Telecommunications Technology

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School of Engineering Technology

Bachelor of Science Degree

The Bachelor of Science degree program in Telecommunications Technology is designed to prepare students for careers in the telecommunications industry as well as to address the transfer and continuing education needs of associate degree graduates in Telecommunications or other related disciplines.

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.

Program graduates, known as Telecommunications technologists, are well prepared for a wide range of industry positions in the areas of telecommunication systems and networks, transmission and switching systems, security in communication networks, optical and wireless communications, internet technologies, as well as other emerging telecommunication technologies.

Telecommunications Technology (BS) Program Outcomes:

• Graduates will be technically competent and will have the necessary skills to enter careers in areas such as the design, development, implementation and management of Telecommunications systems and networks.
• Graduates will be good communicators and will function effectively in teams.
• Graduates will have the knowledge and skills needed to be lifelong learners.
• Graduates will have an appreciation and understanding of the necessity for personal integrity, professional ethics and cultural awareness.

Fall 2017- 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 with Applications (GE) 4
MTH 130 Calculus I with Applications (GE) 4
PHY 135 College Physics I (GE) 4
PHY 136 College Physics II (GE) 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* | 21

Curriculum Courses (58 Credits)

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<th>Course</th>
<th>Credits</th>
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<td>BCS 120 Foundations of Computer Programming I</td>
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<tr>
<td>BCS 215 UNIX Operating Systems</td>
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<td>EET 104 DC/AC Circuits</td>
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<tr>
<td>EET 105 Introduction to Digital Electronics</td>
<td>2</td>
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<td>EET 440 Data Communications and Networking</td>
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<td>TEL 215 Introduction to Telecommunication Systems</td>
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<td>TEL 305 Communication Circuits &amp; Systems</td>
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<td>TEL 320 Wireless Communications</td>
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<td>TEL 325 Optical Communications &amp; Systems</td>
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<td>TEL 420 Emerging Communication Technologies</td>
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<td>TEL 450 Telecomm Senior Project Seminar</td>
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<td>TEL 452 Telecommunications Senior Project</td>
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<td>TEL 460 Mobile and Cellular Communication Systems</td>
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<td>TEL 470 Telecomm Policy and Standards</td>
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<tr>
<td>Free Electives</td>
<td>(6 credits)</td>
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<tr>
<td>Electives*</td>
<td>6</td>
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<td>Total Credits:</td>
<td><strong>125</strong></td>
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*Elective courses are selected in consultation with the student’s academic advisor in areas of student interest which also satisfy the following:

- 15 credits must be in upper division Liberal Arts/Sciences courses
- 6 credits must be in Mathematics selected from the following courses: MTH 110, MTH 236, MTH 245, MTH 322, MTH 360, MTH 390

Degree Type: BS
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 with Applications (GE)
This is a precalculus course with applications from various disciplines including technology, science, and business. Topics include families of functions, mechanics of functions, exponential and logarithmic functions, trigonometric functions and complex numbers. The emphasis is on applications and problem solving. A graphing calculator is required. 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

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

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

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. Credits: 3

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 Credits: 3

EET 104 DC/AC Circuits
An introductory course to the fundamentals and basic principles of DC and AC circuits. Topics covered include: The definition of current, voltage and passive circuit elements such as, resistors, capacitors, and inductors, through their I-V characteristic relationships. Ohm's Law Power, Kirchoff's Current and Voltage Laws, Voltage and Current Divider Rules, and their basic applications in the analysis of series, parallel and series-parallel circuits. The fundamental Network Theorems, Superposition, Thevenin's and Norton's equivalent circuits and Maximum Power Transfer. AC signal waveforms and their Average and RMS value, alternating current, voltage and power resistors, capacitors and inductors in AC circuits, ideal transformers and the concept of resonance. Introduction to the operation and basic applications of first order passive, low and high pass, RC filters. Corequisite(s): MTH 129 Credits: 4

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 200 Electronic Devices and Circuits
Principles and characteristics of semiconductor devices and linear integrated circuits are discussed. Devices studied include: semiconductor diodes, zener diodes, bipolar junction transistors, photodiodes and transistors, field-effect and metal oxide semiconductor transistors, thyristors, and operational amplifiers in various DC power supply, small signal and power amplifier configurations as well as wave shaping circuits. Simulation software will be used throughout the course in both theory and laboratory exercises. Prerequisite(s): EET 104 Credits: 4

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, EET 118 Credits: 4

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 his/her project is required. Prerequisite(s): Knowledge of digital electronics; familiarity with a real time operating system; ability to program in a high level language. Credits: 4

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 Credits: 4

TEL 215 Introduction to Telecommunication Systems
An introduction and survey of the Telecommunications industry's fundamentals. This course will provide an introduction to Internet and Emerging Technologies as well as Fiber optics and Wireless networks. The basics of telephony, switching systems, multiplexing, analog and digital signaling principles, modulation principles, transmissions equipment, and data communication networks are covered. Voice and data communications systems and protocol as well as private and public networks are studied. Prerequisite(s): EET 105, 200 and MTH 129 Credits: 4

TEL 305 Communication Circuits & Systems
Fundamental concepts in communications. Topics include: Tuned Amplifiers, RC and LC oscillators, Fourier Series and the spectral content of signals. Amplitude and Frequency modulation, and signal recovery circuits. Single-sideband communication systems. Digital Communications: encoding technique and transmissions. Prerequisite(s): TEL 215 Corequisite(s): TEL 305L Credits: 4

TEL 320 Wireless Communications
This course will concentrate on the Radio Frequency properties of wireless communications systems. After an introduction to the basics of high frequency signal behavior on transmissions lines and the nature of electromagnetic propagation, the course will examine the various modulation modes used in today's wireless systems. This will include modes such as CDMA, TDMA, and OFDM. Laboratory experiments will study the effects of fading and multipath. Prerequisite(s): TEL 305, EET 223 and MTH 130 Corequisite(s): TEL 320L Credits: 4

TEL 325 Optical Communications & Systems
This course introduces the students to the principles of optical communications systems. Topics include: Optical fibers; attenuation and dispersion; optical sources such as light emitting diodes (LEDs) and laser diodes; optical amplifiers; passive components; photodetectors; PIN and avalanche photodiodes; optical receivers and sensitivity; optical system design issues including power budget, bandwidth, Q-factor, and bit error ratio (BER); Wavelength Division Multiplexing (WDM); introduction
to optical networks. Laboratory experiments and simulations reinforce the theoretical concepts and include the design and simulation of a point-to-point optical link. Prerequisite(s): TEL 305, MTH 130 and PHY 136 Credits: 4

**TEL 420 Emerging Communication Technologies**
This course will concentrate on current and emerging telecommunications technologies. Signaling protocols for call processing for both circuit switched and packet switched communications as well as advance voice coding (e.g., G729) for wireless and VoIP systems will be covered. The course will also cover other technologies such as ISDN, Frame Relay, and Residential Broadband including DSL. SONET networks, ATSC video standards including IPTV, HDTV as well as some modern Satellite communications will be included. Prerequisite(s): TEL 320, 325 and EET 440 Credits: 3

**TEL 450 Telecomm Senior Project Seminar**
The Senior Project Course is the first course in a two course sequence that provides telecommunications technology students the opportunity to integrate critical thinking and technical knowledge learned throughout the program in the identification, design, development and evaluation of a telecommunication related project. Case studies are included to illustrate different design and product development strategies used in the solution of various telecommunication design problems. Students are required to submit a preliminary senior design project proposal by the conclusion of this course. Prerequisite(s): Completion of junior level Telecommunications Technology courses or Department approval. Credits: 2

**TEL 452 Telecommunications Senior Project**
The Senior Project Course is the capstone course for telecommunications technology students. It is the second course in the telecommunications senior project course sequence in which students work under the supervision of a faculty member in the implementation of an approved design project proposal. Students are required to provide a written report and make an oral presentation that addresses areas such as the design process implemented, product specifications, cost analysis, testing and/or computer simulation procedures used in the verification of results obtained as well as ethical and product liability issues addressed. Prerequisite(s): TEL 450 Credits: 2

**TEL 460 Mobile and Cellular Communication Systems**
This course covers the fundamental concepts used in cellular and mobile communication systems such as propagation, link budget, handoffs, power control, and access protocols. The course also introduces the modern cellular network standards such as AMPS, TDMA, GSM, CDMA, 3G/4G with emphasis on different technologies and applications used by these standards. Prerequisite(s): TEL 305 Corequisite(s): TEL 460L Credits: 4

**TEL 470 Telecomm Policy and Standards**
This course covers telecommunications policies and issues with special emphasis on domestic policy, regulation and law. Current issues, trends and standards will also be discussed. The course starts with a basic definition of telecommunications and why policies, regulation/deregulation and law are important to understand. It then moves to the history of US telecommunications development with emphasis on the regulatory environment and continues with discussions of current US regulatory policy at the state and federal levels. Current sweeping changes in the regulatory and legal arenas and the move to a new US and world model will be discussed. The importance of standards for domestic and international telecommunications will be studied along with a description of the standards definition process. Prerequisite(s): Junior standing in the Telecommunications Technology Program. Credits: 3

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.