Information Technology Career Cluster
Advanced Cybersecurity
Course Number: 11.48200

Course Description:
Advanced Cybersecurity is designed to provide students the advanced concepts and terminology of cybersecurity. The course explores the field of cybersecurity with updated content including new innovations in technology and methodologies. It builds on existing concepts introduced in Introduction to Cybersecurity and expands into malware threats, cryptography, organizational security, and wireless technologies.

Various forms of technologies will be used to expose students to resources, software, and applications of cybersecurity. Professional communication skills and practices, problem-solving, ethical and legal issues, and the impact of effective presentation skills are enhanced in this course to prepare students to be college and career ready. Employability skills are integrated into activities, tasks, and projects throughout the course standards to demonstrate the skills required by business and industry. Competencies in the co-curricular student organizations are integral components of both the employability skills standards and content standards for this course.

Advanced Cybersecurity is the third course in the Cybersecurity career pathway in the Information Technology Career Cluster. Students enrolled in this course should have successfully completed Introduction to Hardware Technology and Introduction to Cybersecurity.

Course Standard 1

IT-ACS-1
The following standard is included in all CTAE courses adopted for the Career Cluster/Pathways. Teachers should incorporate the elements of this standard into lesson plans during the course. The topics listed for each element of the standard may be addressed in differentiated instruction matching the content of each course. These elements may also be addressed with specific lessons from a variety of resources. This content is not to be treated as a unit or separate body of knowledge but rather integrated into class activities as applications of the concept.

Standard: Demonstrate employability skills required by business and industry.
The following elements should be integrated throughout the content of this course.

1.1 Communicate effectively through writing, speaking, listening, reading, and interpersonal abilities.

Person-to-Person Etiquette	Telephone and Email Etiquette	Cell Phone and Internet Etiquette	Communicating At Work	Listening
Interacting with Your Boss	Telephone Conversations	Using Blogs	Improving Communication Skills	Reasons, Benefits, and Barriers
Interacting with Subordinates	Barriers to Phone conversations	Using Social Media	Effective Oral Communication	Listening Strategies
Interacting with Co-workers	Making and Returning Calls		Effective Written Communication	Ways We Filter What We Hear
Interacting with Suppliers	Making Cold Calls		Effective Nonverbal Skills	Developing a Listening Attitude
	Handling Conference Calls		Effective Word Use	Show You Are Listening
	Handling Unsolicited Calls		Giving and Receiving Feedback	Asking Questions
				Obtaining Feedback

				Getting Others to Listen

Nonverbal Communication	Written Communication	Speaking	Applications and Effective Résumés
Communicating Nonverbally	Writing Documents	Using Language Carefully	Completing a Job Application
Reading Body Language and Mixed Messages	Constructive Criticism in Writing	One-on-One Conversations	Writing a Cover Letter
Matching Verbal and Nonverbal communication		Small Group Communication	Things to Include in a Résumé
Improving Nonverbal Indicators		Large Group Communication	Selling Yourself in a Résumé
Nonverbal Feedback		Making Speeches	Terms to Use in a Résumé
Showing Confidence Nonverbally		Involving the Audience	Describing Your Job Strengths
Showing Assertiveness		Answering Questions	Organizing Your Résumé
		Visual and Media Aids	Writing an Electronic Résumé
		Errors in Presentation	Dressing Up Your Résumé

1.2 Demonstrate creativity by asking challenging questions and applying innovative procedures and methods.

Teamwork and Problem Solving	Meeting Etiquette
Thinking Creatively	Preparation and Participation in Meetings
Taking Risks	Conducting Two-Person or Large Group Meetings
Building Team Communication	Inviting and Introducing Speakers
	Facilitating Discussions and Closing
	Preparing Visual Aids
	Virtual Meetings

1.3 Exhibit critical thinking and problem-solving skills to locate, analyze and apply information in career planning and employment situations.

Problem Solving	Customer Service	The Application Process	Interviewing Skills	Finding the Right Job
Transferable Job Skills	Gaining Trust and Interacting with Customers	Providing Information, Accuracy and Double Checking	Preparing for an Interview	Locating Jobs and Networking
Becoming a Problem Solver	Learning and Giving Customers What They Want	Online Application Process	Questions to Ask in an Interview	Job Shopping Online
Identifying a Problem	Keeping Customers Coming Back	Following Up After Submitting an Application	Things to Include in a Career Portfolio	Job Search Websites
Becoming a Critical Thinker	Seeing the Customer's Point	Effective Résumés:	Traits Employers are Seeking	Participation in Job Fairs
Managing	Selling Yourself and the Company	Matching Your Talents to a Job	Considerations Before Taking a Job	Searching the Classified Ads
	Handling Customer Complaints	When a Résumé Should be Used		Using Employment Agencies
	Strategies for Customer Service			Landing an Internship
				Staying Motivated to Search

1.4 Model work readiness traits required for success in the workplace including integrity, honesty, accountability, punctuality, time management, and respect for diversity.

Workplace Ethics	Personal Characteristics	Employer Expectations	Business Etiquette	Communicating at Work
Demonstrating Good Work Ethic	Demonstrating a Good Attitude	Behaviors Employers Expect	Language and Behavior	Handling Anger
Behaving Appropriately	Gaining and Showing Respect	Objectionable Behaviors	Keeping Information Confidential	Dealing with Difficult Coworkers
Maintaining Honesty	Demonstrating Responsibility	Establishing Credibility	Avoiding Gossip	Dealing with a Difficult Boss
Playing Fair	Showing Dependability	Demonstrating Your Skills	Appropriate Work Email	Dealing with Difficult Customers
Using Ethical Language	Being Courteous	Building Work Relationships	Cell Phone Etiquette	Dealing with Conflict
Showing Responsibility	Gaining Coworkers' Trust		Appropriate Work Texting	
Reducing Harassment	Persevering		Understanding Copyright	
Respecting Diversity	Handling Criticism		Social Networking	
Making Truthfulness a Habit	Showing Professionalism			
Leaving a Job Ethically				

1.5 Apply the appropriate skill sets to be productive in a changing, technological, diverse workplace to be able to work independently and apply teamwork skills.

Expected Work Traits	Teamwork	Time Management
Demonstrating Responsibility	Teamwork Skills	Managing Time
Dealing with Information Overload	Reasons Companies Use Teams	Putting First Things First
Transferable Job Skills	Decisions Teams Make	Juggling Many Priorities
Managing Change	Team Responsibilities	Overcoming Procrastination
Adopting a New Technology	Problems That Affect Teams	Organizing Workspace and Tasks
	Expressing Yourself on a Team	Staying Organized
	Giving and Receiving Constructive Criticism	Finding More Time
		Managing Projects
		Prioritizing Personal and Work Life

1.6 Present a professional image through appearance, behavior, and language.

On-the-Job Etiquette	Person-to-Person Etiquette	Communication Etiquette	Presenting Yourself
Using Professional Manners	Meeting Business Acquaintances	Creating a Good Impression	Looking Professional
Introducing People	Meeting People for the First Time	Keeping Phone Calls Professional	Dressing for Success
Appropriate Dress	Showing Politeness	Proper Use of Work Email	Showing a Professional Attitude
Business Meal Functions		Proper Use of Cell Phone	Using Good Posture
Behavior at Work Parties		Proper Use in Texting	Presenting Yourself to Associates
Behavior at Conventions			Accepting Criticism

International Etiquette			Demonstrating Leadership
Cross-Cultural Etiquette			
Working in a Cubicle			

Course Standard 2

IT-ACS-2

Explore concepts of cybersecurity related to legal and ethical decisions.

The following elements should be integrated throughout the content of this course.

2.1 Describe internal and external threats to a computer network, methods of avoiding attacks (including patching), and options in dealing with virus attacks.
2.2 Investigate potential abuse and unethical uses of computers and networks.
2.3 Explain the consequences of illegal, social, and unethical uses of information technologies (e.g., piracy; illegal downloading; licensing infringement; inappropriate uses of software, hardware, and mobile devices).
2.4 Differentiate between freeware, shareware, and public domain software copyrights. Determine which industries use open versus proprietary in operating systems.
2.5 Discuss computer crimes, terms of use, and legal issues such as copyright laws, fair use laws, and ethics pertaining to scanned and downloaded clip art images, photographs, documents, video, recorded sounds and music, trademarks, and other elements for use in Web publications.
2.6 Identify netiquette including the use of e-mail, social networking, blogs, texting, and chatting.
2.7 Explain proper netiquette, including the use of e-mail, social networking, blogs, texting, and chatting.
a. Discuss who legally owns content on free online services (Gmail, FaceBook, etc.) and the implications associated with relinquishing ownership of personal content.
2.8 Discuss the importance of cyber safety and the impact of cyber bullying.
2.9 Research and discuss legislation, such as GDPR, COPPA, FERPA, and others, that protects the rights and data of individuals online, including social media sites.

Course Standard 3

IT-ACS-3

Investigate concepts of malicious software threats.

3.1 Analyze and differentiate among types of malicious software, such as malware, ransomware, and others.
3.2 Identify malicious software code, including strings and SQL injection.
3.3 Demonstrate skill in handling malicious software. [NICE 153]
3.4 Demonstrate skill in preserving evidence integrity according to standard operating procedures or national standards. [NICE 217].

Course Standard 4

IT-ACS-4

Demonstrate how to analyze and react to various threats and vulnerabilities.

4.1 Analyze and differentiate among types of network attacks (e.g., virus, worms, trojans, unpatched software, password cracking, advanced persistent threats, etc.).
4.2 Distinguish between different social engineering attacks (e.g., baiting, phishing/spear phishing, pretexting/ blagging, tailgating, quid pro quo, etc.).

4.3 Distinguish between reconnaissance/footprinting, infiltration, network breach, network exploitation, and attack for effects (e.g., deceive, disrupt, degrade, and destroy).
4.4 Demonstrate an understanding of DoS/DDoS, session hijacking, HTTP spoofing, DNS attacks, switch attacks, man-in-the-middle (MITM) attacks, and cross site scripting, and drive-by-attacks.

Course Standard 5

IT-ACS-5
Apply advanced principles of cryptology.

5.1 Use and apply appropriate cryptographic tools and products.
5.2 Explain the core concepts of Public Key Infrastructure.
5.3 Demonstrate knowledge of network access, identity, and access management (e.g., public key infrastructure [PKI]) and implement PKI, certificate management, and associated components. [NICE 79].
5.4 Install and configure Pretty Good Privacy (PGP) and send/receive PGP encrypted email.
5.5 Install and view a digital certificate.
5.6 Understand and master process to enroll for digital certificates.
5.7 Renew, revoke, backup, and restore public and private key certificates.
5.8 Install and secure a Certificate Authority (CA).
5.9 Backup and restore a Certificate Authority (CA).

Course Standard 6

IT-ACS-6
Apply advanced communications and wireless security techniques.

6.1 Implement wireless networks in a secure manner.
6.2 Analyze and differentiate among types of wireless attacks.
6.3 Configure a wireless Access Point (WPA, WPA-2).
6.4 Demonstrate use of InSSIDer and Netstumbler on wireless communications.
6.5 Change the power level of a Wireless Local Area Network (WLAN) Access Point.
6.6 Demonstrate knowledge of Virtual Private Network (VPN) security and configure Virtual Private Network (VPN). [NICE 148]
6.7 Demonstrate knowledge of remote access policy Layer 2 Tunneling Protocol (L2TP) and Point-to-Point Tunneling Protocol (PPTP).

Course Standard 7

IT-ACS-7
Implement organizational security techniques.

7.1 Explain the impact and proper use of environmental controls, such as strong passwords, locked server closets, using secured networks, and more.
7.2 Explain the importance of security-related awareness and training.
7.3 Install environmental controls through Basic Input/Output System (BIOS).
7.4 Write organizational security policies (email, wireless, etc.).

Course Standard 8

IT-ACS-8
Implement contingency planning (incident response and disaster recovery) techniques.

8.1 Demonstrate knowledge of incident response and handling methodologies. [NICE 61]

8.2 Demonstrate knowledge of incident categories, incident responses, and timelines for responses and compare-and-contrast aspects of business continuity. [NICE 60]
8.3 Execute disaster recovery plans and procedures.
a. Explain how cloud backups in multiple locations helps mitigate disaster recovery.
8.4 Demonstrate the ability to capture volatile memory contents.
8.5 Perform imaging functions, such as operating system, network, and software configurations.
8.6 Restore a machine from a known good backup.

Course Standard 9

IT-ACS-9
Perform security analysis, as well as testing and evaluation.

9.1 Analyze and differentiate among types of mitigation and deterrent techniques.
9.2 Implement assessment tools and techniques to discover security threats and vulnerabilities.
9.3 Explain the proper use of penetration testing versus vulnerability scanning in the context of vulnerability assessments.
9.4 Demonstrate skill in conducting vulnerability scans and recognizing vulnerabilities in security systems (e.g., Nessus, Nmap, Retina). [NICE 3]
9.5 Conduct a security audit.
9.6 View and modify an Address Resolution Protocol (ARP) table and understand the business needs behind the tables.
9.7 Perform secure data destruction (e.g., Secure Erase, BCWipe).

Course Standard 10

IT-ACS-10
Implement risk management techniques for personal computer and network systems.

10.1 Explain risk-related concepts, such as using public unsecured wi-fi, purchasing online, transmitting person information online, and more.
10.2 Perform a risk assessment identifying the weak points of the average home router with a handful of connected devices throughout the house.
10.3 Identify mitigations for risks from risk assessment.
10.4 Conduct appropriate risk mitigation strategies.

Course Standard 11

IT-ACS-11
Demonstrate how to work with basic methods of network security.

11.1 Apply and implement secure network administration principles.
11.2 Demonstrate knowledge of how network services and protocols interact to provide network communications in order to securely implement and use common protocols. [NICE 50]
11.3 Identify commonly used default network ports.
11.4 Set up a Network Address Translation (NAT) device.
11.5 Spoof a Media Access Control (MAC) address.
11.6 Configure Virtual Private Network (VPN).
11.7 Configure a remote access policy Layer 2 Tunneling Protocol (L2TP) and Point-to-Point Tunneling Protocol (PPTP).

11.8 Demonstrate knowledge of network protocols (e.g., Transmission Control Protocol and Internet Protocol (TCP/IP), Dynamic Host Configuration Protocol (DHCP) and directory services (e.g., Domain Name System (DNS) by setting up common protocols, e.g., Secure Shell (SSH), netstat, Simple Mail Transfer Protocol (SMTP), nslookup, Telnet, DNS/Bind, FTP, IIS/Web Pages, DHCP/DNS server. [NICE 81]
11.9 Locate open ports by completing a port scan.
11.10 Demonstrate the knowledge and use of network statistics (netstat), a command purpose.

Course Standard 12

IT-ACS-12
Organize personal online career portfolio for specific career interests.

12.1 Review and update résumé to reflect new knowledge and skills master and additional work experience.
12.2 Organize folders within the portfolio to reflect specific careers of interest, including résumé, targeted cover letter, and artifacts relevant to the specific career.
12.3 Update all current items in the portfolio.
12.4 Identify and upload additional industry-appropriate artifacts reflective of mastered skills throughout this course. Write and include a reflective entry for each artifact discussing steps taken, problems encountered and how they were overcome, and other pertinent information about the learning.
12.5 Polish all entries in the online career portfolio to ensure accuracy and professionalism as expected from employers.
12.6 Conduct a job search and share the appropriate folder with the potential employer.

Course Standard 13

IT-ACS-13
Explore how related student organizations are integral parts of career and technology education courses through leadership development, school and community service projects, entrepreneurship development, and competitive events.

13.1 Explain the goals, mission, and objectives of Future Business Leaders of America (FBLA) and/or Technology Student Association (TSA) and/or SkillsUSA.
13.2 Explore the impact and opportunities a student organization (FBLA, TSA, SkillsUSA) can develop to bring business and education together in a positive working relationship through innovative leadership and career development programs.
13.3 Explore the local, state, and national opportunities available to students through participation in related student organizations (FBLA, TSA, SkillsUSA) including but not limited to conferences, competitions, community service, philanthropy, and other student organization activities.
13.4 Explain how participation in career and technology education student organizations can promote lifelong responsibility for community service and professional development.
13.5 Explore the competitive events related to the content of this course and the required competencies, skills, and knowledge for each related event for individual, team, and chapter competitions.