CYBERSECURITY

ASSOCIATE OF APPLIED SCIENCE (AAS) – 60 CREDITS

About this program

This program provides the skills to support and maintain information technology (IT) systems including overall computer knowledge, networking skills, application software and IT security. Students will gain hands-on experience working with routing and switching, server virtualization and private cloud computing environments. Students will explore the concepts of risk, threats, vulnerabilities, attack vectors and exploits while analyzing known security incidents. Students will write policies and apply policies and recommended security framework controls and countermeasures to decrease risk. Courses in this degree program prepare students for the CompTIA Security + and Cisco Certified Entry Network Technician (CCENT) certifications.

Program outcomes

1. Use mechanisms available in an operating system to control access to resources.
2. Configure infrastructure server roles.
3. Investigate various countermeasures and security controls to minimize risk and exposure.
4. Support the ethical responsibility of ensuring software correctness, reliability and safety.
5. Illustrate through examples the concepts of risk, threats, vulnerabilities, attack vectors and exploits, noting there is no such thing as a perfect security.
6. Analyze known security incidents, including social engineering and physical security incidents, to trace and document the steps in the incidents.
7. Develop technical artifacts.
8. Examine ethical issues related to cybersecurity.
9. Write a company-wide security policy.
10. Communicate effectively and efficiently with clients, users and peers.
11. Design and build virtual computing environments.
12. Use a variety of ciphers to encrypt plaintext into ciphertext.
13. Construct input validation and data sanitization in applications, considering adversarial control of the input channel.

Curriculum overview

Crds	Requirement type
48	Required courses
6	Restricted electives in courses
6	Restricted electives in course types
60	**Total**

Developmental courses note: A student may be required to enroll in developmental courses in reading, writing and math. A student's scores on the Accuplacer assessment will determine enrollment in developmental courses. The purpose of developmental courses is to prepare students for the demands of a college-level curriculum. *Credits may vary.*

Accreditation: Minnesota State Community and Technical College is accredited by the Higher Learning Commission, a regional accreditation agency recognized by the U.S. Department of Education. The Higher Learning Commission 230 South LaSalle Street, Suite 7-500 Chicago, IL 60604-1411 http://www.ncahigherlearningcommission.org Phone: 312.263.0456 / 800.621.7440

Curriculum requirement details

Required courses

Course	Crds
COMM1120 - Introduction to Public Speaking	3
CPTR1001 - Introduction To Programming and Scripting	3
CPTR1106 - Microcomputer Databases	3
CPTR1108 - CISCO 1	3
CPTR1118 - CISCO 2	3
CPTR1122 - Microcomputer Maintenance	3
CPTR2224 - Linux I	3
CPTR2236 - Network Security	3
CPTR2245 - Enterprise Network Technologies	3
CPTR2272 - Network Operating Systems	3
CSCI1110 - Informatics	3
CSEC2204 - Managing Directory Services	3
CSEC2210 - Security Breaches and Countermeasures	3
CSEC2228 - Network Defense	3
ENGL1101 - College Writing	3
HUM2236 - Technology in the Humanities	3

Other requirements or restricted electives

3 credits from one or more of these Courses:

Course title	Credits
CPTR2200 - CISCO 3	3
CPTR2208 - CISCO 4	3
CPTR2234 - Linux II	3
CPTR2250 - IT Supervised Occupational Experience	3
CPTR2260 - Advanced Structured Query Language	3
CPTR2294 - Internship	3
CPTR2296 - Topics in Computers	3
CSCI1122 - Computer Science II	4

3 credits from one or more of these Courses:

Course title	Credits
CPTR1170 - Web Engineering I	3
CPTR1178 - Robotics	3
CPTR2230 - Structured Query Language	3
CSCI1121 - Computer Science I	4
CSEC2212 - Web Security	3

6 credits from these Course Types:

- General Education w/MnTC Goals

Course summaries

COMM1120 - Introduction to Public Speaking ..... ***(3 credits)***
Meets MnTC Goal Area 1. This course clarifies the process of oral communication, clarifies the basic principles of public speaking and allows the student to increase the application of these principles while both speaking and listening.
Prerequisites:

CPTR1001 - Introduction To Programming and Scripting ..... ***(3 credits)***
This course is an introduction to computer programming. Emphasis will be on programming concepts, program design methodology, program debugging, problem solving and writing clear code.

CPTR1106 - Microcomputer Databases ..... ***(3 credits)***
This course covers database concepts, design and construction using the latest database software. Topics include database normalization and table relationships, database objects, file creation, file manipulation, queries, macros, form development and report generation. Database programming concepts will also be introduced.

CPTR1108 - CISCO 1 ..... ***(3 credits)***
This is an introduction to networks course that covers the architecture, structure, functions and components of the Internet and other computer networks. Students achieve a basic understanding of how networks operate while building simple local area networks (LANs). Students perform basic configurations for routers and switches and implement Internet Protocol.

CPTR1118 - CISCO 2 ..... ***(3 credits)***
This course covers the architecture, components and operations of routers and switches in small networks and introduces wireless local area networks (WLANs) and security concepts. Students learn how to configure and troubleshoot routers and switches for advanced functionality using security best practices and resolve common issues with protocols in both Internet Protocol Version 4 (IPv4) and Internet Protocol Version 6 (IPv6) networks.
Prerequisites:

CPTR1122 - Microcomputer Maintenance ..... ***(3 credits)***
This course covers the operation, diagnosis, troubleshooting and basic repair of microcomputer components. Topics include hardware compatibility, system architecture, memory, input devices, video displays, disk drives, modems and printers.

CPTR2224 - Linux I ..... ***(3 credits)***
This course deals with Linux installation, configuration and system administration. This course lays the groundwork for continued study of Linux.

CPTR2236 - Network Security ..... ***(3 credits)***
This course deals with the understanding of basic network security. Students learn how to manage systems to guard against various security threats.

CPTR2245 - Enterprise Network Technologies ..... ***(3 credits)***
This course will introduce information technologies used in an enterprise network environment. Possible technologies the course will cover are SANs, virtualization, clustering, enterprise wireless, VPN connectivity, structured cabling and network management. The course will discuss how these technologies provide 24/7 availability and introduce the concept of green technologies.
Prerequisites:

CPTR2272 - Network Operating Systems ..... ***(3 credits)***
This course teaches the functions of a network operating system so the student can effectively maintain and manage a network. The student learns how to establish and oversee the operations of a network, create logins, design and establish directory structures and implement security.
Prerequisites:

CSCI1110 - Informatics ..... ***(3 credits)***
This course explores how data is gathered and analyzed and how it can be applied to information technology solutions to maximize the benefits of data analysis, including increases in the efficiency and productivity of information systems. Students will explore the social, ethical and personal implications of implementing information technologies and how information processes can impact business on a local and global level.

CSEC2204 - Managing Directory Services ..... ***(3 credits)***
This course is designed to further students' understanding of directory services. Directory services provide a central repository for the information available on the network. The student will learn that the first function of the directory is to provide information about objects in the directory including users and resources such as file shares, printers or email boxes. In addition, the student will learn that the information contained in the directory is crucial for the correct and secure operation of the network.
Prerequisites:

CSEC2210 - Security Breaches and Countermeasures ..... ***(3 credits)***
This course introduces the student to the various methodologies for attacking a network. The student will be introduced to concepts, principles and techniques, supplemented by hands-on exercises for attacking and disabling a network. The course will emphasize network attack methodologies with the emphasis on student use of network attack techniques and tools.
Prerequisites:

CSEC2228 - Network Defense ..... ***(3 credits)***
This course introduces students to the various methodologies for defending the information technology network infrastructure. Students will be introduced to the concepts, principles, type and topologies of firewalls to include packet filtering, proxy firewalls, application gateways, circuit gateways and stateful inspection.
Prerequisites:

ENGL1101 - College Writing ..... ***(3 credits)***
Meets MnTC Goal Area 1. This is an introductory writing course designed to prepare students for later college and career writing. The course focuses on developing fluency through a process approach, with particular emphasis on revision. Students will consider purpose and audience, read and discuss writing and further develop their own writing processes through successive revisions to produce polished drafts. Course work will include an introduction to argumentative writing, writing from academic sources and a short research project.
Prerequisites:

HUM2236 - Technology in the Humanities ..... ***(3 credits)***
Meets MnTC Goal Areas 2, 6 and 8. Developments in the arts, architecture, science, philosophy and education and studies in human interaction are often provoked by changes in technology. Early changes in military technology made it possible for civilizations to take charge of various places on the world's stage. However, over time, changes in how the world was understood, motivated by general advances in global exploration, astronomy and other sciences as well as specific inventions such as movable type, proved even more instrumental in driving people to new and different understandings of what it means to be human. This course explores how technology impacts developments in a culture's world view and tries to anticipate how future changes in technology might alter the course of otherwise established ways of life.

CPTR2200 - CISCO 3 ..... ***(3 credits)***
This course describes the architecture, components, operations and security to scale for large, complex networks, including wide area network (WAN) technologies. The course emphasizes network security concepts and introduces network virtualization and automation. Students learn how to configure, troubleshoot and secure enterprise network devices and understand how application programming interfaces (API) and configuration management tools enable network automation.

CPTR2208 - CISCO 4 ..... ***(3 credits)***
This course covers WAN configuration and remote access configuration. Students will practice design and configuration of systems to solve WAN and remote access problems.

CPTR2234 - Linux II ..... ***(3 credits)***
The primary focus of this course is Linux networking, security, ethics and privacy.

CPTR2250 - IT Supervised Occupational Experience ..... ***(3 credits)***
This course is designed to provide students with an opportunity to explore career paths in the information technology field while gaining practical work experience. Emphasis will be placed on the individual student's skills. This experiential learning allows the student to gain insight into one or more careers through job shadowing, service learning, volunteering, externships, work experience or a combination of these options. This class will provide career exploration information as well as work experience to help students identify their career goals and personal interests.

CPTR2260 - Advanced Structured Query Language ..... ***(3 credits)***
Students will build upon the skills learned in the Structured Query Language (SQL) class. This course takes on more advanced but common operations such as joins and sub-queries, unions and intersections. Additional topics will include the use of stored procedures and views and appropriate use of these features, proper indexing of data, altering table definitions and use of the CASE statement.

CPTR2294 - Internship ..... ***(3 credits)***
This course provides students with the opportunity to apply knowledge and skill sets learned in concurrent coursework. Students will perform activities in an employer-supervised industry setting that is consistent with program outcomes. Students also will utilize interpersonal communication skills within the context of applying knowledge and skill sets.

CPTR2296 - Topics in Computers ..... ***(3 credits)***
The goal of this course is to introduce students to a computer topic chosen from a wide range of classic and state-of-the-art research, techniques, systems and technologies in the field of computer programming or networking. Topics will vary each semester. Course may be repeated for credit with a change in subtitle.

CSCI1122 - Computer Science II ..... ***(4 credits)***
This course focuses on advanced programming concepts including an introduction to data structures, analysis of algorithms, recursion, searching, sorting and memory management.

CPTR1170 - Web Engineering I ..... ***(3 credits)***
This course is an introduction to programming and maintaining professional Web pages for the business environment. Topics will include page design, authoring tools, accessibility issues and Web page and website development. Focus will be given to client-side programming languages such as HTML and JavaScript, Web server software, Web server maintenance and Internet protocols.

CPTR1178 - Robotics ..... ***(3 credits)***
This course teaches basic robot building, programming and troubleshooting. The robot building includes working with multiple motors and sensors on a robot. The robot program includes working with a graphical and command line programing environment. Along with reading current literature about robotics, this class provides the student the fundamentals of robotics.

CPTR2230 - Structured Query Language ..... ***(3 credits)***
This course covers the basics of SQL (Structured Query Language) programming. SQL is a popular computer language that is used by small and large business organizations and computer programmers. The primary purpose of SQL is in working with databases and relational database management systems to store, retrieve, edit, manipulate and format data for end users and decision makers.

CSCI1121 - Computer Science I ..... ***(4 credits)***
This course is an introduction to computer science. It includes algorithm design and structured programming using a high-level programming language. Key components of this course are designing, coding, debugging and documenting programs using techniques of good programming style. This course is intended primarily as a first course for computer science majors and/or minors.

CSEC2212 - Web Security ..... ***(3 credits)***
This course will give students hands-on training in securing Web communications and websites. Students will learn the common vulnerabilities of websites, implementing e-business security policies, identifying security threats, developing countermeasures and managing the deployment of security solutions.

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Program Plan — "Primary"

Locations: Moorhead

1st Fall Term (15 credits)

Courses

Course	Crds
COMM1120 - Introduction to Public Speaking	3
CPTR1106 - Microcomputer Databases	3
CPTR1122 - Microcomputer Maintenance	3
CSCI1110 - Informatics	3
ENGL1101 - College Writing	3

1st Spring Term (15 credits)

Courses

Course	Crds
CPTR1001 - Introduction To Programming and Scripting	3
CPTR1108 - CISCO 1	3
CPTR2272 - Network Operating Systems	3

3 credits in one or more of the following:

CPTR1170 - Web Engineering I 3
CPTR1178 - Robotics 3
CPTR2230 - Structured Query Language 3
CSCI1121 - Computer Science I 4
CSEC2212 - Web Security 3

3 credits in one or more of the following:

General Education w/MnTC Goals

2nd Fall Term (15 credits)

Courses

Course	Crds
CPTR1118 - CISCO 2	3
CPTR2224 - Linux I	3
CPTR2236 - Network Security	3
CSEC2204 - Managing Directory Services	3
HUM2236 - Technology in the Humanities	3

2nd Spring Term (15 credits)

Courses

Course	Crds
CPTR2245 - Enterprise Network Technologies	3
CSEC2210 - Security Breaches and Countermeasures	3
CSEC2228 - Network Defense	3

3 credits in one or more of the following:

CPTR2200 - CISCO 3 3
CPTR2208 - CISCO 4 3
CPTR2234 - Linux II 3
CPTR2250 - IT Supervised Occupational Experience 3
CPTR2260 - Advanced Structured Query Language 3
CPTR2294 - Internship 3

CPTR2296 - Topics in Computers 3
CSCI1122 - Computer Science II 4

3 credits in one or more of the following:

General Education w/MnTC Goals