Electrical Engineering Technology

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School of Engineering Technology

Bachelor of Science Degree

The Bachelor of Science degree program in Electrical Engineering Technology is designed to meet the transfer and continuing education needs of associate degree graduates in EET or other related disciplines as well as to address the industry needs for graduates with sound and current skills in electrical engineering technology.

The program has a sound foundation of mathematics and physics, provides a variety of electives in the arts, sciences and the humanities and is focused on applying current engineering technology methods to the solution of technical problems. Transfer admission is open to students from closely allied degree programs and with proper academic advisement the students are able to complete the degree requirements in a timely fashion.

Program graduates, known as engineering technologists, are well prepared for a wide range of industry positions in the areas of electronic product development, automated testing, quality control, technical sales, technical writing, management, etc.

This program is accredited by the Engineering Technology Accreditation Commission of ABET, www.abet.org

Electrical Engineering Technology (BS) Program Outcomes:

• Graduates will be technically competent and have the necessary skills, and experience with modern tools of their discipline to enter careers where they can apply their knowledge in the areas of electronics, communications, systems, and technical project management.
• Graduates will use scientific methodologies and critical thinking skills to identify, analyze, and design solutions to technical problems in the areas of electronics, communications, and systems.
• Graduates will exhibit good communication skills, an ability to work collaboratively as a member of a team, as well as a recognition of the need for life-long learning and a commitment to continuous improvement.

Student Learning Outcomes:

Upon completion of the program students will be able to:

1. Apply knowledge, techniques, skills, and modern tools of mathematics, science, engineering, or technology to solve broadly-defined engineering problems appropriate to the discipline

2. Design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline
3. Apply written, oral, and graphical communication in broadly defined technical and nontechnical environments; and an ability to identify and use appropriate technical literature

4. Conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes

5. Function effectively as a member or leader on a technical team

Fall 2019 - Subject to Revision

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EET 418 Microprocessor Interfacing & Control 4
EET 420 Linear Systems & Controls          4
EET 450 Design Concepts                    2
EET 452W Design Project                    2
Technical Electives*                       6
Total Credits:                             126

*Technical Electives must be selected from EET 414, EET 426, EET 440 or other courses in areas of student interest with Departmental approval.

Degree Type: BS                           
Total Required Credits: 126

Please refer to the General Education, Applied Learning, and Writing Intensive requirement sections of the College Catalog and consult with your advisor to ensure that graduation requirements are satisfied.

Course Descriptions

EGL 101 Composition I: College Writing (GE)
This is the first part of a required sequence in college essay writing. Students learn to view writing as a process that involves generating ideas, formulating and developing a thesis, structuring paragraphs and essays, as well as revising and editing drafts. The focus is on the development of critical and analytical thinking. Students also learn the correct and ethical use of print and electronic sources. At least one research paper is required. A grade of C or higher is a graduation requirement. Note: Students passing a departmental diagnostic exam given on the first day of class will remain in EGL 101; all others will be placed in EGL 097. Prerequisite is any of the following: successful completion of EGL 097; an SAT essay score (taken prior to March 1, 2016) of 7 or higher; an SAT essay score (taken after March 1, 2016) of 5 or higher; on-campus placement testing. Credits: 3

EGL 102 Composition II: Writing About Literature
This is the second part of the required introductory English composition sequence. This course builds on writing skills developed in EGL 101, specifically the ability to write analytical and persuasive essays and to use research materials correctly and effectively. Students read selections from different literary genres (poetry, drama, and narrative fiction). Selections from the literature provide the basis for analytical and critical essays that explore the ways writers use works of the imagination to explore human experience. Grade of C or higher is a graduation requirement. Prerequisite(s): EGL 101 Credits: 3

EGL 310 Technical Writing
A detailed study of the fundamentals of writing technical reports and other technical communications. Topics emphasized include the elements of a technical report, the interpretation of statistics and data, and the composition of letters, memos, and informal reports containing technical information. Assignments and student exercises are drawn from the student's technical area. Prerequisite(s): EGL 102 with a grade of C or higher Credits: 3

**MTH 129 Precalculus (GE)**
In this course, the topics introduced in College Algebra course will be extended. The course will provide a comprehensive study of functions, which are the basis of calculus and other higher-level mathematics courses. The students will study the properties, graphs, and some applications of polynomial, rational, inverse, exponential, logarithmic, and trigonometric functions. Note: Students completing this course may not receive credit for MTH 117. Prerequisite(s): MP3 or MTH 116 Credits: 4

**MTH 130 Calculus I with Applications (GE)**
This is a calculus course for those not majoring in Mathematics, Engineering Science or Computer Science. Topics include the derivative, differentiation of algebraic, trigonometric, exponential and logarithmic functions, applications of the derivative and the definite integral. Applications are taken from technology, science, and business. Problem solving is stressed. A graphing calculator is required. Note: Students completing this course will not receive credit for MTH 150. Prerequisite(s): MP4 or MTH 117 or 129 Credits: 4

**MTH 236 Calculus II with Applications (GE)**
A continuation of Calculus I with Applications. Topics include techniques of integration, applications of the definite integral, multivariable calculus, and an introduction to Differential Equations. Applications are taken from technology, science and business. Problem solving is emphasized. A graphing calculator is required. Prerequisite(s): MTH 130 or MTH 150 Credits: 3

**MTH 245 Linear Algebra**
A study of the basic properties of vectors and vector spaces; linear transformations and matrices; matrix representations of transformations; characteristic values and characteristic vectors of linear transformations; similarity of matrices, selected applications. Prerequisite(s): MTH 151 or MTH 236 Credits: 3

**MTH 322 Advanced Mathematical Analysis**
Topics include: infinite series, first and second order differential equations and applications, homogeneous and forced response, Laplace transforms, Taylor series, matrices, Gauss-Elimination method. Prerequisite(s): MTH 236 Credits: 3

**PHY 135 College Physics I (GE)**
An integrated theory/laboratory general college physics course without calculus. Topics will include fundamental concepts of units, vectors, equilibrium, velocity and acceleration in linear and rotational motion, force, energy, momentum, fluids at rest and in motion, and oscillatory motion. Laboratory problems, experiments and report writing associated with the topics studied in the theory are performed. Prerequisite(s): MTH 129 Corequisite(s): PHY 135L Credits: 4

**PHY 136 College Physics II**
A continuation of PHY 135. Topics will include heat, electricity, magnetism, light and optics. Prerequisite(s): PHY 135 Corequisite(s): PHY 136L Credits: 4

**PHY 323 Electromagnetics Theory**
This course is an introduction to electromagnetic theory. Topics covered are Vector Analysis; Coulomb's Law; Gauss's Law; the Del Operator; the Divergence and Gradient; the Potential; Potential Gradient; Conductors, Dielectrics and Capacitors; the Magnetic Field; the Biot-Savart Law; Ampere's Law; the Curl of E and H; Faraday's Law; Maxwell's Equations. Prerequisite(s): PHY 136 and MTH 236 Credits: 3
ECO 321 Engineering Economics (GE)
This course will provide students with a basic understanding of the economic aspects of engineering in terms of the evaluation of engineering proposals with respect to their worth and cost. Topics include: introduction to Engineering Economics; interest and interest formulas; equivalence and equivalence calculations; evaluation of replacement alternatives and operational activities; basic fundamentals of cost accounting. Prerequisite(s): Admission to a Tech Program or approval of this Department chair. Credits: 3

EET 105 Introduction to Digital Electronics
An introduction to the fundamental concepts of Digital Electronics. Topics covered: Number systems, Boolean Algebra, Logic Gates, Combinational Circuits, Karnaugh Map Minimization Techniques, Adders, Signed Numbers, Multiplexers, Code-Converters, Decoders, Encoders, Comparators and 7-segment displays. The laboratory component of the course reinforces the topics covered in the theory through relevant experiments performed by students using logic trainers. Corequisite(s): EET 111 or EET 104 Credits: 2

EET 110 Computer Applications
An introduction to computer programming with applications. Examples and assignments are drawn from problems in Electrical and Computer Engineering Technology. The course uses Windows based PCs, the "C/C++" programming language (visual C++), and IEEE-488 Standard interfacing to programmable instrumentation. Corequisite: EET 111 Credits: 2

EET 111 Electric Circuits I
A basic course in direct current circuit theory. Concepts of charge, current and voltage; Ohm's Law, Kirchoff's Laws; analysis of series, parallel, and combination circuits; mesh and nodal analysis; Superposition, Thevenin's and Norton's theorems; maximum power transfer theorem; electric fields and capacitance; magnetic fields and inductance; analysis of R-C and R-L switching networks. The laboratory is coordinated with, and supports, the theory course. Corequisite(s): MTH 129 Credits: 3

EET 113 Electric Circuits II
This is the second of a two-course sequence designed to provide the background needed to analyze electric networks. Topics covered in this course include sinusoidal waveforms and non-sinusoidal waveforms; the phasor representation of sinusoidal signals; the use of complex numbers to analyze R-C, R-L, and R-L-C networks under sinusoidal steady-state conditions; series and parallel resonance; average power calculations; simple passive filters, frequency response (dB magnitude and phase) and its relations to the step response of simple R-C, R-L and R-L-C networks; transformer principles and types of transformers; three phase balance systems. Prerequisite(s): EET 111 and MTH 129 Credits: 3

EET 118 Semiconductor Devices and Circuits
Fundamentals of semiconductor diodes and bipolar junction transistors are discussed in this course. Topics covered include: Q point operating conditions of semiconductor diodes in various circuit configurations, full and half-wave rectification, capacitor input filters, zener diodes and basic linear DC power supply configurations. Q point operating conditions of BJT transistors in various bias configurations are analyzed as well as small signal single-stage and multi-stage amplifiers at mid-band frequencies in terms of voltage gain, current gain, power gain, input impedance, output impedance, AC load lines and signal node voltages. Corequisite(s): EET 113 Credits: 3

EET 223 Digital Electronics
Analysis and design of combinational and sequential logic circuits. SSI and MSI circuits; flip-flops, counters, and shift registers; integrated circuit families; multiplexers; semiconductor memory devices; D/A and A/D converters. The associated laboratory reinforces the topics covered in the theory through relevant experiments performed by the student. A formal report is part of the laboratory requirement. Prerequisite(s): EET 105 Corequisite(s): EET 223L, 118 Credits: 4

EET 224 Amplifiers
Signal parameters of Class A and Class B power amplifiers as well as operational amplifiers are studied in this course. Topics covered include, efficiency, dB, dBm, heat sinks, JFET and MOSFET transistors, operational amplifiers, and the frequency response of amplifier circuits. In addition, operational amplifier characteristics and models are used in the analysis of open loop and closed loop amplifiers. Adders, subtractors, active filters, comparators, differentiators, integrators, and the Schmitt trigger are also studied. Feedback concepts and the effect of feedback on gain, impedance and frequency response of amplifiers are studied as well as circuit stability, gain, and phase margins. Simulation software is used in the analysis of operating conditions and frequency response of amplifiers. Formal Report writing is part of the Laboratory requirement. Prerequisite(s): EET 118 Corequisite(s): EET 110, MTH 130 Credits: 3

EET 225 Communications Electronics
An introduction to communication signals and circuits. Topics include: filters, simple audio and RF oscillators, interpretation and application of Fourier series; mathematics of amplitude; frequency and phase modulation; basic transmitter circuitry; superheterodyne receivers for various modulation methods; multiplexing techniques including FM stereo multiplexing. Introduction to Digital Transmission Techniques as time permits. Prerequisite(s): EET 224 Credits: 3

EET 251 Microprocessors
Fundamental microprocessor and microcontroller concepts; architecture, memory, memory interfacing, programming, signals, timing, delay calculations, I/O interfacing and interrupts. The students will be required to interface input and output devices to the embedded controller and quantify associated hardware/software trade-offs. Laboratory work requires programming in assembly language and in C/C++. Prerequisite(s): EET 223 Credits: 3

EET 311 Network Analysis
A calculus based network analysis course that introduces the use of Laplace transforms in the analysis of both active and passive lumped parameter time-invariant linear networks. Topics covered include Mesh and Nodal analysis using matrix formulations; the network theorems; impedance and the modeling of initial conditions; first and second order systems; transfer functions; poles and zeros; impulse and step response; forced and natural response as well as system stability and time domain response. The sinusoidal steady state (AC) phasor transformation and its relation to the Laplace transform and the frequency response of networks are also included. The laboratory utilizes simulation of electric networks. Corequisite(s): MTH 236 Credits: 4

EET 316 Digital Design
Introduction to Digital Design using FPGA (Field Programmable Gate Arrays) and VHDL (Hardware Description Languages). The FPGA circuits are designed using Schematic Capture as well as VHDL. The target chips are Xilinx FPGAs and Xilinx tools are used to simulate and to “place and route” the design. Designs are then tested using FPGA based platforms. Prerequisite(s): EET 223 Credits: 4

EET 317 Industrial Electronics
Selected topics involving Difference and Instrumentation amplifiers with Transducer Bridge applications. Linear and Switching mode regulated power supply operation with analysis and design techniques using existing industrial ICs Thyristor characteristics with SCR, DIAC and TRIAC applications in power control circuits. Theory concepts are illustrated in the laboratory. Formal report writing is part of the laboratory requirement. Prerequisite(s): EET 224 Credits: 4

EET 327 Signal Processing
The course will provide the students with an introduction to continuous-time and discrete-time signals and systems. Topics to be covered include: Linear Time-Invariant (LTI) systems, Laplace transforms, transfer function, impulse and step response, transient and steady state responses, frequency response, Bode plots, passive and active filters, modulation, oscillators. Fourier series and Fourier transforms, power spectral density and Parseval’s theorem. Random signals and noise. Signal-to-noise ratio. Discrete-time signals. Sampling, filtering, convolution, Discrete Fourier Transform (DFT), Fast Fourier Transform
(FFT) algorithms, and the z-transform. The use of MATLAB is integrated throughout the course in laboratory exercises, demonstrations and student projects. Prerequisite(s): EET 311 Credits: 4

**EET 418 Microprocessor Interfacing & Control**
This course covers an in-depth study of microprocessor systems by exploring the internal functions of a computer. Hardware and software capabilities are studied in order to build a foundation for the design and interfacing of microprocessor based systems using real world examples. Assembly as well as a high level language such as "C++" is used in various programming projects and in interfacing devices. Prerequisite(s): EET 110 and EET 251 Credits: 4

**EET 420 Linear Systems & Controls**
This course covers the principles and characteristics of continuous time invariant linear systems and controls as well as the basic performance parameters and analysis techniques of such systems. Topics include: Review of Laplace Transforms and their applications in analyzing the performance of systems in terms of their impulse and step response; block diagram models, signal flow graphs, and state variable representation of systems; second order active filters and the performance characteristics of second order systems in terms of overshoot, speed and setting time. Feedback Control System characteristics, the Routh-Hurwitz stability criteria, and the application of Root Locus and Frequency Response techniques in the analysis of control systems are also covered. The laboratory utilizes MATLAB to demonstrate and enhance the theory principles covered in the lecture portion of the course. Prerequisite(s): EET 311 Corequisite(s): MTH 245 Credits: 4

**EET 450 Design Concepts**
General design considerations and concepts with particular emphasis in "worst case" design and "optimum" design. Case studies will be provided through examples of different areas of Electrical Engineering Technology. Product development procedures and processes will be presented along with testing and costing considerations. By the end of this course students must select their senior design project for EET 452W and must submit an appropriate proposal. Prerequisite(s): Completion of junior level EET courses or Department permission. Credits: 2

**EET 452W Design Project**
The student's overall technical knowledge is applied to this "capstone" design project under the supervision of faculty. A complete oral and written presentation is required of each student explaining the design process and specifications, cost considerations, testing and/or computer simulation results when appropriate. Note: Students will be expected to write short exercises, as well as longer papers that will be revised and graded. This is a writing-intensive course. Note: EET 452W can be used to fulfill the writing intensive requirement. Prerequisite(s): EET 450 and EGL 101 with a grade of C or higher Credits: 2

Admission to Farmingdale State College - State University of New York is based on the qualifications of the applicant without regard to age, sex, marital or military status, race, color, creed, religion, national origin, disability or sexual orientation.