



2017-2018

Cybersecurity I

OUTLINE

DESCRIPTION:

Cybersecurity I prepares students for a career in network administration and technical support with a focus on cybersecurity. The course includes a series of technical subjects that provide hands-on knowledge and skills in computer hardware, operating systems, networking, and security concepts. Industry-based curricula are utilized in a networked environment to assist in preparing students for industry recognized certifications. Students go through intricate problem solving exercises that mimic the technical challenges of the real world. The program targets students preparing for careers in cybersecurity and information and communications technology. Activities in this course include work-based learning that connects students to industry and the local community.

Cybersecurity I has been UC a-g approved to meet the elective (“g” – Mathematics – Computer Science) requirement.

INFORMATION:

- A. Pre-requisites: Algebra I and recommendation from course instructor or one year of experience in usage of any operating system.
- B. Length: One year
- C. Sector: Information and Communication Technologies
- D. Pathway: Information Support and Services

O*Net SOC Codes	
Code #	Title
15-1051.00	Computer User Support Specialists
15-1122.00	Information Security Analysts
13-1199.02	Security Management Specialists

Orientation
<ul style="list-style-type: none">A. Introduce the course and facilities.B. Discuss the syllabus and major objectives.C. Explain applicable classroom management procedures, the ROP Student Rules of Conduct, and any operational guidelines.D. Review instructor/student expectations.E. Explain enrollment and attendance requirements and procedures.F. Review grading and student evaluation procedures.G. Discuss the community classroom aspect of the program if applicable.H. Discuss the "next steps" related to additional education, training, and employment.I. Review classroom safety, emergency and disaster procedures.
1. Communication Skills
<ul style="list-style-type: none">A. Demonstrate positive verbal communication skills using appropriate vocabulary, demeanor, and vocal tone in the classroom and/or worksite.B. Read and interpret written information and directions.C. Practice various forms of written communication appropriate to the occupation.D. Practice positive body language skills.E. Practice professional verbal skills for resolving a conflict.F. Demonstrate active listening skills including techniques for checking for understanding, and for obtaining clarification of directions.
2. Interpersonal Skills
<ul style="list-style-type: none">A. Demonstrate positive teamwork skills by contributing to a group effort.B. Practice the importance of diversity awareness and sensitivity in the workplace.C. Define sexual harassment in the workplace and identify the employee's role and responsibility.D. Practice participation skills.E. Identify different personality types and strategies for working effectively with each type.F. Practice business and social etiquette skills appropriate to the occupation.G. Discuss the role of business and personal ethics in the decision-making process.H. Evaluate various job-related scenarios and justify decisions based on ethics.I. Demonstrate flexibility and adaptability in working with others.J. Demonstrate the use of time management skills.
3. Employability Skills

- A. Demonstrate appropriate attendance and punctuality practices for the classroom and worksite if applicable.
- B. Prepare a resume, cover letter, and job application forms.
- C. Demonstrate interviewing techniques using appropriate tone and body language.
- D. Demonstrate appropriate dress and grooming standards in seeking employment and for the workplace.
- E. Identify strategies for employment retention.
- F. Analyze the impact of social networking on employability.
- G. Identify the need for continuing education, professional development, and professional growth in chosen field.
- H. Identify appropriate procedures for leaving a job.
- I. Identify sources of job information, including electronic sources.
- J. Review company policies and current trends in employee compatibility screening, drug screening, and background checks.

4. Leadership

- A. Define leadership and identify the responsibilities, competencies, and behaviors of successful leaders.
- B. Work with peers to promote divergent and creative perspectives.
- C. Demonstrate how to organize and structure work, individually and in teams, for effective performance and the attainment of goals.
- D. Explain multiple approaches to conflict resolution and their appropriateness for a variety of situations in the workplace.
- E. Employ ethical behaviors and actions that positively influence others.
- F. Use a variety of means to positively impact the direction and actions of a team or organization.
- G. Analyze the short-term and long-term effects a leader's actions and attitudes can have on productivity, morale, and organizational culture.

5. Personal and Occupational Safety

- A. Demonstrate procedures to be followed in the case of emergencies.
- B. Discuss ways to report a potential safety hazard to a supervisor.
- C. Identify and discuss cyber ethics, cyber safety, and cybersecurity.
- D. Identify common electrostatic discharge risks and the procedures to safeguard against potential damage.
- E. Apply personal safety practices to and from the job.
- F. Describe the procedure for reporting a work-related hazard or injury.
- G. Recognize the effects of substance abuse in the workplace.

6. Certification Preparedness

- A. Identify the certifications each organization provides.
- B. Identify the various certification organizations within the industry.
- C. Identify the objectives necessary to sit for certification exams.
- D. Identify training opportunities available to prepare for certification.

7. Ethics and Technology
<ul style="list-style-type: none">A. Explain the purpose of the U.S. Patriot Act and the Computer Security Act.B. Explain the purpose of COPPA - Children's Online Privacy Protection Act.C. Explain the importance of maintaining privacy of others.D. Explain the purpose of HIPAA- Health Insurance Portability and Accountability Act.E. Explain common federal state, and international laws related to computer use and security.F. Identify the importance of maintaining ethics and intellectual property.G. Identify common copy-write and plagiarism violations and infringements (e.g., software, media, etc.).
8. Technology Mathematics
<ul style="list-style-type: none">A. Apply proper technical notations when calculating rates and capacities of specific computer components and technologies.B. Convert and apply decimal binary and hexadecimal expressions using basic arithmetic functions, exponent relations, or algebraic fundamentals.
9. Hardware Fundamentals
<ul style="list-style-type: none">A. Identify the names, purpose, and characteristics of key components and system modules common to a PC.B. Identify the names and performance characteristics of common ports, associated connectors, cabling and the peripherals that use them.C. Demonstrate basic procedures for upgrading or replacing common field replaceable modules including CPU, RAM, drives and add-on cards.D. Demonstrate the procedures for installing/replacing a new device including loading and configuring device drivers.E. Identify the Intel x86 microprocessor genealogy and explain its relationship to the MS Operating System.F. Identify primary and secondary storage devices.G. Identify the different power supplies and how they apply to different form factors, including connector pin-outs and their electrical values.H. Describe the differences between direct current (DC) and alternating current (AC).I. Compare and contrast the characteristics of popular CPU chips and explain their relationship to the MS operating systems.J. Identify RAM types, form factors, and compare their operational characteristics.K. Identify popular motherboard form factors, components, and features.L. Demonstrate how to configure typical CMOS parameters when setting up a new motherboard.M. Demonstrate procedures to optimize PC operations by reducing latency, using specialized devices, or applying temperature control practices.
10. Operating Systems

- A. Compare and contrast the different operating systems and their features (e.g., Windows, Android, Linux, Unix, etc.).
- B. Demonstrate the procedures for installing current PC-based operating systems from a bootable CD including related CMOS settings.
- C. Demonstrate the basic procedures for creating and managing drives, directories, and files using their respective utilities and editors.
- D. Demonstrate proper command line use and syntax.
- E. Identify the major desktop components, user interfaces, and their functions.
- F. Identify typical system resource (IRQ, DMA, I/O address) allocations and demonstrate procedures for altering these device settings.
- G. Identify the basic system boot sequences and boot methods, and how to create an emergency boot disk with utilities.
- H. Demonstrate the installation of any Linux distribution.

11. System Utilities and Troubleshooting

- A. Demonstrate system recovery and restore using Windows 8 Boot Options Menu.
- B. Configure, troubleshoot, and recover boot failure using CMOS/BIOS.
- C. Identify common audible and visual POST codes to isolate operating system boot failures from peripheral device failures.
- D. Describe the purpose of the registry and demonstrate its use.
- E. Demonstrate common disk management tasks, including partitioning.
- F. Identify and demonstrate best practices for using built-in operating system diagnostic tools including drive utilities (e.g., MSCONFIG).

12. Preventative Maintenance Techniques

- A. Identify various preventative maintenance measures including proper cleaning, ventilation, and surge protection.
- B. Install system updates including drivers, service packs, anti-virus, and security patches.
- C. Identify and demonstrate common backup procedures.
- D. Create and maintain a computer repair/maintenance log.

13. Printer Installation & Configuration

- A. Identify and demonstrate the procedures for installing and configuring a printer for local and network access.
- B. Differentiate between different printer types.
- C. Identify common printer problems and techniques used to resolve them.

14. Basic TCP/IP Networking

- A. Identify common technologies for internet connectivity, related cabling and components, and compare their performance characteristics.
- B. Install, configure, and test a static TCP/IP network, including DNS for Internet access.
- C. Configure a CISCO router using the Command-Line Interface (CLI).
- D. Configure a Linux-based system for LAN/WAN access.

- E. Enumerate IP addresses using both binary and hexadecimal notations to prove network settings.
- F. Manually configure mobile devices using Wi-Fi connectivity.
- G. Install, configure, and troubleshoot a Network Interface Card.
- H. Create crossover, straight-through, and rollover cables using Category 6 wire and an RJ45 connector.
- I. Demonstrate the various steps used to troubleshoot network connectivity problems using TCP/IP utilities.
- J. Identify the three major types of network media.
- K. Identify the seven layers of the OSI model and four layers of TCP/IP model.
- L. Install, configure, and test TCP/IP addresses including subnet, gateway, and DNS settings.

15. System and Network Security

- A. Install, update, and use various real time antivirus software and virus scanners to prevent and remove malicious software.
- B. Distinguish firewall components including: common ports, router access control lists, and port forwarding used to secure the network perimeter.
- C. Configure user and file security using NTFS permissions.
- D. Create permissions for user and group accounts and demonstrate access control.
- E. Demonstrate intrusion detection to identify and resolve potential threats.
- F. Recognize different virus types and how they are transmitted.
- G. Demonstrate proper installation techniques of anti-virus software.
- H. Identify authentication technologies utilized for security purposes.
- I. Configure security options for various internet browsers.
- J. Identify the characteristics of a strong password security system.
- K. Identify common data security issues in the workplace (e.g., taking screenshots with smartphones, devices labeled openly with IP addresses, etc.).

Key Assignment	Competencies	Career Ready Practices	Anchor Standards	Pathway Standards	CCSS
1. Students will participate in mock interviews that represent current industry practices (e.g., skills demonstrations, resumes, applications, portfolios, personal websites, etc.).	1A, B, D 3B, C, D, I, J	2 3 10	2 3		LS 11-12.6 SLS 11-12.2
2. Students will analyze a security issue whose ethics are questionable, form an opinion and verbally support their position through a debate. Students must respond thoughtfully to diverse perspectives, synthesize comments, claims and evidence made on all sides of the issue, resolve contradictions when possible, and determine what additional information or research is required to deepen the investigation.*	1A, B, E, F 2D, G-J 5C 7C, E, F	2 5 8 10 11 12	2 4 5 8 9 10	A 1.0 A 3.0 A 5.0	LS 11-12.6 RSIT 11-12.7
3. Students will research and write a 2-3 page essay on how laws and ethics shape policy in regards computer access and security protocols. They must draw evidence from informational texts to support their analysis, reflection, and research.*	1B, C 2H 5C 7C, E, F	1 2 5 10 11 12	2 4 5 8 10	A 1.0 A 2.0 A 3.0 A 5.0	LS 11-12.6 RSIT 11-12.7 11-12.9 WS 11-12.1
4. Students will install a multi-boot computer operating system (Windows/Linux, Windows/Android, etc.).*	1B, E, F 2D, J 5C 7C-G 8A 9D, F, L 10A-H	1 4	4 5 8 10	A 2.0 A 4.0 A 8.0	LS 11-12.6 RSIT 11-12.7 WS 11-12.7

Key Assignment	Competencies	Career Ready Practices	Anchor Standards	Pathway Standards	CCSS
	11A, B, E, F 12B				
5. Students will compare and contrast the characteristics of popular CPU architecture and RAM form factor and chart their relationship to various operating system bit structures; gathering relevant information from multiple authoritative print and digital sources, using advanced searches effectively to identify established patterns, and predict emerging technologies.*	1B, C 9A-D, G, I- L 10A, C	1 2 4 5 10 11	4 5 10	A 1.0 A 2.0 A 3.0 A 4.0	RSIT 11-12.7 WS 11-12.7
6. Students will conduct research and synthesize multiple sources to compare and contrast operating systems based on available features and security enhancements to develop and present a business proposal to upgrade an existing computer system to meet a client's expanding needs.*	1A-C 2F, J 5C 10A, E	1 2 4 5 10 11 12	2 4 5 7 8 10	A 1.0 A 2.0 A 3.0 A 7.0 A 8.0	LS 11-12.6 RSIT 11-12.7 WS 11-12.7
7. Students will conduct on-campus surveys, collecting quantitative and qualitative data on preferred operating systems. They will then use this data to create a database to record and identify trends and customer preferences and present findings to class, communicating clearly, effectively, and with reason.*	1A-C 2D, F, J 10A, E	1 2 5 11	2 4 5 10	A 7.0 A 8.0	LS 11-12.6 WS 11-12.6 N-Q 3
8. Students will repair a failing computer system by installing device drivers to correct the lack of audio, poor video, and internet connectivity.*	1B, E, F 2D, J 9A, B, D 10E, F	1 4 5	4 5 10	A 2.0 A 4.0	LS 11-12.6 WS 11-12.7

Key Assignment	Competencies	Career Ready Practices	Anchor Standards	Pathway Standards	CCSS
	11F 12B				
9. Students will install and configure a TCP/IP network, applying the suite of network commands to troubleshoot and monitor performance issues.*	1A, B, E, F 2D, J 5C 7C-G 8B 14A-E, G, I,K,L	1 2 4 5	4 5 8 10	A 2.0 A 3.0 A 4.0 A 6.0	LS 11-12.6 RSIT 11-12.7 RLST 11-12.4 WS 11-12.7 N-Q 3
10. Students will create a CAT6 network cable and test by connecting two devices.*	1A, B, E, F 2D, J 5C, D 7C-G 9A, B 13A-H 14A, B, G-J, L	1 2 5	2 4 5 6 10	A 3.0 A 6.0 A 8.0	LS 11-12.6 RSIT 11-12.7 WS 11-12.7 N-Q 3
11. Students will troubleshoot and bring to a running-state a non-booting computer (dead PC). Students will document findings, actions, and outcomes. Students will apply these skills to create an emergency boot disk that will automate this process.*	1B,E, F 2A, D, G-J 5C, D 7C-G 9A, D, F 10A-D, F, G 11A, B 12D	1 2 4 5	4 5 6 10	A 4.0 A 6.0	LS 11-12.6 RSIT 11-12.7 RLST 11-12.4 WS 11-12.7

Key Assignment	Competencies	Career Ready Practices	Anchor Standards	Pathway Standards	CCSS
<p>12. Students will diagnose and remove viruses without further damaging the system, bringing the computer back to a running state.*</p>	<p>1A, B, C, F 2A, B, D-E,G-J 7C-G 8A 9B, D, F 10A-E, G 11A, D, F 12B, C, D 14A, B, F, G, I, L 15A, B, E-J</p>	<p>1 2 4 5 7 8</p>	<p>2 4 5 8 10</p>	<p>A 4.0 A 5.0 A 6.0</p>	<p>LS 11-12.6 RSIT 11-12.7 WS 11-12.7</p>
<p>13. Students will install, configure and share a network printer.*</p>	<p>1A, B, E, F 2D, J 5D 9B, D 13A-C 14A, B, E-G, I, J, L</p>	<p>1 4</p>	<p>4 10</p>	<p>A 4.0</p>	<p>LS 11-12.6 RSIT 11-12.7</p>
<p>14. Students will create a "Map of Network Topology" that displays connected network devices in various rooms and buildings. Working in teams, they will research and determine which IP address schemes will allow computer-to-computer communication based on provided tables and submit a written report, detailing how "subnet classes" can impact or improve network communication.*</p>	<p>1B, C 2A, D, I 14A-E, G-L 15B-D</p>	<p>1 2 4 5 10 11</p>	<p>2 4 5 9 10</p>	<p>A 1.0 A 2.0 A 3.0 A 7.0</p>	<p>LS 11-12.6 RSIT 11-12.7 WS 11-12.6</p>

Key Assignment	Competencies	Career Ready Practices	Anchor Standards	Pathway Standards	CCSS
15. Students will install service packs and updates to maintain device drivers and system security.*	1A-C, F 2D, G, J 5C 7C-E 9D 10E 11A, F 12B, C 15A, F, H, I	1 2 4	4 5 10	A 2.0 A 4.0	LS 11-12.6 RSIT 11-12.7 WS 11-12.7
16. Students will create a batch program or script to automate system maintenance procedures (e.g., clear system caches, network scanning, etc.) that will culminate in a custom system utility disk the students will retain.*	1A-C, F 2D, F-H, J 5C 7A-G 10C, D, E 11A, D, F 12C 14B, G, I, L 15D, I	1 2 4 5 7 8 10	4 5 8 10	A 2.0 A 4.0 A 6.0	LS 11-12.6 RSIT 11-12.7 WS 11-12.7
17. Utilizing essay prompts provided in the essay competition of the Center for Homeland Defense and Security, students will research and write a 3-4 page response citing reliable and valid sources.*	1B, C 2H 5C 7A, E	1 2 4 5 10	2 4 5 8 10	A 1.0 A 3.0 A 5.0 A 6.0	LS 11-12.6 RSIT 11-12.7 WS 11-12.7

Key Assignment	Competencies	Career Ready Practices	Anchor Standards	Pathway Standards	CCSS
		11			
18. Utilizing online resources, students will retrieve, summarize, and present recent articles and news reports on Cybersecurity to a partner.*	1B, C 2A, D, I 5C 7A, E	1 2 4 5 10 11 12	2 4 5 8 10	A 1.0 A 3.0 A 5.0 A 6.0	LS 11-12.6 RSIT 11-12.7 WS 11-12.7
19. Students will research the top reasons why computer systems are compromised or infected while surfing the Internet. They will compare findings to available browser security settings to identify a best practice procedure, testing settings and taking screen shots of each confirmed step to create a "How to Secure Your Windows Browser" guide, including text descriptions that identify which vulnerability is being resolved by each step. Students will then conduct peer review of other students' work, testing and critiquing projects, and providing feedback.*	1A-C, F 2A, D, F, J 5C 7C, E, F 15B, F, H, J, K	1 2 4 5 7 10 11	2 4 5 7 8 9 10	A 1.0 A 2.0 A 3.0 A 5.0 A 6.0 A 7.0	LS 11-12.6 RSIT 11-12.7 WS 11-12.7

* = UC a-g required assignment

Career Ready Practices

1. Apply appropriate technical skills and academic knowledge.
2. Communicate clearly, effectively, and with reason.
3. Develop an education and career plan aligned to personal goals.
4. Apply technology to enhance productivity.
5. Utilize critical thinking to make sense of problems and persevere in solving them.
6. Practice personal health and understand financial well-being.
7. Act as a responsible citizen in the workplace and the community.
8. Model integrity, ethical leadership, and effective management.
9. Work productively in teams while integrating cultural/global competence.
10. Demonstrate creativity and innovation.
11. Employ valid and reliable research strategies.
12. Understand the environmental, social, and economic impacts of decisions.

Anchor Standards

2.0 Communications

- Acquire and use accurately sector terminology and protocols at the career and college readiness level for communicating effectively in oral, written, and multimedia formats.

3.0 Career Planning and Management

- Integrate multiple sources of career information from diverse formats to make informed career decisions, solve problems, and manage personal career plans.

4.0 Technology

- Use existing and emerging technology, to investigate, research, and produce products and services, including new information, as required in the sector workplace environment.

5.0 Problem Solving and Critical Thinking

- Conduct short, as well as more sustained, research to create alternative solutions to answer a question or solve a problem unique to the sector using critical and creative thinking, logical reasoning, analysis, inquiry, and problem-solving techniques.

6.0 Health and Safety

- Demonstrate health and safety procedures, regulations, and personal health practices and determine the meaning of symbols, key terms, and domain-specific words and phrases as related to the sector workplace environment.

7.0 Responsibility and Flexibility

- Initiate, and participate in, a range of collaborations demonstrating behaviors that reflect personal and professional responsibility, flexibility, and respect in the sector workplace environment and community settings.

8.0 Ethics and Legal Responsibilities

- Practice professional, ethical, and legal behavior, responding thoughtfully to diverse perspectives and resolving contradictions when possible, consistent with applicable laws, regulations, and organizational norms.

9.0 Leadership and Teamwork

- Work with peers to promote divergent and creative perspectives, effective leadership, group dynamics, team and individual decision making, benefits of workforce diversity, and conflict resolution.

10.0 Technical Knowledge and Skills

- Apply essential technical knowledge and skills common to all pathways in the sector following procedures when carrying out experiments or performing technical tasks.

Pathway Standards

Information and Communication Technologies - Information Support and Services Pathway

- A 1.0** Describe the role of information and communication technologies in organizations.
- A 2.0** Acquire, install, and implement software and systems.
- A 3.0** Access and transmit information in a networked environment.
- A 4.0** Administer and maintain software and systems.
- A 5.0** Identify requirements for maintaining secure network systems.
- A 6.0** Diagnose and solve software, hardware, networking, and security problems.
- A 7.0** Support and train users on various software, hardware, and network systems.
- A 8.0** Manage and implement information, technology, and communication projects.

Common Core State Standards

ENGLISH LANGUAGE ARTS

Language Standards

LS 11-12.6: Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the (career and college) readiness level, demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Reading Standards for Literacy in Science and Technical Subjects

RLST 11-12.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context.

Reading Standards for Information Text

RSIT 11-12.7: Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.

Speaking and Listening Standards

SLS 11-12.2: Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions, and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

SLS 11-12.1: Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners, building on others ideas and expressing their own clearly and persuasively.

SLS 11-12.1d: Respond thoughtfully to diverse perspectives, synthesize comments, claims and evidence made on all sides of an issue, resolve contradictions when possible, and determine what additional information or research is required to deepen the investigation or complete the work.

Writing Standards

WS 11-12.7: Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem, narrow or broaden the inquiry when appropriate, synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

MATHEMATICS

Numbers and Quantities - N-Q – Quantities

N-Q3: Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.