

# ACM's New Cybersecurity and Information Technology Curricular Guidance for Two-Year Degree Programs

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For more information visit [ccecc.acm.org/guidance](http://ccecc.acm.org/guidance).

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## Cyber2yr2020 Overview

- Curriculum guidelines for associate degree Cybersecurity programs
  - Transfer programs (A.S. degree)
  - Career programs (A.A.S. degree)
- Based on ACM CSEC2017
- Aligned with:
  - CAE2Y knowledge units (KUs) - 2019 Foundational + Technical Core
  - NICE Cybersecurity Workforce Framework
  - ABET Cybersecurity criteria for associate programs

### Knowledge Areas / Domains & Knowledge Units / Subdomains

Knowledge Area / Domain	Knowledge Units / Subdomains	Knowledge Units / Subdomains
<b>Data</b>	Cryptography Digital Forensics Data Integrity and Authentication Access Control	Secure Communication Protocols Cryptanalysis Data Privacy Information Storage Security
<b>Software</b>	Fundamental Principles Design Implementation Analysis and Testing	Deployment and Maintenance Documentation Ethics
<b>Component</b>	Component Design Component Procurement	Component Testing Component Reverse Engineering
<b>Connection</b>	Physical Media Hardware and Physical Component Interfaces and Connectors Distributed Systems Architecture	Network Architecture Network Implementations Network Services Network Defense
<b>System</b>	System Thinking System Management System Access and Control	System Testing Common System Architectures
<b>Human</b>	Identity Management Social Engineering Personal Compliance with Cybersecurity Rules/Policy/Ethical Norms	Awareness and Understanding Personal Data Privacy and Security Usable Security and Privacy
<b>Organizational</b>	Risk Management Security Governance & Policy Analytical Tools Systems Administration	Cybersecurity Planning Business Continuity, Disaster Recovery, and Incident Management Security Program Management Personnel Security
<b>Societal</b>	Cybercrime Cyber Law Cyber Ethics	Cyber Policy Privacy

Software Security			
<p><b>Definition</b></p> <p>Focuses on the development of software with security and potential vulnerabilities in mind so that it cannot be easily exploited.</p> <p>The security of a system, and of the data it stores and manages, depends in large part on the security of its software. The security of software depends on how well the requirements match the needs that the software is to address, how well the software is designed, implemented, tested, and deployed and maintained. The documentation is critical for everyone to understand these considerations, and ethical considerations arise throughout the creation, deployment, use, and retirement of software.</p>			
<p><b>Essential Competencies</b></p> <ul style="list-style-type: none"> <li>[SOF-E1] Write secure code with appropriate documentation for a software system and its related data. <i>Applying</i></li> <li>[SOF-E2] Analyze security and ethical considerations at each phase of the software development lifecycle. <i>Analyzing</i></li> <li>[SOF-E3] Use documentation, such as third-party library documentation, in a given secure computing scenario. <i>Applying</i></li> </ul>	<p><b>Supplemental Competencies</b></p> <ul style="list-style-type: none"> <li>[SOF-S1] Implement isolation to secure a process or application. <i>Applying</i></li> <li>[SOF-S2] Discuss the relationship between an organization's mission and secure software design. <i>Understanding</i></li> <li>[SOF-S3] Write software specifications, including security specifications, for a given process or application. <i>Applying</i></li> <li>[SOF-S4] Assess a given test plan, from a security perspective. <i>Evaluating</i></li> <li>[SOF-S5] Examine social and legal aspects of software development from a security perspective. <i>Analyzing</i></li> <li>[SOF-S6] Develop user documentation for software installation with security appropriately included. <i>Creating</i></li> </ul>		
<p><b>Knowledge Units</b></p> <table border="1"> <tr> <td>Fundamental Principles Design Implementation Analysis and Testing</td> <td>Deployment and Maintenance Documentation Ethics</td> </tr> </table>		Fundamental Principles Design Implementation Analysis and Testing	Deployment and Maintenance Documentation Ethics
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## Focus

Competency = (Knowledge + Skills + Dispositions) in Context



## Program Examples Wanted!

Highlight your Cybersecurity or Information Technology program: [ccecc.acm.org/correlations](http://ccecc.acm.org/correlations)



## Rubrics

Component Security		
Emerging	Learning Outcome - Developed	Highly Developed
Component Design		
Recognize that a component's design may create vulnerabilities in information systems. <i>Remembering</i>	Discuss how a component's design may create vulnerabilities in information systems. <i>Understanding</i> [COM-LO-E01]	Illustrate how a component's design may create vulnerabilities in information systems. <i>Applying</i>
Component Procurement		
List some vulnerabilities, risks, and mitigations for components of an organizational network in a supply chain. <i>Remembering</i>	Discuss vulnerabilities, risks, and mitigations for components of an organizational network at various points in a supply chain. <i>Understanding</i> [COM-LO-E02]	Analyze vulnerabilities, risks, and mitigations for components of an organizational network at various points in a supply chain. <i>Analyzing</i>
Name some security threats and risks to hardware and software in component procurement. <i>Remembering</i>	Discuss security threats and risks to both hardware and software in component procurement, such as malware attached during manufacturing or transportation. <i>Understanding</i> [COM-LO-E03]	Outline security threats and risks to both hardware and software in component procurement. <i>Analyzing</i>

ITE-NET Domain: Networking
<p><b>Scope</b></p> <ol style="list-style-type: none"> <li>1. Topology of ad hoc and fixed networks of all sizes</li> <li>2. Role of the layered model in standards evolution and interoperability</li> <li>3. Physical layer through routing layer issues</li> <li>4. Higher layers related to applications and security, such as functions and design</li> <li>5. Approaches to designing for and modeling latency, throughput, and error rate</li> </ol>
<p><b>Essential Competencies</b></p> <p>[NET-E01] Compare the characteristics of various communication protocols and how they support application requirements within a telecommunication system. (Requirements and Technologies) (Analyzing)</p> <p>[NET-E02] Describe different network standards, components, and requirements of network protocols within a distributed computing setting. (Network Protocol Technologies) (Understanding)</p> <p>[NET-E03] Explain different main issues related to network management. (Network Management) (Understanding)</p>
<p><b>Supplemental Competencies</b></p> <p>[NET-S01] Contrast various networking topologies in terms of robustness, expandability, and throughput used within a cloud enterprise. (Technologies) (Analyzing)</p>

## Rubrics

ITE-SPA Domain: System Paradigms		
Emerging	Learning Outcome - Developed	Highly Developed
Essential		
Explain appropriate procedures and technologies to enforce administrative policies within a corporate environment. (Operational activities) (Bloom's level: Understanding)	Implement appropriate procedures and technologies to enforce administrative policies within a corporate environment. (Operational activities) (Bloom's level: Applying) [SPA-E01]	Integrate appropriate procedures and technologies to enforce administrative policies within a corporate environment. (Operational activities) (Bloom's level: Analyzing)
Explain appropriate and emerging technologies to improve the performance of computer systems. (Performance analysis) (Bloom's level: Understanding)	Use appropriate and emerging technologies to improve the performance of computer systems. (Performance analysis) (Bloom's level: Applying) [SPA-E02]	Choose appropriate and emerging technologies to improve the performance of computer systems. (Performance analysis) (Bloom's level: Evaluating)
Supplemental		
Discuss effective and appropriate system administration policies with sensitivity to the goals and constraints of an organization. (System governance) (Bloom's level: Understanding)	Implement effective and appropriate system administration policies with sensitivity to the goals and constraints of an organization. (System governance) (Bloom's level: Applying) [SPA-S01]	Examine effective and appropriate system administration policies with sensitivity to the goals and constraints of an organization. (System governance) (Bloom's level: Analyzing)

## IT-Transfer2020 Overview

IT-Transfer2020 is a subset of the IT2017 curricular framework and guidelines that would guide how two-year colleges would structure their IT transfer programs to help prepare transfer students for successful upper division study in programs that implement the IT2017 guidance.

Essential IT Domains and IT-Transfer2020 Competencies			
Tag	IT2017 Domain	IT-Transfer2020 Essential Competencies	IT-Transfer2020 Supplemental Competencies
ITE-CSP	<a href="#">Cybersecurity Principles</a>	2	1
ITE-GPP	<a href="#">Global Professional Practice</a>	3	2
ITE-IMA	<a href="#">Information Management</a>	1	2
ITE-IST	<a href="#">Integrated Systems Technology</a>	2	2
ITE-NET	<a href="#">Networking</a>	3	1
ITE-PFT	<a href="#">Platform Technologies</a>	3	2
ITE-SPA	<a href="#">System Paradigms</a>	2	1
ITE-SWF	<a href="#">Software Fundamentals</a>	2	3
ITE-UXD	<a href="#">User Experience Design</a>	1	1
ITE-WMS	<a href="#">Web and Mobile Systems</a>	1	4
Total Competencies:		20	19

Supplemental IT Domains and IT-Transfer2020 Competencies			
Tag	IT2017 Domain	IT-Transfer2020 Essential Competencies	IT-Transfer2020 Supplemental Competencies
ITS-ANE	<a href="#">Applied Networks</a>	0	1
ITS-CCO	<a href="#">Cloud Computing</a>	1	2
ITS-CEC	<a href="#">Cybersecurity Emerging Challenges</a>	2	1
ITS-DSA	<a href="#">Data Scalability and Analytics</a>	0	1
ITS-IOT	<a href="#">Internet of Things</a>	0	1
ITS-MAP	<a href="#">Mobile Applications</a>	0	2
ITS-SDM	<a href="#">Software Development and Management</a>	0	1
ITS-SRE	<a href="#">Social Responsibility</a>	2	1
ITS-VSS	<a href="#">Virtual Systems and Services</a>	2	2
Total Competencies:		7	12