Computer Security Technology

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Security Systems and Law Enforcement Technology
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631-794-6216
School of Engineering Technology

Bachelor of Science Degree

The Bachelor of Science degree in Computer Security Technology prepares students to combat security issues and challenges in the digital environment, including computer systems, computer networks and cyberspace. Graduates will be able to face the security threats and protect valuable information and/or physical resources from unauthorized access and malicious activities. In addition to preparing students for rewarding careers in the security industry, the program prepares students for lifelong learning and advanced studies in related disciplines.

Typical Employment Opportunities

Corporate Security
Federal, State and Local Security Agencies
Software Industries
Computer and Information Systems Manager

Computer Security Technology (BS) Program Outcomes:

- Graduates will demonstrate the knowledge-based skills to analyze and excel in computer and cyber security technologies.
- Graduates will demonstrate an appreciation of professional requirements, ethics and leadership skills.
- Graduates will utilize effective oral and written communication skills.
- Graduates will apply critical thinking skills to analyze current issues and develop innovative solution techniques.

Liberal Arts and Sciences ( 62 credits )

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<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>EGL 101 Composition I: College Writing (GE)</td>
<td>3</td>
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<tr>
<td>EGL 102 Composition II: Writing About Literature</td>
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<tr>
<td>MTH 129 Precalculus with Applications</td>
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<tr>
<td>PHY 135 College Physics I</td>
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<td>PHY 136 College Physics II</td>
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<tr>
<td>BIO 120 General Biology</td>
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<td>Humanities (GE)</td>
<td>3</td>
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<td>Arts (GE)</td>
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American/Other World/Western Civilization (GE) 3
Foreign Language (GE) 3
Liberal Arts & Sciences Electives 12
ECO 321 Engineering Economics 3
EGL 310 Technical Writing 3
300-400 Level Liberal Arts/Sciences Electives 6

Required Courses: (59 credits)

BCS 120 Foundations of Computer Programming 3
EET 104 DC/AC Circuits OR EET 111 Electric Circuits I 4
EET 105 Introduction to Digital Electronics 2
CPS 201 Digital Systems and Security 3
CPS 203 Data Security and Privacy 3
CPS 205 Digital Signal and Image Processing 3
BCS 215 UNIX Operating Systems 3
CPS 301 Biometric Recognition 3
CPS 303 Operating Systems and Security 3
CPS 305 Foundations of Cryptography 3
EET 440 Networking and Data Communications 4
EET 441 Advanced Networking 4
CPS 401 Applied Cryptography 3
CPS 460/TEL460 Network Security 3
CPS 405W Senior Project 3
100-200 Level Technical Elective * (see list below) 3
300-400 Level Technical Elective * (CPS 461, 462 or 463) 3
300-400 Level Technical Electives * (BCS, CPS, CRJ, EET, SET) 6

Total Credits 121

Degree Type: BS
Total Required Credits: 121

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.
Notes:
*Technical Elective courses can be selected in consultation with the student’s academic advisor within the course designations of EET, SET, BCS, CRJ and CPS.

100-200 Level Technical Electives:

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<tr>
<td>BCS 262 Data Communications</td>
<td>3</td>
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<tr>
<td>CRJ 217 Computer Forensics II</td>
<td>3</td>
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<tr>
<td>EET 113 Electrical Circuits II</td>
<td>4</td>
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<tr>
<td>EET 118 Semiconductor Devices &amp; Circuits</td>
<td>4</td>
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<tr>
<td>EET 223 Digital Electronics</td>
<td>4</td>
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<td>SET 105 Intro to Symbolic &amp; Logic Programming</td>
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<tr>
<td>SET 205 Introduction to Artificial Intelligence and Robotics Technology</td>
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300-400 Level Suggested Technical Electives:

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<tr>
<td>BCS 318 Virtualization &amp; Cloud Computing</td>
<td>3</td>
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<td>CPS 461 Penetration Testing</td>
<td>3</td>
</tr>
<tr>
<td>CPS 462 Smart Grid Security</td>
<td>3</td>
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<tr>
<td>CPS 463 Distributed Systems and Security</td>
<td>3</td>
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<tr>
<td>CRJ 440 Bitcoin &amp; Cryptocurrency</td>
<td>3</td>
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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

**MTH 129 Precalculus with Applications**
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**
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**
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

**BIO 120 General Biology**
With a focus on building bridges between students? lives and foundational topics in the field, General Biology is an introductory survey course of cellular and evolutionary biology. Students learn the biological underpinnings of topics like diets, cloning, stem cell research, genetic engineering, extinction, and climate change. Biodiversity is also emphasized through the study of evolution and the impacts our species has had on the world. Laboratory exercises provide hands-on examination of lecture topics, while emphasizing common research techniques. Note: BIO 120 is approved in the Natural Sciences General Education Competency Area and can serve as a lower-level laboratory science elective within the Liberal Arts. However it does not satisfy Bioscience Core requirements and cannot be used as a substitute for either BIO 130 or BIO 131. Note: The laboratory course, BIO 120L is a part of your grade for this course. Corequisite(s): BIO 120L Credits: 4

**ECO 321 Engineering Economics**
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

**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

**BCS 120 Foundations of Computer Programming**
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

**EET 104 DC/AC Circuits OR EET 111 Electric Circuits I**
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, Kirchhoff'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. AS 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: 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

**CPS 201 Digital Systems and Security**
The course will examine the security threats to digital information, computer systems and networks. Students will learn about the principles of digital systems, including computer architecture and programming, digital information, and techniques to maintain the confidentiality, integrity and availability of information. Topics will include risk assessment, security awareness, security policy, security auditing, and legal and ethical aspects. The course will prepare the students with background knowledge in cryptography, biometrics, software security and network security. Prerequisite(s): EET 105 Credits: 3

**CPS 203 Data Security and Privacy**
In this course, students will learn about the security issues with data that relates to personal and organizational privacy. The students will develop the skill to identify and address critical security and privacy issues involved in the design, development and deployment of information systems. Students will be able to design and maintain the security of database containing the confidential information such as Electronic Medical Records and Biometric Data. Topics will also include legal and policy perspectives of privacy in the digital age. Prerequisite(s): CPS 201 Credits: 3

**CPS 205 Digital Signal and Image Processing**
This course will examine the fundamental concepts of digital signals and image in relation to security applications. Topics will include signal and image characteristics, acquisition, quantization, filtering, enhancement, spectral analyses, feature extraction, segmentation, and morphological transformation. Students will be trained on algorithm and mathematical tools, and practical applications of Digital Signal and Image Processing techniques. The course will also examine the digital video and its applications to security field. Prerequisite(s): CPS 201 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

CPS 301 Biometric Recognition
This course will examine the concepts of automated human recognition with anatomical biometrics and behavioral biometrics. It focuses on biometric system design, biometric image and signal processing, biometric sensor technology, and anti-spoofing technology. Students will learn how each biometric works, how to process non-ideal biometric signals and images, and how to choose the right biometrics for different applications. The course also covers the security and privacy issue of biometrics. Prerequisite(s): CPS 205 Credits: 3

CPS 303 Operating Systems and Security
This course presents the state of the art of OS security to students. It covers OS-level mechanisms, and how they relate to mitigating and defending against malware attacks on computer systems, such as buffer overflow, remote access Trojan, self-propagating worms, large-scale botnets, etc. Basic OS security techniques such as logging, system call auditing, address space randomization, memory protection, virtual machine introspection (VMI) will be discussed. Other techniques, such as host-based intrusion and detection, system randomization, vulnerability fingerprinting, and virtualization, will also be introduced. Prerequisite(s): CPS 201 Credits: 3

CPS 305 Foundations of Cryptography
This course examines the mathematical principles underlying encryption and cryptanalysis. It covers cryptology-related concepts in Number Theory, Group Theory, Linear Algebra, and Probability Theory. It introduces algebraic structures such as groups and fields, and covers fundamental algorithms for integer arithmetic such as primality testing and integer factorization. Upon successful completion, students will have a solid foundation to learn a variety of cryptographic algorithms. Prerequisite(s): (MTH 130 or MTH 150) and CPS 201 Credits: 3

EET 440 Networking and Data Communications
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. Chair approval. 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

CPS 401 Applied Cryptography
This course examines the inner workings of modern symmetric and public-key cryptosystems and algorithms, including DES, AES, MD5, SHA-1/2/3, RSA, multi-party computation, and elliptic curve cryptography (ECC), and the constructions of Message Authentication Code (MAC) and Digital Signature (DS). It examines the privacy applications of cryptography supporting anonymous credentials and private database lookup. Lattice-based cryptography will also be examined.

Prerequisite(s): CPS 305 Credits: 3

**CPS 460/TEL460 Network Security**

This course will examine the security threats to computer networks and techniques to secure network. Topics will include network components and protocols, access control, firewall, honeypot, intrusion detection, virtual private network, vulnerability assessment, malware propagation, denial of service attacks, investigation of network data, and security protocols. At the conclusion of the course, students will have a full understanding of security design, network monitoring, and response to network attacks. Prerequisite(s): CPS 303 Credits: 3

**CPS 405W Senior Project**

This capstone course will require students to employ the technical knowledge they gathered throughout the curriculum in order to carry out an independent research project on a topic related to computer security technology. Under supervision of a Faculty member, students will produce creative projects, generate research papers, and present their work. Prerequisite(s): CPS 401 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.