Computer Engineering Technology

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School of Engineering Technology

Bachelor of Science Degree

The Bachelor of Science degree program in Computer Engineering Technology is designed to address the ever increasing need for graduates possessing skills in both computer programming and computer hardware (digital electronics), and in the underlying principles of networking.

The program establishes a sound foundation in applied mathematics and physics including the necessary principles of electrical engineering technology, computer engineering technology, elective choices in the arts, sciences and the humanities. Transfer admission is easily available to students from related degree programs.

Graduates of this program, engineering technologists, will be well prepared to fill the wide range of engineering technology positions which rely upon an understanding of hardware and software applications of digital, microprocessor, microcontroller, and computer based systems.

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

Computer 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 networking and data communications, microprocessors, digital 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 networking and data communications, microprocessors, and digital 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: Computer Engineering Technology

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

ABET Data

Fall 2019 - Subject to Revision

Liberal Arts and Sciences (61 credits)
EGL 101 Composition I: College Writing (GE) 3
EGL 102 Composition II: Writing About Literature 3
EGL 310 Technical Writing 3
MTH 129 Precalculus (GE) 4
MTH 130 Calculus I with Applications (GE) 4
MTH 236 Calculus II with Applications (GE) 3
MTH 245 Linear Algebra 3
MTH 322 Advanced Mathematical Analysis 3
PHY 135 College Physics I (GE) 4
PHY 136 College Physics II 4
ECO 321 Engineering Economics (GE) 3
The Arts (GE) 3
Foreign Language (GE) 3
Humanities (GE) 3
American/Other World/Western Civilization History (GE) 3
Liberal Arts and Sciences Electives 12

Required Major Courses (65 credits)
BCS 120 Foundations of Computer Programming I 3
BCS 215 UNIX Operating Systems 3
BCS 230 Foundations of Computer Programming II 3
BCS 370 Data Structures 3
EET 105 Introduction to Digital Electronics 2
EET 110 Computer Applications 2
EET 111 Electric Circuits I 4
EET 113 Electric Circuits II 4
EET 118 Semiconductor Devices and Circuits 4
EET 223 Digital Electronics 4
EET 224 Amplifiers 4
EET 251 Microprocessors 3
EET 316 Digital Design 4
EET 418 Microprocessor Interfacing & Control 4
EET 440 Data Communications and Networking 4
EET 441 Advanced Networking 4
EET 450 Design Concepts 2
EET 452W Design Project 2
Technical Electives* 6
Total Credits: 126

*Technical Electives must be selected from EET 311, EET 317, EET 327, EET 426, 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.

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

**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

**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

**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

**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

**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

**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

**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

**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

**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.

**BCS 120 Foundations of Computer Programming I**
This course introduces the C++ Programming Language as a means of developing structured programs. Students will be taught to develop algorithms using top-down stepwise refinement. Students will be introduced to the concept of Object Oriented programming. In addition, students will get a thorough exposure to C++ syntax and debugging techniques.

**BCS 215 UNIX Operating Systems**
This course develops the fundamental knowledge of computer operating systems using UNIX. Topics include basic understanding of the UNIX system, utilizing the file system, programming language and security system. BCS 120 may be taken as a Prerequisite or Corequisite. Prerequisite(s): BCS 120 Corequisite(s): BCS 120

**BCS 230 Foundations of Computer Programming II**
This course expands the knowledge and skills of Foundations of Computer Programming I. Among the topics covered are: arrays, pointers, strings, classes, data abstraction, inheritance, composition and overloading. Prerequisite(s): BCS 120 with a grade of C or higher

**BCS 370 Data Structures**
This course will present sequential and linked representations of various built-in and abstract data structures including arrays, records, stacks, queues and trees. Algorithms will be developed relating to various sorting and searching techniques, merging and recursion. A high-level structured programming language, such as C, using both static and dynamic storage concepts, will be used in exploring and developing these algorithms. Prerequisite(s): BCS 230 with a grade of C or higher

**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

**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

**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

**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

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

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

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

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

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

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

EET 440 Data Communications and Networking
This course covers the basic concepts of networking and computer connectivity. Several network topologies and related media access techniques are explored. The rudiments of Data Communications and Open System Interconnection (OSI) are discussed in detail. Students will learn the components of a client server networks using the Novell's Net Ware/ Intra Net Ware. Certain protocols such as TCP/IP and SPX/IPX are also discussed. Laboratory experiments are designed to give students a hands on experience in Network administration, configuration and resource management. Completion of this course includes a final project related to the design of a local area network, complete with Layers I and II, as well as the Directory Tree Structure based on the netware. An oral presentation by each student of their project is required. Prerequisite(s): Knowledge of digital electronics; familiarity with a real time operating system; ability to program in a high level language. Chair approval.

**EET 441 Advanced Networking**
This course is a continuation of EET 440, Networking and Data Communications. The principles of Architecture Layering, Multiplexing and Encapsulation are discussed. TCP/IP, IPX, PPP, ISDN and Frame Relay Protocols are covered. Network equipment such as repeaters, bridges router hubs and switches are studied in detail. Equipment examples are drawn from key vendors such as CISCO, 3COM and Cabletron. The laboratory portion of the course will concentrate on experiments and projects designed using CISCO Systems networking equipment, such as 2500 and 2600 series routers, 1900 and 2900 catalysts switches. The students will also learn how to design networks using VLANS on the above mentioned equipment. Prerequisite(s): EET 440

**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.

**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

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.