CYBERSECURITY

ASSOCIATE OF APPLIED SCIENCE (AAS) – 60 CREDITS

About this program

This program provides the skills to support and maintain information technology (IT) systems. These skills include overall computer knowledge, networking, 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 risks, 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 companywide 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

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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

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Curriculum requirement details

Required courses

Course	Crds
COMM1120 - Introduction to Public Speaking	3
CPTR1001 - Introduction To Programming and Scripting	3
CPTR1040 - Introduction to Programming Logic	3
CPTR1108 - CISCO 1	3
CPTR1118 - CISCO 2	3
CPTR1122 - System Maintenance	3
CPTR2224 - Linux I	3
CPTR2240 - Database Administration	3
CPTR2245 - Enterprise Network Technologies	3
CSCI1110 - Informatics	3
CSEC1110 - Fundamentals of IT Security	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
CPTR1115 - COBOL Programming	4
CPTR2001 - Scripting for Automation	3
CPTR2210 - Database Report Generation	3
CPTR2230 - Structured Query Language	3
CPTR2294 - Internship	3
CPTR2296 - Topics in Computers	3

3 credits from one or more of these Courses:

Course title	Credits
CPTR1129 - RPG Programming	4
CPTR2234 - Linux II	3
CPTR2242 - Java Programming	3
CPTR2260 - Advanced Structured Query Language	3
CSCI1121 - Computer Science I	4

6 credits from these Course Types:

- General Education w/MnTC Goals

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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:

- Assessment into ENGL 1101

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.

CPTR1040 - Introduction to Programming Logic ..... ***(3 credits)***
This course introduces students to computer programming logic and troubleshooting. Students are introduced to algorithm development and structure programming. These concepts are foundational to learning to program and general troubleshooting.

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:

- CPTR1108

CPTR1122 - System Maintenance ..... ***(3 credits)***
The focus of this course is troubleshooting computers and computing-related equipment. The course begins with an overview of basic electronics and progresses to building and troubleshooting computing equipment and IoT (Internet of Things) devices. It also deals with optimizing the performance of systems.

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.

CPTR2240 - Database Administration ..... ***(3 credits)***
Students in this course will identify core database concepts and create database models. Installation, configuration and maintenance of a database management system (DBMS) will be covered. Students will analyze and administer a database's performance optimization. Additional topics will include user administration within the database, backup and restoration, and database normalization.

Prerequisites:

- CPTR1040

OR

- CPTR1001

CPTR2245 - Enterprise Network Technologies ..... ***(3 credits)***
This course will introduce information technologies used in an enterprise network environment. This course follows computing development from single hardware/single operating system operation to virtualization to container technology to implementation on the cloud. Students work with technology from each phase of computing development. The class discusses current trends within enterprise networking.

Prerequisites:

- CPTR1108

OR

- CPTR1040

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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.

CSEC1110 - Fundamentals of IT Security ..... ***(3 credits)***
Security is an important component of information technology. This course introduces industry-recommended security guidelines and controls. Students will practice implementing several examples of controls and encrypting data in transit and for storage.

CSEC2204 - Managing Directory Services ..... ***(3 credits)***
Directory services provide a central repository for information available on a network. In this course, students will learn that the purpose of a directory is to provide information about people and other resources, which supports the increasingly important function of identity management. Students will learn to automate directory service management functions.

Prerequisites:

- CPTR1040

OR

- CPTR1148

OR

- CPTR1122

OR

- CPTR1001

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:

- CPTR2236

OR

- CSEC1110

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:

- CSEC1110

OR

- CPTR2236

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. Coursework will include an introduction to argumentative writing, writing from academic sources and a short research project.

Prerequisites:

- Completion of ELL1085, ENGL0096, or ENGL0097 with a grade of C or higher OR placement into college-level English.

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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.

CPTR1115 - COBOL Programming ..... ***(4 credits)***
This course provides an overview of the COBOL programming language. Students will gain a solid foundation in the fundamentals of COBOL coding including knowledge of COBOL syntax, program structure, program design, execution and debugging. Maintenance and modification of typical business applications will also be coded throughout the course.

CPTR2001 - Scripting for Automation ..... ***(3 credits)***
Students will build on the skills learned in Introduction to Programming and Scripting. Students will learn scripting styles, procedures and methods for system, database, web and network environments.

CPTR2210 - Database Report Generation ..... ***(3 credits)***
This course is an introduction to database reporting using commonly used tools. Examples include Microsoft Structured Query Language (SQL) Reporting Services, Comma-Separated Values (CSV), Microsoft Access and Excel, and Crystal Reports. Ethical and security concerns and challenges of database reporting are covered, along with best practices and business requirements used in database reporting.

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.

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.

CPTR1129 - RPG Programming ..... ***(4 credits)***
This course is an introduction to RPG programming and AS400 system operations. The student will learn the basics of operating the AS400 and begin writing RPG programs. These programs will include building physical files, writing RPG code, compiling, error finding and producing reports. There will be a strong emphasis on developing logic to program more intermediate RPG programs. A high concentration will be on the structure of the student's calculation specifications. Students will learn how to add, delete and update data to physical files through their RPG programs. Students also will be developing screen programs where users can enter data.

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

CPTR2242 - Java Programming ..... ***(3 credits)***
In this course the student utilizes the Java programming language to create both Internet applets and applications.

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.

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.

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Program Plan — "Primary"

Locations: Moorhead,Online

1st Fall Term (15 credits)

Courses

Course	Crds
COMM1120 - Introduction to Public Speaking	3
CPTR1040 - Introduction to Programming Logic	3
CPTR1122 - System 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
CPTR2224 - Linux I	3
CSEC1110 - Fundamentals of IT 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
CPTR2240 - Database Administration	3
CSEC2204 - Managing Directory Services	3
HUM2236 - Technology in the Humanities	3

3 credits in one or more of the following:

CPTR1115 - COBOL Programming	4
CPTR2001 - Scripting for Automation	3
CPTR2210 - Database Report Generation	3
CPTR2230 - Structured Query Language	3
CPTR2294 - Internship	3
CPTR2296 - Topics in Computers	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:

CPTR1129 - RPG Programming	4
CPTR2234 - Linux II	3
CPTR2242 - Java Programming	3
CPTR2260 - Advanced Structured Query Language	3
CSCI1121 - Computer Science I	4

3 credits in one or more of the following:

General Education w/MnTC Goals

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