

CYBERSECURITY, B.S.

Program Description

This program equips students with the knowledge and skills necessary to protect computer systems, networks, and data from cyber threats. It develops skilled professionals capable of ensuring information security in various organizations. The program bridges computer and network development, and it includes studies in cryptography.

Degree Earned

Bachelor of Science (B.S.)

Required for Graduation

- Courses
 - Major: 19
- Credits
 - Major: 61-62
 - Total: 120+
- GPA
 - Major: 2.0+
 - Cumulative: 2.0+

Student Learning Outcomes

- Identify and assess foundational structures in cyber threats
- Analyze vulnerabilities
- Design and implement security solutions
- Respond to cyber incidents
- Understand legal and ethical implications

Progress Chart

Code	Title	Credits
<i>Technology Common Core (Also taken by CS and IT majors)</i>		
CSC 230	Programming Concepts and User Interfaces	4
CSC 240	Database Management Systems	3
CSIT 220	Data Communication	3
<i>CSC Sequence</i>		
CSC 280	Object Programming	4
CSC 290	Introduction to Data Structures and Algorithms	4
CSC 301	Computer Architecture	3
CSC 457	Operating Systems	3
<i>CSIT Sequence</i>		
CSIT 320	LANs and Network Administration	3
CSIT 330	Computer Forensics	3
CSIT 422	Information Security	3
CSIT 423	Penetration Testing & Ethical Hacking	3
<i>MTH Sequence</i>		
MTH 120	Calculus I	4
MTH 260	Discrete Structures I	3
Select one of the following:		3
MTH 261	Discrete Structures II	
MTH 302	Foundations of Mathematics	
MTH 440	Cryptography	3
<i>Ethics and Electives</i>		

CSIT 300	Computers, Ethics, And Social Values	3
CSIT/CSC 300+ elective		3
CSIT/CSC 300+ elective		3
Select one of the following: (Math elective)		3
MTH 240	Linear Algebra	
MTH 341	Abstract Algebra	
MTH 345	Combinatorics	
MTH 405	History of Mathematics	
MTH 415	Financial Mathematics	
MTH 425	Mathematical Modeling	

Recommended Course Sequence

Course	Title	Credits
First Year		
First Semester		
CSC 230	Programming Concepts and User Interfaces	4
CSL 230	Laboratory	0
CSIT 220	Data Communication	3
MTH 120	Calculus I	4
Core Class		3
Core Class		3
Credits		17
Second Semester		
CSC 240	Database Management Systems	3
CSC 280	Object Programming	4
CSL 280	Laboratory	0
Core Class		3
Core Class		3
Core Class		3
Credits		16
Second Year		
First Semester		
CSC 290	Introduction to Data Structures and Algorithms	4
CSL 290	Laboratory	0
MTH 260	Discrete Structures I	3
Core Class		3
Core Class		3
Core Class		3
Credits		16
Second Semester		
MTH 261	Discrete Structures II	3
CSIT 320	LANs and Network Administration	3
Core Class		3
Core Class		3
Free Electives		3
Credits		15
Third Year		
First Semester		
CSIT 422	Information Security	3
MTH 440	Cryptography	3
Class for a minor		3
Free Electives		3
Free Electives		3
Credits		15
Second Semester		
CSIT 423	Penetration Testing & Ethical Hacking	3
CSC 301	Computer Architecture	3
Class for a minor		3
Class for a minor		3

Free Electives	3
Credits	15
Fourth Year	
First Semester	
CSC 457 Operating Systems	3
CSIT 300 Computers, Ethics, And Social Values	3
CSC/CSIT 300+ Elective	3
Class for a minor	3
Class for a minor	3
Credits	15
Second Semester	
CSIT 330 Computer Forensics	3
MTH Elective	3
CSC/CSIT 300+ Elective	3
Class for a minor	3
Free Electives	3
Credits	15
Total Credits	124

Courses

CSC 230 Programming Concepts and User Interfaces

This course addresses problem solving and programming using problem-based learning; variables, control flow, iteration, modules, arrays, file processing, classes, and objects; and basic graphical-user interface concepts (forms/pages and controls) for desktop and/or Web or mobile environments. The course consists of three hours of lecture and three hours of laboratory per week. Prerequisite(s): MTH 101 or Math Placement Score 102M Corequisite(s): CSL 230

CSL 230 Laboratory

This course is the lab that accompanies CSC 230. CSC 230 and CSL 230 must be taken together.

CSC 240 Database Management Systems

This course includes components of database systems, database models: entity-relationship, relational, hierarchical, network; normalization, integrity, relational algebra, query languages, system security, distributed databases, and social and ethical concerns. In addition, case studies using a relational DBMS will be implemented.

CSIT 220 Data Communication

This course will address current methods and practices in the use of computer networks to enable communication; physical layers, architectural layers, design, operation, management, and the ISO standards. Local, cloud and wide area networks are examined. Student projects may include introductory LAN design, implementation and administration.

CSC 280 Object Programming

This course involves problem solving using a high-level object-oriented language, such as Java; analyzing problems, designing a solution, implementing a solution, testing, and debugging; abstraction, encapsulation, and inheritance; using, designing, creating, and testing classes; and selection, iteration, and simple collections, such as arrays. The course consists of three hours of lecture and three hours of laboratory per week. Prerequisite(s): CSC 230. Corequisite(s): CSL 280

CSL 280 Laboratory

This course is the lab that accompanies CSC 280. CSC 280 and CSL 280 must be taken together.

CSC 290 Introduction to Data Structures and Algorithms

This course is a continuation of CSC 280. It focuses on abstract data types, including lists, stacks, queues, binary trees, and hash tables; recursive techniques; iterators; and use of classes in the Java Collections Framework for problem solving. The course consists of three hours of lecture and three hours of laboratory per week. Prerequisite(s): CSC 280 Corequisite(s): CSL 290

CSL 290 Laboratory

This course is the lab that accompanies CSC 290. CSC 290 and CSL 290 must be taken together.

CSC 301 Computer Architecture

This course is an introduction to computer architecture and hardware; underlying structures needed to accomplish tasks electronically; and hardware and software architecture components relative to memory management, I/O control, and processing capabilities. Prerequisite(s): CSIT 220

CSC 457 Operating Systems

Principles and concepts of process and resource management in operating systems will be the focus of this course. I/O programming; interrupt mechanism and memory management; processor management; scheduler; priority queues; traffic controller; device management; and information management and file systems are select topics. (offered in alternate years) Prerequisite(s): CSC 290

CSIT 320 LANs and Network Administration

This course provides a practical approach to network administration methodology using current technologies; network hardware; Network Operating System installation; account management; file sharing; network printing; protocol and services configuration; client connectivity and troubleshooting; network application support; server maintenance; and cross-platform integration. One hour of lecture and two hours of laboratory are scheduled per week. (offered in alternate years) Prerequisite(s): CSIT 220

CSIT 330 Computer Forensics

This course focuses on legislation related to digital forensics, the role of a computer forensics examiner, evidence preservation, and computer forensic tools. This course provides a comparative study of legislation related to civil and criminal cases using digital forensics, evidence analysis, chain of custody, and data retrieval from computer hardware and software applications. Students will have hands-on labs examining network intrusion and digital evidence preservation using various computer forensic tools. Prerequisite(s): CSIT 220

CSIT 422 Information Security

Topics in this course include basic computer security concepts, terminology, and issues, including network security, Windows security, and Linux security; hardening, TCP/IP, scanning, sniffing, IPSec, public key infrastructure, Kerberos, certificates, cryptography, firewalls, intrusion detection systems, security policies, and processes. (offered in alternate years) Prerequisite(s): CSIT 320 or CSIT 321

CSIT 423 Penetration Testing & Ethical Hacking

This course systematically covers the skills in penetration testing: the act of attempting to penetrate a computer system on behalf of the owners of the system for the purpose of discovering security vulnerabilities that can be exploited by the hacker. The topics of this course include reconnaissance, scanning, enumeration, vulnerability assessment, escalation, workflow of penetration testing, and legal aspects of ethical hacking.

MTH 120 Calculus I

Topics in this course include functions of various types: rational, trigonometric, exponential, logarithmic; limits and continuity; the derivative of a function and its interpretation; applications of derivatives, including finding maxima and minima and curve sketching; antiderivatives, the definite integral and approximations; the fundamental theorem of calculus; and integration using substitution. A TI graphing calculator is required. Prerequisite(s): MTH 119 or its equivalent

MTH 260 Discrete Structures I

This course is the first half of a two-semester course in discrete mathematics. Topics in the course include logic, sets, functions, numeric bases, matrix arithmetic, divisibility, modular arithmetic, elementary combinatorics, probability, graphs, and trees. There will be an emphasis on applications of mathematics. Prerequisite(s): MTH 101 or a Mathematics Placement of 102M

MTH 261 Discrete Structures II

This course is the second half of a two-semester course in discrete mathematics. Topics in the course include rules of inference, proof methods, sequences and summation, growth of functions, complexity of algorithms, prime numbers and their application to cryptography, proof by induction, recursion, recurrence relations, and properties of relations. There will be an emphasis on applications. Prerequisite(s): MTH 260

MTH 440 Cryptography

This course provides a comprehensive introduction to the mathematics of modern cryptography, examining theoretical foundations and their secure implementation in practical applications. Students will explore classical, private-key (symmetric), and public-key (asymmetric) cryptography. Key topics include encryption methods such as AES and RSA, authentication protocols, hash functions and one-way hashing, digital signatures, and secure key exchange. The course also addresses blockchain technology and cryptocurrencies, system vulnerabilities, and zero-knowledge proofs. Prerequisites: MTH 120 and MTH 302 or a B- or better MTH 261

CSIT 300 Computers, Ethics, And Social Values

The topics in this course include privacy and information use/misuse offline and online, intellectual property, the First Amendment, e-waste, accuracy of information, ethics, effects of computers on work and society, responsibilities and risks of computing, current issues such as credit cards and associated debt, cyberwar, and cloud computing. (offered in alternate years) Prerequisite(s): CSIT 220, CSC 240 Corequisite(s): ENG 210

MTH 240 Linear Algebra

This course includes vectors and matrices, systems of linear equations, determinants, real vector spaces, spanning and linear independence, basis and dimension, linear transformations, eigenvalues and eigenvectors, and orthogonality. Applications in mathematics, computer science, the natural sciences, and economics are included. Prerequisite(s): MTH 120

MTH 341 Abstract Algebra

Sets and mappings; groups, rings, fields, and integral domains; substructures and quotient structures; homomorphisms and isomorphisms; abelian and cyclic groups; symmetric and alternating groups; polynomial rings are topics of discussion in this course. (offered in alternate years) Prerequisite(s): MTH 302 or a B- or better in MTH 261

MTH 345 Combinatorics

This course addresses permutations and combinations, generating functions, recurrence relations and difference equations, inclusion/exclusion principle, derangements, and other counting techniques, including cycle indexing and Polya's method of enumeration. Prerequisite(s): MTH 120

MTH 405 History of Mathematics

This course is an in-depth historical study of the development of arithmetic, algebra, geometry, trigonometry, and calculus in Western mathematics (Europe and the Near East) from ancient times up through the 19th century, including highlights from the mathematical works of such figures as Euclid, Archimedes, Diophantus, Fibonacci, Cardano, Napier, Descartes, Fermat, Pascal, Newton, Leibniz, Euler, and Gauss. A term paper on some aspect of the history of mathematics is required. (offered in alternate years) Prerequisite(s): MTH 302 or a B- or better in MTH 261

MTH 415 Financial Mathematics

This course introduces students to the fundamental concepts of financial mathematics and provides opportunities to apply those concepts to real-world problems. Students will gain an understanding of concepts behind present and future values for various streams of cash flows and will work with reserving, valuation, pricing, asset and liability management, investment income, budgeting, and contingencies. Pre-requisite(s): Math 120 or permission of Chair.

MTH 425 Mathematical Modeling

This course addresses the uses of mathematical methods to model real-world situations, including energy management, assembly-line control, inventory problems, population growth, predator-prey models. Other topics include: least squares, optimization methods interpolation, interactive dynamic systems, and simulation modeling. Prerequisite(s): MTH 120

CSC 340 .Net Programming

This course focuses on programming in .NET (such as Visual Basic.NET or C#) and Active Server Pages (ASP.NET) that supports work with databases and the Web; models that support database access, such as MS SQL, Entity Framework, and LINQ; design and development of solutions to problems using database tools and programming; and database-driven Web sites, including validation, navigation, and security. (offered in alternate years) Prerequisite(s): CSC 230 and CSC 240

CSC 341 Open-Source Application Development

Students will develop Web solutions that integrate client- and server-side interfaces. The emphasis for the course will be on development for server side, with results being viewed and designed for the client. At least half of the course will include database maintenance using the open-source solution, including development of authentication and authorization. (offered in alternate years) Prerequisite(s): CSC 230 and CSC 240

CSC 343 Client-Side Scripting

This course will require students to design and develop standards-based client interfaces for Web/client-side applications using the latest versions of HTML, CSS, and Javascript. Students will study Web-based standards and application/design styles. Students will also use popular Web-development tools. Some mobile development will be included in the course. (offered in alternate years) Prerequisite(s): CSC 230

CSC 349 Mobile Computing

This course covers software mobile application development, its architecture and lifecycle as well as its inherent design considerations. Students will learn about mobile resources, activities, views, layouts, and intents in addition to interacting with the location-based services, messaging services, multimedia interfaces, and sensors available on the mobile device. The applications developed will manage data input from and output to files, databases, and content providers. After developing applications in an emulation environment, students will install them on individual mobile devices as well as prepare them for marketplace distribution. (offered in alternate years) Prerequisite(s): CSC 280

CSC 366 Language Theory and Design

This course involves programming languages; historical perspective and underlying serial computation model; theory: finite automata, Backus-Naur Form, representations, and grammars; and design: syntax, semantics, run-time implementation, and application domains. Language paradigms will include procedural, functional, logical, object-oriented, and non-sequential processing. (offered in alternate years) Prerequisite(s): CSC 290 and MTH 261

CSC 446 Data Mining

This course introduces data mining, with an emphasis on applying machine learning techniques for data mining; popular methods, such as learning of decision trees, decision tables, rules, and cases; algorithms and applicability; practical applications; data preparation and evaluation of results, including human role in data mining; and ethical issues. (offered in alternate years) Prerequisite(s): CSC 280

CSC 456 Artificial Intelligence

Intelligent systems technologies that have or may become practical for organizational use will be addressed in this course. Topics may include simple expert systems and expert systems with certainty factors, case-based reasoning, machine learning, neural networks, genetic algorithms, fuzzy logic, and two-person game playing. (offered in alternate years) Prerequisite(s): CSC 230 and MTH 260

CSC 464 Theory of Algorithms

Students will engage in problem-solving strategies, including divide and conquer, greedy, backtracking, and dynamic programming; will focus on the complexity analysis of algorithms; and will be introduced to complexity classes P and NP, with strategies for NP-complete problems. (offered in alternate years) Prerequisite(s): CSC 290 and MTH 261

CSC 381 Software Engineering

The intent of this course is to focus on basic concepts and major issues of project design using a software engineering approach; the software development life cycle; structured analysis and object-oriented design techniques; and modeling, project planning, requirements definition, and requirements testing. Prerequisite(s): CSC 290

CSC 481 Project Implementation

This course addresses implementation issues, programming language features, validation and verification techniques, and software maintenance. It requires a team project to develop, document, test, and maintain a software system. Prerequisite(s): CSC 381

Program Contact Information

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