**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 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 organization, Future Business Leaders of America (FBLA), are integral components of the employability skills standard 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 Digital 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.

<table>
<thead>
<tr>
<th>Person-to-Person Etiquette</th>
<th>Telephone and Email Etiquette</th>
<th>Cell Phone and Internet Etiquette</th>
<th>Communicating At Work</th>
<th>Listening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interacting with Your Boss</td>
<td>Telephone Conversations</td>
<td>Using Blogs</td>
<td>Improving Communication Skills</td>
<td>Reasons, Benefits, and Barriers</td>
</tr>
<tr>
<td>Interacting with Subordinates</td>
<td>Barriers to Phone conversations</td>
<td>Using Social Media</td>
<td>Effective Oral Communication</td>
<td>Listening Strategies</td>
</tr>
<tr>
<td>Interacting with Co-workers</td>
<td>Making and Returning Calls</td>
<td></td>
<td>Effective Written Communication</td>
<td>Ways We Filter What We Hear</td>
</tr>
<tr>
<td>Interacting with Suppliers</td>
<td>Making Cold Calls</td>
<td></td>
<td>Effective Nonverbal Skills</td>
<td>Developing a Listening Attitude</td>
</tr>
<tr>
<td></td>
<td>Handling Conference Calls</td>
<td></td>
<td>Effective Word Use</td>
<td>Show You Are Listening</td>
</tr>
<tr>
<td></td>
<td>Handling Unsolicited Calls</td>
<td></td>
<td>Giving and Receiving Feedback</td>
<td>Asking Questions</td>
</tr>
</tbody>
</table>
### Nonverbal Communication
- Communicating Nonverbally
  - Writing Documents
- Reading Body Language and mixed Messages
  - Constructive Criticism in Writing
- Matching Verbal and Nonverbal communication
  - Small Group Communication
- Improving Nonverbal Indicators
  - Large Group Communication
- Nonverbal Feedback
  - Making Speeches
- Showing Confidence Nonverbally
  - Involving the Audience
- Showing Assertiveness
  - Answering Questions

### Written Communication
- Applications and Effective Résumés
  - Completing a Job Application
- Writing a Cover Letter
  - Things to Include in a Résumé
- Terms to Use in a Résumé
- Describing Your Job Strengths
- Organizing Your Résumé
- Dressing Up Your Résumé

### Speaking
- Using Language Carefully
- One-on-One Conversations
- Involving the Audience

### Applications and Effective Résumés
- Errors in Presentation

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

<table>
<thead>
<tr>
<th>Teamwork and Problem Solving</th>
<th>Meeting Etiquette</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thinking Creatively</td>
<td>Preparation and Participation in Meetings</td>
</tr>
<tr>
<td>Taking Risks</td>
<td>Conducting Two-Person or Large Group Meetings</td>
</tr>
<tr>
<td>Building Team Communication</td>
<td>Inviting and Introducing Speakers</td>
</tr>
<tr>
<td></td>
<td>Facilitating Discussions and Closing</td>
</tr>
<tr>
<td></td>
<td>Preparing Visual Aids</td>
</tr>
<tr>
<td></td>
<td>Virtual Meetings</td>
</tr>
</tbody>
</table>

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

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

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

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

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

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

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

<table>
<thead>
<tr>
<th>On-the-Job Etiquette</th>
<th>Person-to-Person Etiquette</th>
<th>Communication Etiquette</th>
<th>Presenting Yourself</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using Professional Manners</td>
<td>Meeting Business Acquaintances</td>
<td>Creating a Good Impression</td>
<td>Looking Professional</td>
</tr>
<tr>
<td>Introducing People</td>
<td>Meeting People for the First Time</td>
<td>Keeping Phone Calls Professional</td>
<td>Dressing for Success</td>
</tr>
<tr>
<td>Appropriate Dress</td>
<td>Showing Politeness</td>
<td>Proper Use of Work Email</td>
<td>Showing a Professional Attitude</td>
</tr>
<tr>
<td>Business Meal Functions</td>
<td></td>
<td>Proper Use of Cell Phone</td>
<td>Using Good Posture</td>
</tr>
<tr>
<td>Behavior at Work Parties</td>
<td></td>
<td>Proper Use in Texting</td>
<td>Presenting Yourself to Associates</td>
</tr>
<tr>
<td>Behavior at Conventions</td>
<td></td>
<td></td>
<td>Accepting Criticism</td>
</tr>
</tbody>
</table>
Support of CTAE Foundation Course Standards and Georgia Standards of Excellence L9-10RST 1-10 and L9-10WHST 1-10:
Georgia Standards of Excellence ELA/Literacy standards have been written specifically for technical subjects and have been adopted as part of the official standards for all CTAE courses.

**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 the threats to a computer network, methods of avoiding attacks, 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.
- **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.
- **2.8** Discuss the importance of cyber safety and the impact of cyber bullying.

**Course Standard 3**

**IT-ACS-3**
Investigate concepts of malware threats.

- **3.1** Analyze and differentiate among types of malware.
- **3.2** Identify malware code, including strings.
- **3.3** Demonstrate skill in handling malware. [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.
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.
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.
9.7 Evaluate the patch status of a machine.
9.8 Demonstrate knowledge of packet-level analysis in order to install and view packet sniffer. [NICE 93]
9.9 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.
10.2 Perform a risk assessment.
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 advanced methods of cybersecurity.

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**  
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.

12.1 Explain the goals, mission and objectives of Future Business Leaders of America.

12.2 Explore the impact and opportunities a student organization (FBLA) can develop to bring business and education together in a positive working relationship through innovative leadership and career development programs.

12.3 Explore the local, state, and national opportunities available to students through participation in related student organization (FBLA) including but not limited to conferences, competitions, community service, philanthropy, and other FBLA activities.

12.4 Explain how participation in career and technology education student organizations can promote lifelong responsibility for community service and professional development.

12.5 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.