders through innovation in applied engineering education.

Electrical Engineering Technology is part of the technological field that requires the application of scientific and engineering knowledge and methods combined with technical skills in support of engineering activities; it lies in the occupational spectrum between the technician and the engineer at the end of the spectrum closest to the engineer.

#### Program Educational Objectives (PEOs)

The Electrical Engineering Technology program at Southern Illinois University Carbondale prepares students to attain the following objectives, 3 to 5 years after graduation:

1. Become productive professionals and successfully formulate cost-effective solutions to real-world problems that are fundamental to electrical/electronic systems and related fields.
2. Pursue life-long learning through professional development activities, advanced degrees, professional licensure or certifications.
3. Serve the public and improve the quality of life by acting in a professional, safe and ethical manner.
4. Continually seek higher-level tasks requiring independent thinking and judgment, and advance professionally with increased responsibility.
5. Successfully integrate and contribute to the success of multi-disciplinary teams.

The undergraduate program in electrical engineering technology is accredited by the Engineering Technology Accreditation Commission of ABET, [www.abet.org](http://www.abet.org). For each curriculum, a minimum of 30 hours in engineering technology courses must be taken in residence at Southern Illinois University Carbondale.

### Bachelor of Science (B.S.) in Electrical Engineering Technology

The electrical engineering technology major is designed to prepare graduates who are capable of technical design and who can contribute to the development, production, testing, and installation of electrical and electronic devices, circuits, and systems. In addition, graduates are capable of participation in the planning and installation of power distribution systems and operating and maintaining complex electrical systems. Graduates of the program are employed in communications, power, electronics, sales, manufacturing, and other fields.

#### B.S. Electrical Engineering Technology Degree Requirements

Degree Requirements	Credit Hours
University Core Curriculum Requirements <sup>1</sup>	39

Degree Requirements	Credit Hours
Foundation Skills	13
ENGL 101, ENGL 102	6
Mathematics (substitute Mathematics in major)	3
CMST 101	3
UNIV 101	1
Disciplinary Studies	23
Fine Arts	3
Human Health	2
Humanities	6
Science (substitute PHYS in major for 3 hours)	6
Social Science	6
Integrative Studies	3
Multicultural	3
Requirements for Major in Electrical Engineering Technology	(6)+81
PHYS 203A, PHYS 203B, PHYS 253A, PHYS 253B	(3)+5
MATH 111, MATH 150, MATH 282	(3)+8
MGMT 202	3
ENGR 222, CS 202, ECE 222	2
EET 150, EET 238, EET 245, or ECE 235, EET 304A, EET 304B, EET 332A, EET 332B, EET 403A, EET 403B, EET 437A, EET 437B, EET 438A, EET 438B, EET 439, EET 495A, EET 495B	56
Technical electives	7
<b>Total</b>	<b>120</b>

<sup>1</sup> Courses in parentheses will also apply towards 6 hours in the University Core Curriculum, making a total of 39.

## Capstone Option for Transfer Students

A Capstone Option may be available in the electrical engineering technology major and is explained on the Capstone Option page. Students holding associate degrees of at least 60 semester hours in non-baccalaureate-oriented programs or equivalent certification with a minimum grade point average of 2.0 are qualified. For the electrical engineering technology major, the associate degree or equivalent certification should be in an electrical or electronics-related field. This option permits qualified students to fulfill their degree requirements by completing 60 semester hours of work approved by the Capstone advisor. Each individual's program of study may differ according to the previous academic work.

## Electrical Engineering Technology Courses

**EET103 - Engineering Drawing I** (Same as IMAE 105) Links the components of technical sketching with current CAD software. Sketching to include: orthographic projection, sectional views and dimensioning. Employ these elements with current CAD software in creating drawing entities, managing layers, displaying and modifying drawings, annotating and dimensioning, and file management. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 3

**EET104 - Engineering Drawing II** Principles and practices of engineering drawing. Representation of mechanical components, dimensioning, tolerancing, and mechanical drawing symbols. Introduction to computer-aided drawing systems with applications to both micro-computer and mini-computer systems. Prerequisite: EET 103. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 3

**EET150 - Introduction to Electrical Engineering Technology** This laboratory course gives students instrumentation and construction skills. It covers CAD/CAM for electronics and instrumentation used to measure circuit values and generate signals. Students learn to identify components, analyze error, use units common to electrical measurement, and learn to design and build circuits. Students demonstrate skills by assembling, testing, and trouble-shooting an electronic kit. Prerequisite: MATH 111 or concurrent enrollment. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 2

**EET209 - Manufacturing Process Laboratory** (Same as IMAE 209) Laboratory experiments to familiarize the student with the theory and operation of manufacturing processes. Lab. Prerequisite: IMAE 208 or consent of instructor. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 3

**EET238 - Digital System Fundamentals** This course studies fundamental digital concepts used in electronic design and application. The course covers traditional design approaches for combinational and sequential circuits. The course introduces contemporary approaches such as hardware design languages. Topics include logic gates, flip-flops, memory circuits, Karnaugh map, and VHDL/Verilog. A laboratory emphasizes design and application. Prerequisite: EET 150 or concurrent enrollment, MATH 111 or concurrent enrollment. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 4

**EET245 - Introductory Circuit Theory and Applications** This course covers the fundamental theories of electric circuits. It covers symbols and diagrams that represent electric circuits and includes mathematical definitions and application of circuit components. Students analyze circuits using Ohm's and Kirchoff's Laws. The course introduces mathematical descriptions for alternating currents with practical examples. A laboratory demonstrates theory. Prerequisite: MATH 111, EET 150 or equivalent. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 4

**EET258 - Work Experience Credit** Credit granted for past work experience while employed in fields related to the student's educational objective. Credit is established by departmental evaluation. Restricted to Electrical Engineering Technology students or departmental approval required. Credit Hours: 2-30

**EET259 - Occupational Credit** For occupational credit earned at junior colleges and technical institutes. Credit is established by departmental evaluation. Restricted to Electrical Engineering Technology students or departmental approval required. Credit Hours: 2-60

**EET304A - AC/DC Circuit Theory and Application** DC network mesh and nodal analysis. The course covers Thevenin's theorems, Norton's theorems, superposition, delta-wye resistor transformations, maximum power transfer, phasor transforms and impedance concepts for AC analysis. The course covers frequency response of RC, RL, and RLC, resonant circuits. The course presents Bode plots of simple RC and RL filter circuits. A laboratory teaches safety and instrument usage. Prerequisite: EET 245 or ECE 235 with a C or better. Credit Hours: 4

**EET304B - Network Theory and Application** Course covers phasor transform methods for AC networks, dependent sources, source conversions, mesh and nodal analysis, AC bridges, superposition, Thevenin's theorem, Norton's theorem and delta-wye conversion. The course analyzes RC transient response and pulse characteristics. It presents and solves ideal OP AMP circuits. Fourier series theory for non-sinusoidal signals. Laboratory teaches instrument usage. Prerequisite: EET 304A, MATH 150. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 4

**EET321 - Automated Instrumentation and Data Acquisition** The course covers computerized control of instruments and data acquisition systems. Students learn equipment and sensors selection, test equipment control and data acquisition systems development. The course introduces LabVIEW programming language. Students develop automated testing programs to control processes, display and analyze data using programmable test equipment and software. (Lecture + Lab). Prerequisite: ENGR 222 or CS 202 or ECE 222 with a minimum grade of C; EET 245 or ECE 235 with a minimum grade of C. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 3

**EET332A - DC Motors, Generators and Energy Conversion Devices** Course covers theory, application, and operation of DC motors and generators. It emphasizes testing and measurement of machine characteristics, parameters and efficiency and develops circuit models describing machine operation. The course covers analysis of industrial motor protection and control schemes. It introduces the science, application, and economics of DC power using photocells. Laboratory. Prerequisite: EET 304A or concurrent enrollment. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 4

**EET332B - AC Electric Machines and Power Systems** The theory and operation of AC machines and industrial power systems with emphasis on testing and measurement of machine characteristics, parameters and efficiency. The course reviews basic AC circuit analysis and introduces three-phase circuit analysis. The course develops power transformer, AC motor, and AC generator models. Laboratory experience using test instruments and software. Prerequisite: EET 304B or concurrent enrollment. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 4

**EET338 - Device Programming for IoT** This course provides a hands-on introduction to programmable devices that may be used with the Internet of Things (IoT). The course covers essential electronics, device interfacing and programming for local monitoring and control. The use of Wi-Fi or Ethernet for monitoring and control via the Internet will be explored as well as security methods for IoT devices. Students will be required to purchase a microcontroller system ranging in cost between \$80-100. Lecture and Laboratory. A grade of C or better is required. Prerequisite: IST 209 or ENGR 222 with a grade of C or better. Credit Hours: 3

**EET342 - Technology Design** A design project on any technical subject selected by the student with advice from the instructor. Individual or group effort required to develop functional design. Report writing and oral presentation required. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 2

**EET358 - Work Experience Credit** Credit granted for past work experience that is principally management and/or supervisory in nature. Students seeking credit must demonstrate an employment history in fields/areas related to the student's educational objective. Credit is established by departmental

evaluation. Restricted to Electrical Engineering Technology students or departmental approval required. Credit Hours: 1-30

**EET359 - Occupational Credit** Credit will be awarded via program evaluation of upper-level non-accredited occupational education and training related to the student's academic and career objectives. Credit is established by departmental evaluation. Credit Hours: 2-60

**EET390 - Cost Estimating** (Same as IMAE 390) Study of the techniques of cost estimation for products, processes, equipment, projects, and systems. Prerequisite: Mathematics 111. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 3

**EET392A - Electrical Engineering Technology Co-op** Supervised work experience in Electrical Engineering Technology industry. Restricted to junior standing. Special approval needed from the instructor. Mandatory Pass/Fail. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 1

**EET392B - Electrical Engineering Technology Co-op** Supervised work experience in Electrical Engineering Technology industry. Restricted to junior standing. Special approval needed from the instructor. Mandatory Pass/Fail. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 1

**EET403A - Electronic Circuit Analysis** This course studies fundamental solid-state electronic concepts, the application and design of transistor amplifiers, and operational amplifier circuits. Course topics include the ideal operational amplifier, diodes, rectifiers, analysis and design of bipolar transistor (BJT) amplifiers, and the analysis and design of field effect transistor (FET) amplifiers. A laboratory emphasizes electronics circuit design and analysis. Prerequisite: EET 304B. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 4

**EET403B - Electronics Application and Design** This course focuses on system-level design and application of electronics circuits. Circuits include linear integrated circuits, quasi-linear circuits, integrated digital circuits, and pulse waveform generating and timing circuits. Topics include power amplifiers, Schmitt triggers, comparators, timers, and active filters. A design laboratory allows students to implement several design projects with increasing complexity. Prerequisite: EET 403A. Restricted to Junior/Senior standing. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 4

**EET436 - Wireless Communications & Security** This course provides a comprehensive overview of wireless communications through an examination of the wireless channel, signal modulation, encoding and transmission techniques, antennae theory and error control. Uses of wireless technologies in local, personal and mobile networks will be examined. An emphasis will be placed on security measures and techniques in wireless communications. A grade of C or better is required. Credit Hours: 3

**EET437A - Telecommunication Systems Fundamentals** This course is a study of the fundamental concepts of analog and digital communication systems in addition to a survey of the state of the art of current and emerging communication technologies. Topics include modulation, signal encoding, transmission media, multiplexing, cellular, bluetooth, Wi-Fi, WiMAX and LTE-Advanced. Associated labs reinforce the concepts introduced and allow students to simulate and build real systems. (Lecture + Lab). Prerequisite: EET 304B with a minimum grade of C. Restricted to Junior/Senior standing. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 4

**EET437B - Data and Computer Communication** This course is a study of data and computer networks. Students are introduced to communication protocols, networking technologies and the various computer networks topologies. The OSI (Open Systems Interconnection) model is used as a guide in introducing the purpose and underlying principles of the existing communication protocol standards. The course concludes with an overview of emerging communication standards and technologies. Topics include LAN, WAN, TCP/IP, Routing, and Data Link layer. Associated labs reinforce the concepts introduced and allow students to simulate and build real systems. Lecture + Lab. Prerequisite: EET 437A with a minimum

grade of C. Restricted to Junior/Senior standing. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 4

**EET438A - Automatic Control Systems Technology** The mathematical concepts and tools used to model and design automatic control systems. The mathematical models for electric, hydraulic, mechanical and thermal processes found in industry. The course uses Laplace transforms, transfer functions, block diagrams and signal flow graphs to represent systems, determine system response and design control systems. A laboratory demonstrates applications. Prerequisites: EET 304B with a C or better, or consent of instructor; and EET 332A. Credit Hours: 4

**EET438B - Sequential Digital Control and Data Acquisition** Concepts and components used in data acquisition and sequential control systems. The course covers sensors, signal conditioning, analog-to-digital/digital-to-analog conversion devices, relay logic design and programmable logic controllers. A laboratory demonstrates lecture topics and gives students experience with data acquisition and control languages and ladder logic programming within a design team. Prerequisites: CS 202 or ENGR 222 or ECE 222 with a C or better; EET 438A with a C or better, or consent of instructor. Credit Hours: 4

**EET439 - Microcontroller Application and Design** This course introduces embedded systems design and microcontroller programming. Students study microcontroller architectures and design applications. The course emphasizes interfacing microcontrollers with sensors and actuators. Software tools like Matlab and Simulink aid in visualization and Model-Based Design. Prerequisites: EET 238 with a C or better; CS 202 or ENGR 222 or ECE 222 with a C or better; or consent of instructor. Credit Hours: 4

**EET445 - Computer-Integrated Manufacturing** (Same as IMAE 445) Introduction to the use of computers in the manufacturing of products. Includes the study of direct and computer numerical control of machine tools as well as interaction with process planning, inventory control and quality control. Prerequisite: IMAE 208. Restricted to Junior/Senior standing. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 3

**EET455 - Industrial Robotics** (Same as IMAE 455) Study of robotics within a wide variety of application areas. Topics covered include classification of robots, sensor technology, machine vision; control systems, including programmable logic controllers (PLCs); robot safety and maintenance; and economic justification of robotic systems. Prerequisite: None. Restricted to Junior/Senior standing. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 3

**EET492 - Special Problems in Industry and Technology** Special opportunity for students to obtain assistance and guidance in the investigation and solution of selected technical problems. Not for graduate credit. Special approval needed from the instructor. Restricted to College of Engineering, Computing, Technology, and Mathematics students or departmental approval required. Credit Hours: 1-6

**EET495A - Electrical Engineering Technology Senior Design I** Capstone Design Part 1. Includes proposal and preliminary design as part of a team project. Project development skills, scope of work, time and cost estimating, quality, ethical issues, professionalism, documentation of team member efforts, preliminary designs, identification and assignment of tasks to project team members, development of final proposal, design work and review, oral presentation of final proposal. Not for graduate credit. Restricted to senior standing in Electrical Engineering Technology (second to last semester). Credit Hours: 1

**EET495B - Electrical Engineering Technology Senior Design II** Capstone Design part 2. Demonstrated project management principles. Design options & cost-benefit analysis. Development of the final decision matrix. Team coordination and documentation of team member efforts, design stages, team communication and team decision making processes. Implementation of the design (if the project warrants). Evaluation of final product. Written, oral and poster presentation of final design. Not for graduate credit. Prerequisite: EET 495A with a grade of C or better. Restricted to senior standing in Electrical Engineering Technology (last semester). Credit Hours: 1

## Electrical Engineering Technology Faculty

**DeRuntz, Bruce D.**, Professor, Ph.D., Southern Illinois University Carbondale, 2005.

**Dunston, Julie K.**, Associate Professor and Chair, Ph.D., Florida State University, 1995.

**Spezia, Carl J.**, Associate Professor, Ph.D., Southern Illinois University Carbondale, 2002.

**Velasco, Tomas**, Associate Professor, Ph.D., University of Arkansas, 1991.

### **Emeriti Faculty**

**Chang, Feng-Chang (Roger)**, Associate Professor, Emeritus, Ph.D., Ohio State University, 1985.

**Marusarz, Ronald K.**, Associate Professor, Emeritus, Ph.D., Southern Illinois University Carbondale, 1999.

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Last updated: 01/30/2023