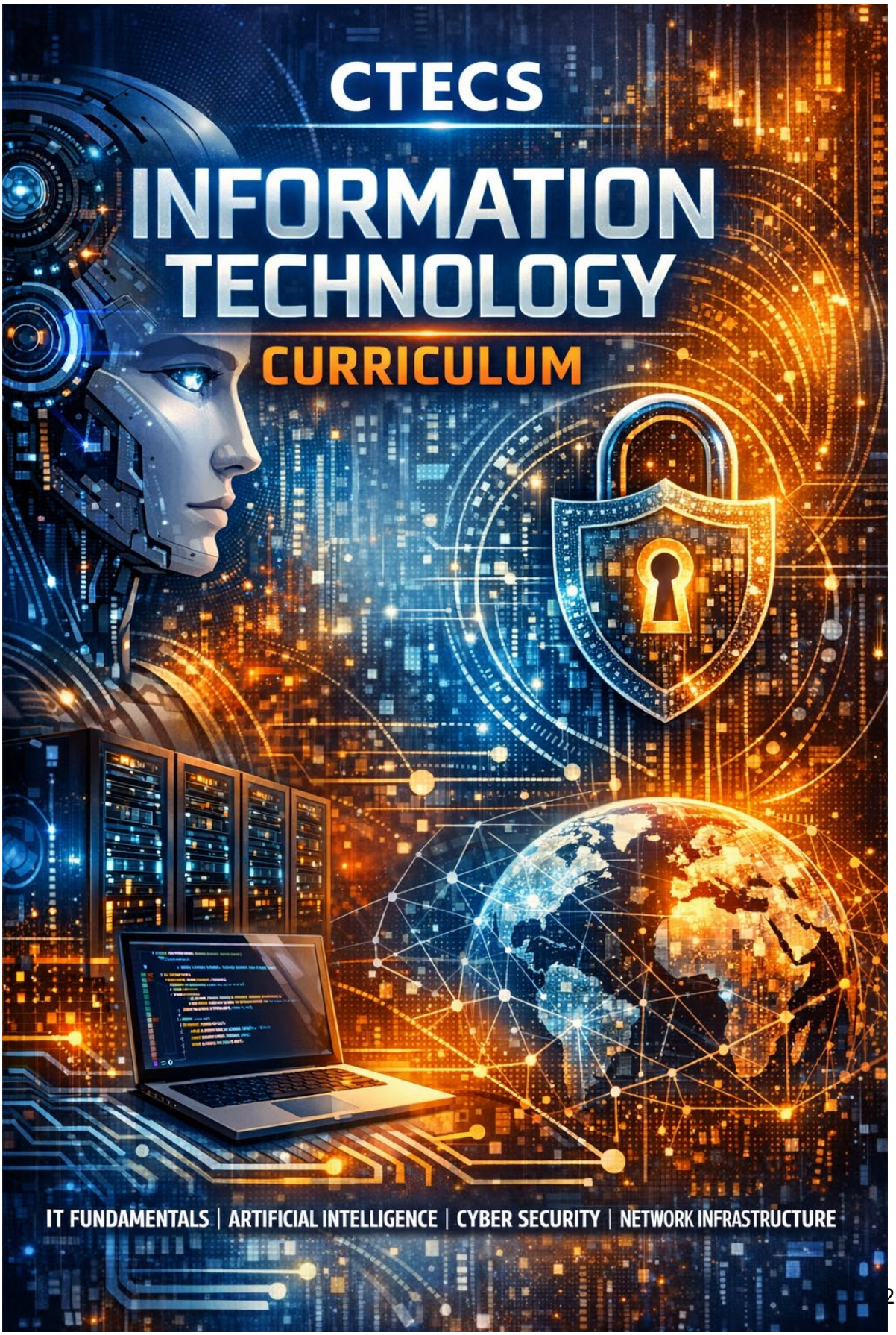
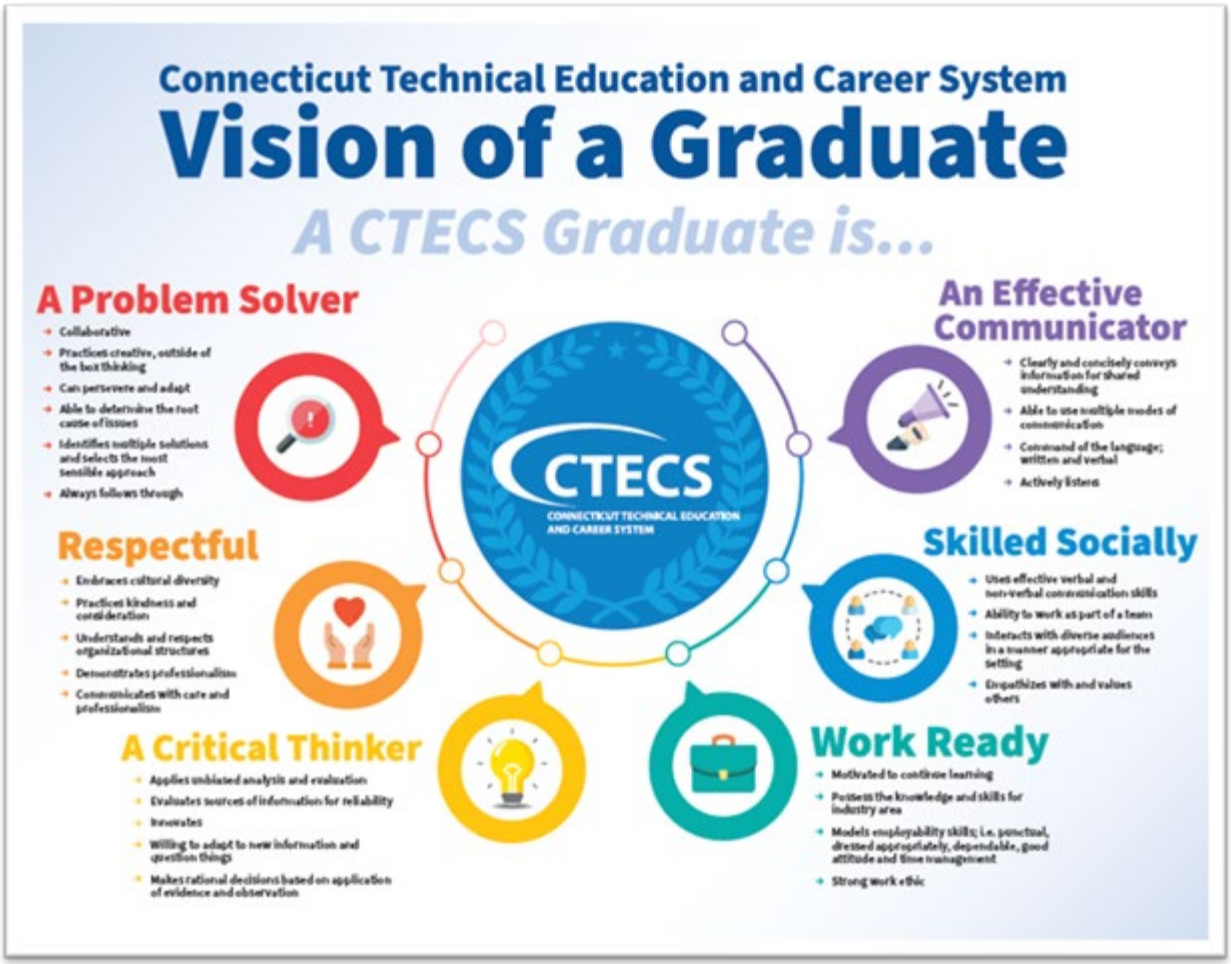

CTECS
INFORMATION TECHNOLOGY
CURRICULUM
IT FUNDAMENTALS | ARTIFICIAL INTELLIGENCE | CYBER SECURITY | NETWORK INFRASTRUCTURE

2026

# CTECS – Vision of the Graduate

The Vision of a Graduate (VoG) at the Connecticut Technical Education and Career System (CTECS) embodies our commitment to preparing students for success in Connecticut's workforce. Developed in collaboration with students, parents, staff, and employers, the VoG ensures that CTECS students are not only job-ready but also equipped to lead, innovate, and adapt in a dynamic world.

As educators, we are dedicated to developing these qualities by providing a comprehensive education that empowers our students to achieve their fullest potential and make meaningful contributions to society.



| A Problem Solver | Work Ready |
|---|---|
| ***Problem solvers tackle challenges by identifying root causes of issues, brainstorming solutions, implementing effective strategies, and demonstrating adaptability.***<br>• **Engage students with open-ended, creative thinking tasks that require both conventional and innovative solutions.**<br>• **Facilitate group discussions and collaborative projects.**<br>• **Use real-world scenarios and hands-on activities.**<br>• **Highlight the importance of effort, persistence, and continuous learning.**<br>• **Provide regular feedback and encourage reflection.** | ***To be work-ready includes a combination of technical expertise, soft skills, and personal qualities that ensure a graduate can effectively contribute to the workplace from day one.***<br>• **Set high standards for punctuality, responsibility, professionalism, and task completion.**<br>• **Use project-based learning and collaborative assignments.**<br>• **Emphasize clear written and verbal communication.**<br>• **Offer practical exercises like mock interviews and resume workshops.**<br>• **Integrate technology and teach digital literacy.** |
| **Respectful** | **Skilled Socially** |
| ***Graduates who embody respectfulness emphasize the importance of treating others with dignity, valuing diversity, and fostering an inclusive and positive environment, both personally and professionally.***<br>• **Demonstrate personal, interpersonal, and professional skills.**<br>• **Show respect for diversity.**<br>• **Model respect through active listening and empathy.** | ***Graduates who are skilled socially are equipped to navigate social environments, build relationships, and contribute positively to their communities and workplaces.***<br>• **Show awareness of global responsibility to others and the environment.**<br>• **Participate in community involvement.**<br>• **Design cooperative group projects and team activities** |

| | |
|---|---|
| • **Set clear expectations for respectful interactions.**<br>• **Promote collaboration and group discussions.**<br>• **Celebrate respectful behavior.**<br>• **Address disrespect promptly and constructively.** | • **Set expectations for respect and give regular feedback.**<br>• **Facilitate discussions on inclusivity, kindness, and respect.**<br>• **Model positive interactions and recognize strong social skills.** |
| **A Critical Thinker** | **An Effective Communicator** |
| ***Critical thinkers approach problems systematically by analyzing, evaluating, and synthesizing information to make well-informed decisions and contribute to innovative solutions.***<br>• **Encourage critical thinking individually and collaboratively.**<br>• **Design lessons that challenge assumptions and explore diverse viewpoints.**<br>• **Use open-ended questions, rigorous activities, and cross-curricular projects.**<br>• **Integrate project-based learning and real-world problem-solving.**<br>• **Offer reflective opportunities like journaling and discussions.**<br>• **Cultivate an environment that values curiosity and inquiry.** | ***Effective communicators convey ideas, information, and emotions accurately and persuasively, fostering understanding and collaboration.***<br>• **Communicate effectively using oral, written, visual, artistic, and technical modes.**<br>• **Include group discussions, presentations, and peer reviews.**<br>• **Promote active listening and thoughtful responses.**<br>• **Offer clear guidelines and constructive feedback.**<br>• **Stress clear, respectful, and purposeful communication.** |

# CTECS Instructional Model (Marzano)

CTECS uses the Marzano Compendium to guide research-based instructional strategies that differentiate learning and promote access, engagement, and success for all students. Teachers apply these strategies to support diverse learners, including multilingual learners, students with disabilities, and students with varied academic or technical backgrounds, through scaffolds, modeling, guided practice, and multiple ways to participate and demonstrate understanding.

This instructional approach ensures students progress toward proficiency in the Priority Standards and the competencies outlined in the CTECS Vision of a Graduate.

| Feedback | Content | Context |
|---|---|---|
| **Providing and Communicating Clear Learning Goals**<br>1. Providing scales and rubrics<br>2. Tracking student progress<br>3. Celebrating success<br>**Using Assessments**<br>4. Using informal assessments of the whole class<br>5. Using formal assessments of individual students | **Conducting Direct Instruction Lessons**<br>6. Chunking content<br>7. Processing content<br>8. Recording and representing content<br>**Conducting Practicing and Deepening Lessons**<br>9. Using structured practice sessions<br>10. Examining similarities and differences<br>11. Examining errors in reasoning<br>**Conducting Knowledge Application Lessons**<br>12. Engaging students in cognitively complex tasks<br>13. Providing resources and guidance<br>14. Generating and defending claims<br>**Using Strategies That Appear in All Types of Lessons**<br>15. Previewing strategies<br>16. Highlighting critical information<br>17. Reviewing content<br>18. Revising knowledge<br>19. Reflecting on learning<br>20. Assigning purposeful homework<br>21. Elaborating on information<br>22. Organizing students to interact | **Using Engagement Strategies**<br>23. Noticing and reacting when students are not engaged<br>24. Increasing response rates<br>25. Using physical movement<br>26. Maintaining a lively pace<br>27. Demonstrating intensity and enthusiasm<br>28. Presenting unusual information<br>29. Using friendly controversy<br>30. Using academic games<br>31. Providing opportunities for students to talk about themselves<br>32. Motivating and inspiring students<br>**Implementing Rules and Procedures**<br>33. Establishing rules and procedures<br>34. Organizing the physical layout of the classroom<br>35. Demonstrating withitness<br>36. Acknowledging adherence to rules and procedures<br>37. Acknowledging lack of adherence to rules and procedures<br>**Building Relationships**<br>38. Using verbal and nonverbal behaviors that indicate affection for students<br>39. Understanding students' backgrounds and interests<br>40. Displaying objectivity and control<br>**Communicating High Expectations**<br>41. Demonstrating value and respect for reluctant learners<br>42. Asking in-depth questions of reluctant learners<br>43. Probing incorrect answers with reluctant learners |

# Curriculum Introduction

This curriculum document outlines the essential learning for this academic program and provides a clear structure for planning, instruction, and assessment. It includes the components required by NEASC Standard 2.2a, along with elements that reflect the unique nature of CTECS academic programs. The curriculum is organized to show what students learn in each course, how learning progresses across grade levels, and how instruction supports both technical skill development and the CTECS Vision of a Graduate.

Teachers should use this document to:

- Understand the overall structure and expectations of the course sequence
- Reference the Course Map to see the scope and sequence of Priority Standards and the alignment to district assessments
- Use the Priority Standards and Units of Study to guide daily, weekly, and cycle-based planning
- Integrate Big Ideas, Essential Questions, Skills/Learning Outcomes, vocabulary, and resources during lesson design
- Plan and implement formative assessments to monitor progress and guide instruction
- Maintain consistency of technical and artistic practice instruction across campuses while adapting to student needs and industry-based opportunities

# Curriculum Components

**Course Map**

A Course Map serves as the scope and sequence for this course by outlining the progression of instructional units and the standards that guide teaching and assessment. While each campus will have individual student needs and cycle schedules, all instructors are expected to teach the standards outlined in the Course Map. Using the Course Map below, teachers will intentionally plan learning experiences that prepare students to meet the identified standards within the designated assessment windows.

**Priority Standards (Units of Study)**

Priority Standards identify the most essential learning in the program. They reflect the core competencies and skills that require the greatest instructional focus and appear on program assessments. Priority Standards guide each Unit of Study with big ideas, essential questions, content topics, and skills/learning outcomes aligned to assessments.

**Vertical Alignment**

Vertical alignment shows how Priority Standards and instructional expectations progress within the program. It provides a clear pathway of skill development, increasing complexity, and technical proficiency across a sequence.

**Learning Outcomes**

Learning outcomes are what students will know (Concepts) and be able to do (Skills).

Concepts identify the major content topics within the Priority Standard (Unit of Study). They appear in the left column of the Learning Outcomes table and follow a similar coding structure as the Priority Standard.

Skills are learning objectives that describe the measurable actions students must be able to perform to demonstrate proficiency. They appear in the right column of the Learning Outcomes table and show the progression of learning evidence in the Priority Standard.

**Vocabulary**

Essential vocabulary includes the content and academic terms students must understand and use accurately to engage in learning and demonstrate proficiency on assessments. Vocabulary is foundational to communication, and should be a primary initial focus within each unit and taught explicitly through modeling, demonstration, and repeated application.

**Resources**

Resources include the texts, materials, and digital tools that support learning within each unit to achieve the standards.

**Assessment Practices**

Teachers use ongoing formative assessments—such as questioning, checks for understanding, performance demonstrations, reflections, and teacher observation—

to monitor progress, guide instruction, and support all learners in mastering the Priority Standards.

Each program also includes district assessments, which measure proficiency on the Priority Standards identified in the Course Map. These assessments provide consistent evidence of student learning across campuses and ensure alignment to course expectations and program outcomes. Teachers should reference the Course Map and Units of Study when planning instruction to ensure students have opportunities to practice and demonstrate the skills and knowledge assessed on the district assessments.

# Grade 9 Information Technology Course Map (Two-Semester Model)

**Course Length:** Full Year
**Structure:** 2 Semesters (18–20 weeks each)
**Approach:** Foundational IT literacy emphasizing safety, systems awareness, productivity, computational thinking, and responsible AI use to prepare students for Grade 10 CompTIA A+ coursework

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**Semester 1 – IT Foundations, Safety, Systems & Productivity**

*Focus: Safe technology use, computing systems, digital productivity, troubleshooting, and professional practice*

| Unit | Priority Standards | Focus Areas | Estimated Duration |
|---|---|---|---|
| **Unit 1: IT Safety, Ethics & Responsible Technology Use** | 9.1 | Lab safety, ESD, ergonomics, privacy, acceptable use, ethical AI foundations | 3 weeks |
| **Unit 2: Hardware, Operating Systems & Troubleshooting** | 9.2 | Hardware components, OS navigation, file management, structured troubleshooting | 5 weeks |
| **Unit 3: Digital Productivity & Documentation (MOS + Adobe)** | 9.3 | Word processing, spreadsheets, presentations, accessibility, PDF workflows | 6 weeks |
| **Semester 1 Culminating Experience** | Integrated | Help desk–style troubleshooting task with professional documentation | 2–3 weeks |

**Semester 1 Outcomes**

Students will:

- Demonstrate **safe and ethical technology practices**
- Identify and explain **basic hardware and operating system functions**

- Apply **structured troubleshooting methods**
- Create **professional digital documents** using industry-standard tools
- Communicate technical information clearly and responsibly

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**Semester 2 – Computational Thinking, AI Foundations & Career Awareness**

*Focus: Logic, problem decomposition, introductory coding, AI literacy, and early career exploration*

| Unit | Priority Standards | Focus Areas | Estimated Duration |
|---|---|---|---|
| **Unit 4: Computational Thinking & Introductory Coding** | 9.4 | Algorithms, sequencing, variables, loops, conditionals, debugging | 5 weeks |
| **Unit 5: Artificial Intelligence Foundations** | 9.5 | AI concepts, prompting, limitations, ethics, verification, bias awareness | 5 weeks |
| **Unit 6: Career Awareness & Professional Practice** | 9.6 | IT career pathways, certifications, communication, documentation, professionalism | 4 weeks |
| **Semester 2 Culminating Experience** | Integrated | Foundational IT capstone (systems, AI, documentation, and career artifact) | 2–3 weeks |

**Semester 2 Outcomes**

Students will:

- Break problems into logical steps using **computational thinking**
- Write and debug **introductory programs**
- Explain how **AI systems work at a conceptual level**
- Use AI tools responsibly with **human verification**
- Explore **IT careers and certifications** aligned to future coursework

**Year-at-a-Glance Summary**

| Semester | Primary Emphasis |
|---|---|
| **Semester 1** | Safety, systems, troubleshooting, digital productivity |
| **Semester 2** | Coding basics, AI literacy, career awareness |

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**Assessment & Evidence (Across Both Semesters)**

- Safety and ethics scenarios and reflections
- Hardware identification and OS navigation labs
- Help desk tickets and troubleshooting reports
- MOS-style digital productivity performance tasks
- Introductory coding projects and debugging challenges
- AI prompting and verification activities
- Career exploration artifacts (resume, pathway plan)

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**Grade 9 → Grade 10 Transition**

This course map intentionally prepares students for **Grade 10 Information Technology** by introducing:

- Foundational **troubleshooting workflows**
- Professional **documentation and communication habits**
- Operating system and device familiarity
- Ethical and verified use of **AI in learning and productivity**
- Awareness of **CompTIA A+, ITF+, and Tech+ pathways**

# Grade 9 Information Technology Curriculum

**Course Overview**

**Course Title:** Information Technology – Foundations (Grade 9)

**Program Area:** Information Technology (CTECS)

**Credit:** 1.0

**Grade Level:** 9

**Course Description:**

This course introduces students to foundational information technology concepts aligned to the Connecticut Technical Education and Career System (CTECS). Students develop core skills in hardware, operating systems, digital productivity, computational thinking, and artificial intelligence (AI). Emphasis is placed on safety, ethical technology use, troubleshooting, and professional practice. The course prepares students for Grade 10 CompTIA A+ coursework and Certiport MOS and Adobe Certified Professional pathways.

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**Vision of the Graduate Alignment**

- **Problem Solver** – Diagnoses and resolves technical issues using structured reasoning
- **Critical Thinker** – Evaluates AI outputs, data, and digital content
- **Effective Communicator** – Produces professional documents and presentations
- **Work Ready** – Demonstrates safety, ethics, and career awareness

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## Priority Standard 9.1: IT Safety & Ethical Practice

**Big Ideas**

1. **Safe work habits and lab procedures protect people, equipment, and data in IT environments.**
2. **Ethical technology use requires understanding privacy, intellectual property, and acceptable use.**

3. **Responsible AI use depends on human judgment, transparency, and verification.**

**Essential Questions**

1. **How do safety practices like ESD prevention and ergonomics reduce risk in IT labs?**
2. **Why are privacy, intellectual property, and acceptable use policies essential in computing?**
3. **How can AI tools be used ethically in academic and real-world scenarios?**

| **Learning Outcomes** | |
|---|---|
| **Students will know** | **As evidenced by: (oral, written, or performance)** |
| 9.1.1 IT Safety & Ethical Practice | • Apply IT lab safety rules consistently during classroom activities<br>• Use ESD prevention techniques when handling computer equipment<br>• Set up and maintain an ergonomically correct workstation<br>• Identify unsafe behaviors or conditions in an IT lab environment<br>• Explain the purpose of safety procedures and their impact on people and equipment |
| 9.1.2 Ethical Technology Use | • Demonstrate responsible use of computers, networks, and digital tools<br>• Apply ethical guidelines when using AI tools for learning and productivity |

| | |
|---|---|
| | • Identify examples of inappropriate or unethical technology use<br>• Evaluate AI-generated content for accuracy, bias, and reliability<br>• Make informed decisions about appropriate technology use in academic and real-world contexts |
| 9.1.3 Privacy and Acceptable Use | • Explain why privacy protection is important in digital environments<br>• Recognize intellectual property and respect ownership of digital content<br>• Follow acceptable use policies when accessing school technology resources<br>• Distinguish between appropriate and inappropriate uses of digital tools<br>• Apply privacy and acceptable use rules to real-world technology scenarios |

**Key Vocabulary:**

- Electrostatic Discharge (ESD)
- Ergonomics
- Acceptable Use Policy (AUP)
- Digital Citizenship
- Data Privacy
- Intellectual Property

- Bias (AI)
- Ethical Use

**Alignment:**

- **CompTIA ITF+/Tech+**: Security concepts, professionalism, safe computing practices
- **Certiport (MOS/Adobe)**: Digital responsibility, document ownership, accessibility awareness
- **Code.org**: Digital citizenship and responsible computing practices
- **CodeHS**: Computing ethics and safe use of technology

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## Priority Standard 9.2: Hardware, Operating Systems & Troubleshooting

**Big Ideas**

1. **Computer systems rely on the interaction of hardware components and operating systems.**
2. **Operating systems manage files, settings, and applications to support users.**
3. **Structured troubleshooting leads to accurate diagnosis and effective solutions.**

**Essential Questions**

1. **How do hardware components and operating systems work together to run a computer?**
2. **What role does the operating system play in managing files and system resources?**
3. **Why is a step by step troubleshooting process critical when resolving technical issues?**

| **Learning Outcomes** | |
|---|---|
| **Students will know** | **As evidenced by: (oral, written, or performance)** |

| | |
|---|---|
| 9.2.1 Hardware | • **Identify internal hardware components such as CPU, RAM, storage, and motherboard**<br>• **Identify external hardware components and peripherals**<br>• **Distinguish between internal and external hardware components**<br>• **Explain the function and role of each hardware component within a computer system**<br>• **Classify hardware based on input, output, storage, or processing functions** |
| **9.2.2 Operating Systems** | • **Navigate an operating system interface efficiently**<br>• **Perform file and folder management tasks, including creating, organizing, and deleting files**<br>• **Manage basic system settings and user preferences**<br>• **Launch, close, and manage applications**<br>• **Explain the role of the operating system in managing hardware and software resources**<br>• |

| | |
|---|---|
| **9.2.3 Troubleshooting** | • **Apply a structured, step-by-step troubleshooting methodology**<br>• **Diagnose common hardware and software issues using observable symptoms**<br>• **Analyze problems to determine possible causes**<br>• **Propose appropriate solutions based on evidence and logical reasoning**<br>• **Document problems and solutions using help desk–style tickets or reports** |

**Key Vocabulary:**

- CPU, RAM, Storage (HDD/SSD)
- Motherboard
- Peripheral
- Input / Output Device
- Operating System (OS)
- File System
- Driver
- Boot Process
- Troubleshooting
- Help Desk Ticket

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**Alignment:**

- **CompTIA ITF+/Tech+**: Infrastructure, hardware, operating systems, troubleshooting
- **Certiport**: Device readiness and system use for productivity tools
- **Code.org**: Understanding computing systems and how hardware/software interact
- **CodeHS**: Computing systems and basic troubleshooting concepts

## Priority Standard 9.3: Digital Productivity & Documentation (MOS + Adobe)

**Big Ideas**

1. **Digital productivity tools support clear, accurate, and professional communication.**
2. **Formatting and accessibility improve the effectiveness and usability of documents.**
3. **Industry standard documentation workflows prepare students for workplace expectations.**

**Essential Questions**

1. **How do word processing, spreadsheet, and presentation tools communicate information effectively?**
2. **Why do formatting and accessibility standards matter in professional documents?**
3. **How do PDF workflows support document security and information sharing?**

| **Learning Outcomes** | |
|---|---|
| **Students will know** | **As evidenced by: (oral, written, or performance)** |

| | |
|---|---|
| 9.3.1 Productivity | • **Create professional documents, spreadsheets, and presentations**<br>• **Use word processing, spreadsheet, and presentation tools to communicate information clearly**<br>• **Organize content using appropriate layouts, headings, and visual structure**<br>• **Select appropriate digital tools based on task, audience, and purpose**<br>• **Apply basic design principles to improve clarity and professionalism** |
| 9.3.2 Accessibility | • **Apply accessibility standards to digital documents**<br>• **Use consistent formatting to improve readability and usability**<br>• **Structure documents to support clear navigation and understanding**<br>• **Revise documents to meet accessibility expectations**<br>• **Explain why accessibility is important in professional and educational settings** |
| 9.3.3 Documentation | • **Create accurate and professional digital documents** |

| | |
|---|---|
| | • **Maintain consistency in formatting, layout, and style**<br>• **Communicate information effectively through written and visual documentation**<br>• **Review and edit documents for accuracy and completeness**<br>• **Demonstrate professional documentation practices** |
| 9.3.4 Security | • **Protect digital documents using appropriate security features**<br>• **Apply document permissions to control access and sharing**<br>• **Explain the purpose of securing digital documents**<br>• **Recognize situations that require document protection**<br>• **Demonstrate responsible handling of digital files** |
| 9.3.5 Workflows | • **Convert documents into PDF format**<br>• **Enhance documents using industry standard PDF workflows**<br>• **Produce accessible PDF documents**<br>• **Apply secure PDF settings appropriate for sharing** |

| | |
|---|---|
| | • **Follow structured digital workflows aligned to workplace expectations** |

**Key Vocabulary:**

- Formatting
- Styles
- Spreadsheet
- Formula
- Cell Reference
- Accessibility
- OCR (Optical Character Recognition)
- PDF
- Encryption
- Digital Workflow

**Alignment:**

- **CompTIA ITF+/Tech+**: Applications and software concepts
- **Certiport MOS**: Word, Excel, PowerPoint foundational skills
- **Certiport Adobe**: Acrobat Pro document workflows and accessibility
- **Code.org / CodeHS**: Application of digital tools for communication

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## Priority Standard 4: Computational Thinking & Introductory Coding

**Big Ideas**

1. **Computational thinking helps break problems into logical, manageable steps.**
2. **Algorithms use sequencing, variables, loops, and conditionals to complete tasks.**

3. **Debugging is an essential process for refining programs and problem solving strategies.**

**Essential Questions**

1. **How does breaking a problem into steps make it easier to solve?**
2. **How do loops, variables, and conditionals control the behavior of a program?**
3. **Why is debugging an important part of learning to code?**

| **Learning Outcomes** | |
|---|---|
| **Students will know** | **As evidenced by: (oral, written, or performance)** |
| 9.4.1 Algorithms | • Sequence steps to solve a defined problem<br>• Incorporate loops, variables, and conditionals into an algorithm<br>• Represent algorithms using structured logic or flow |
| 9.4.2 Programming | • Create simple programs using block-based or introductory text-based languages<br>• Write programs that complete defined tasks<br>• Modify existing code to change program behavior |

| | |
|---|---|
| 9.4.3 Debugging | • Test programs to identify syntax and logic errors<br>• Use logical reasoning to isolate errors in code<br>• Correct errors and verify program functionality through re-testing |

**Key Vocabulary:**

- Algorithm
- Sequence
- Variable
- Loop
- Conditional
- Boolean
- Debugging
- Logic Error
- Syntax
- Program

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**Alignment:**

- **CompTIA ITF+/Tech+**: Software development concepts
- **Code.org**: Algorithms, sequencing, conditionals, loops

**CodeHS**: Introductory programming and debugging skills

## Priority Standard 5: Artificial Intelligence Foundations

**Big Ideas**

1. **AI systems operate using data, algorithms, and models with defined limitations.**
2. **Effective AI use depends on well designed prompts and clear purpose.**
3. **AI generated outputs must be evaluated for accuracy, bias, and relevance.**

**Essential Questions**

1. **How do AI systems work at a basic conceptual level?**
2. **What makes an AI prompt effective and purposeful?**
3. **Why is it important to verify AI generated information before using it?**

| **Learning Outcomes** | |
|---|---|
| **Students will know** | **As evidenced by: (oral, written, or performance)** |
| **9.5.1 Artificial Intelligence** | • **Describe how AI systems work at a conceptual level**<br>• **Identify common uses of AI in learning, troubleshooting, and productivity**<br>• **Explain the role of data and algorithms in AI systems**<br>• **Apply AI tools to support academic and technical tasks**<br>• **Distinguish between human decision-making and AI-assisted outputs** |

| | |
|---|---|
| 9.5.2 Limitations | • **Identify limitations of AI systems, including incomplete or incorrect outputs**<br>• **Recognize situations where AI may produce misleading information**<br>• **Explain why AI systems do not replace human judgment**<br>• **Analyze AI-generated responses for gaps or errors**<br>• **Adjust use of AI tools based on identified limitations** |
| 9.5.3 Prompting | • **Create effective AI prompts with clear context, constraints, and purpose**<br>• **Refine prompts to improve relevance and quality of AI-generated outputs**<br>• **Compare results from different prompts to evaluate effectiveness**<br>• **Use precise language to guide AI responses**<br>• **Explain how prompt design impacts AI output** |
| 9.5.4 Ethics | • **Explain ethical considerations related to AI use** |

| | |
|---|---|
| | • **Identify examples of biased or inappropriate AI-generated content**<br>• **Evaluate AI outputs for fairness and responsible use**<br>• **Apply ethical guidelines when using AI tools in academic and workplace contexts**<br>• **Demonstrate responsible decision-making when incorporating AI-generated information** |
| 9.5.5 Verification | • **Verify AI-generated content for accuracy before use**<br>• **Identify bias or misinformation in AI-generated outputs**<br>• **Cross-check AI responses with trusted sources or prior knowledge**<br>• **Revise AI-generated content to improve accuracy and reliability**<br>• **Justify final decisions when using AI-assisted information** |

**Key Vocabulary:**

- Artificial Intelligence (AI)
- Machine Learning
- Prompt

- Hallucination (AI)
- Bias
- Verification
- Automation
- Dataset
- Human-in-the-Loop

**Alignment:**

- **CompTIA ITF+/Tech+**: Emerging technologies and data concepts
- **Certiport**: Ethical and effective use of digital tools
- **Code.org**: AI concepts and societal impact
- **CodeHS**: Introductory AI and data-driven decision making

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## Priority Standard 6: Career Awareness & Professional Practice

**Big Ideas**

1. **IT careers require both technical knowledge and professional behavior.**
2. **Clear communication and documentation are essential workplace skills.**
3. **Early career exploration supports informed decisions about certifications and pathways.**

**Essential Questions**

1. **What entry level IT careers and certifications are available in the information technology field?**
2. **Why is professional communication important in technical environments?**
3. **How can documenting technical work demonstrate readiness for the workplace?**

| **Learning Outcomes** | |
|---|---|
| **Students will know** | **As evidenced by: (oral, written, or performance)** |
| 9.6.1 Careers | • **Identify entry level IT career pathways**<br>• **Describe common roles within the information technology field**<br>• **Explain the skills required for entry level IT positions**<br>• **Compare different IT career options based on interests and strengths**<br>• **Connect classroom learning to real world IT careers** |
| 9.6.2 Certifications | • **Identify industry recognized IT certifications**<br>• **Describe the purpose and value of certifications in career preparation**<br>• **Explain which certifications align to entry level IT roles**<br>• **Discuss how certifications support career advancement**<br>• **Demonstrate awareness of certification pathways in IT** |

| | |
|---|---|
| 9.6.3 Communication | • **Communicate technical information clearly and accurately**<br>• **Use appropriate professional language in technical contexts**<br>• **Adjust communication style for different audiences**<br>• **Explain technical concepts using clear and organized language**<br>• **Demonstrate effective written and verbal communication skills** |
| 9.6.4 Documentation | • **Document technical work using industrystyle formats**<br>• **Create help desk tickets that clearly describe problems and solutions**<br>• **Maintain accurate and organized technical records**<br>• **Edit documentation for clarity, accuracy, and completeness**<br>• **Demonstrate proper documentation practices used in IT environments** |
| 9.6.5 Professionalism | • **Create professional resumes aligned to workplace expectations**<br>• **Demonstrate appropriate workplace behavior and ethics** |

| | |
|---|---|
| | • **Follow professional standards during technical tasks**<br>• **Meet deadlines and expectations for technical assignments**<br>• **Exhibit employability skills such as reliability, organization, and responsibility** |

**Key Vocabulary:**

- Career Pathway
- Certification
- Resume
- Cover Letter
- Professional Communication
- Technical Documentation
- Employability Skills
- Workplace Ethics

**Alignment:**

- **CompTIA**: IT career pathways and professional practices
- **Certiport**: Certification readiness and workplace application
- **Code.org / CodeHS**: Career exploration in computer science and IT

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**Explicit Standards Alignment**

**CTECS**

- Safety and Health
- Hardware and Operating Systems
- Productivity Tools
- Programming Foundations
- Emerging Technologies
- Career Development & Employability

**CompTIA Alignment (Grade 9 – Pre-A+ / ITF+ / Tech+)**

This course intentionally aligns to **CompTIA ITF+ and Tech+ domains** as a *foundational, non-exam Grade 9 experience* that prepares students for **CompTIA A+ Core 1 and Core 2 in Grade 10**.

**CompTIA ITF+ / Tech+ Domains Addressed:**

- **IT Concepts & Terminology** – hardware, software, data, and systems (Priority Standards 1 & 2)
- **Infrastructure** – device components, peripherals, basic networking (Priority Standard 2)
- **Applications & Software** – operating systems, productivity tools (Priority Standards 2 & 3)
- **Software Development Concepts** – algorithms, logic, variables (Priority Standard 4)
- **Security** – basic cybersecurity concepts, safe and ethical use (Priority Standards 1 & 5)

**A+ Readiness Skills Introduced:**

- Structured troubleshooting methodology
- Help desk ticket documentation
- Device and OS navigation
- Professional technical communication

**ISTE Standards (Students)**

- **1.1.a** – Empowered Learner: Articulate learning goals using technology

- **1.2.b** – Digital Citizen: Practice safe, ethical technology use
- **1.4.a** – Innovative Designer: Develop algorithms and programs
- **1.5.b** – Computational Thinker: Analyze data and troubleshoot systems
- **1.6.a / 1.6.b** – Creative Communicator: Create professional digital artifacts

**CSTA Standards**

- **1B-CS-02** – Model how hardware and software work together
- **1B-AP-08** – Compare and refine multiple algorithms
- **1B-AP-12** – Use variables and control structures
- **1B-IC-18** – Discuss computing impacts and ethics
- **1B-DA-06** – Organize and visualize data
- **1B-CS-02** – Model how hardware and software work together
- **1B-AP-08** – Compare and refine multiple algorithms
- **1B-AP-12** – Use variables and control structures
- **1B-IC-18** – Discuss computing impacts and ethics
- **1B-DA-06** – Organize and visualize data

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**One-Page Scope & Sequence (Grade 9)**

| Quarter | Focus Topics | Certifications & Tools |
|---|---|---|
| Q1 | Safety, IT careers, hardware basics, AI ethics | ITF+/Tech+ concepts, AI Foundations |
| Q2 | Operating systems, troubleshooting, AI help desk | CompTIA-aligned labs, AI Help Desk |
| Q3 | Word processing, spreadsheets, PDFs | MOS Foundations, Adobe Acrobat Pro |
| Q4 | Coding basics, AI prompting, capstone project | Intro Coding, AI Prompting |

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**Priority Standards → Assessment Mapping**

| Priority Standard | Assessment Type |
|---|---|
| IT Safety & Ethics | Safety certification test, AI ethics reflection |
| Hardware Identification | Lab-based component ID assessment |
| Troubleshooting Process | AI-supported help desk ticket project |
| Digital Productivity | MOS-style performance tasks |
| Adobe PDF Workflows | Acrobat Pro project (accessibility & security) |
| Computational Thinking | Coding mini-project & debugging challenge |
| AI Prompting & Verification | Prompt design and AI critique task |
| Career Awareness | Career pathway plan & professional artifact |

# Grade 10 Information Technology Course Map (Two-Semester Model)

**Course Length: Full Year**
**Structure: 2 Semesters (18–20 weeks each)**
**Approach: Systems-focused progression from hardware, safety, and user support → operating systems, networking, security, AI-assisted diagnostics, and certification readiness**

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**Semester 1 – Systems, Hardware & User Support Foundations**

***Focus: Safe practices, hardware systems, troubleshooting, and professional IT workflows***

| Unit | Priority Standards | Focus Areas | Estimated Duration |
|---|---|---|---|
| **Unit 1: IT Safety, Security & Professional Ethics** | **10.1** | **Lab safety, ESD, basic cybersecurity, ethical decision-making, AI responsibility** | **2 weeks** |
| **Unit 2: Hardware Installation, Maintenance & Troubleshooting** | **10.2** | **PC assembly, component upgrades, preventive maintenance, diagnostic workflows** | **5 weeks** |
| **Unit 3: Operating System Fundamentals & Virtualization (Intro)** | **10.3 (intro)** | **OS structure, installs, updates, basic VM use for testing** | **4 weeks** |
| **Unit 4: Connectivity & Device Support** | **10.4 (intro)** | **Basic networking concepts, peripherals, mobile devices, connectivity troubleshooting** | **3 weeks** |
| **Semester 1 Culminating Experience** | **Integrated** | **Performance-based hardware & support labs, ticket documentation, Core 1 prep** | **2–3 weeks** |

**Semester 1 Outcomes**

**Students will:**

- **Apply safe and ethical practices in IT environments**
- **Install, maintain, and troubleshoot computer hardware systems**
- **Use structured troubleshooting methodologies**
- **Document work using help desk and professional IT standards**
- **Demonstrate readiness for CompTIA A+ Core 1**

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**Semester 2 – Operating Systems, Networking, Security & AI-Supported IT**

***Focus: OS management, connectivity, cybersecurity fundamentals, automation concepts, and certification readiness***

| Unit | Priority Standards | Focus Areas | Estimated Duration |
|---|---|---|---|
| **Unit 5: Operating Systems, Software & Virtualization** | **10.3** | **OS installs, users, permissions, updates, recovery tools, VMs** | **4 weeks** |
| **Unit 6: Networking & Connectivity** | **10.4** | **IP configuration, wired/wireless networks, diagnostics, troubleshooting** | **4 weeks** |
| **Unit 7: AI & Automation in IT Operations** | **10.5** | **AI-assisted troubleshooting, verification, automation concepts, human oversight** | **2–3 weeks** |
| **Unit 8: Career Readiness & Certification Preparation** | **10.6** | **Professional communication, documentation, resumes, exam readiness** | **3 weeks** |

| | | | |
|---|---|---|---|
| **Semester 2 Culminating Experience** | **Integrated** | **Multi-station PBAs, OS/network labs, certification-aligned capstone** | **2–3 weeks** |

**Semester 2 Outcomes**

**Students will:**

- **Install and manage operating systems and software environments**
- **Configure and troubleshoot basic networks**
- **Use AI tools responsibly to support diagnostics and documentation**
- **Communicate professionally through tickets, reports, and user guides**
- **Demonstrate readiness for CompTIA A+ Core 2**

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**Year-at-a-Glance Summary**

| Semester | Primary Emphasis |
|---|---|
| **Semester 1** | **Safety, hardware systems, troubleshooting, user support** |
| **Semester 2** | **Operating systems, networking, security, AI support, certification** |

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**Assessment & Evidence (Across Both Semesters)**

- **Hardware assembly and troubleshooting labs**
- **Preventive maintenance and diagnostic documentation**
- **OS installation and recovery tasks**
- **Network configuration and connectivity tests**
- **Help desk tickets and professional communication artifacts**
- **AI-assisted diagnostic workflows with verification evidence**
- **Certification-aligned performance-based assessments (PBAs)**

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**Grade 10 → Grade 11 Transition**

**This course map intentionally prepares students for Grade 11 Information Technology by building:**

- **Troubleshooting discipline and documentation habits**
- **OS and networking foundations needed for systems administration**
- **Ethical and verification-centered AI use**
- **Comfort with PBAs, labs, and multi-step technical problem solving**

# Grade 10 Information Technology Curriculum

**Course Overview**

**Course Title: Information Technology – Systems & Support (Grade 10)**

**Program Area: Information Technology (CTECS)**

**Credit: 1.0 (Full Year)**

**Grade Level: 10**

**Course Description: This course builds directly on Grade 9 Information Technology Foundations and is aligned to the Connecticut Technical Education and Career System (CTECS). Students develop intermediate skills in computer hardware, operating systems, networking, cybersecurity, troubleshooting, and professional IT practices. Instruction is explicitly aligned to CompTIA A+ Core 1 and Core 2, Certiport MOS and Adobe, and supported through Code.org and CodeHS where appropriate. Artificial Intelligence (AI) is integrated as a tool for diagnostics, productivity, and ethical decision-making, with emphasis on verification and professional judgment.**

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**Vision of the Graduate Alignment**

- **Technical Problem Solver – Diagnoses, documents, and resolves complex IT issues**
- **Critical Evaluator – Verifies AI-assisted outputs and technical solutions**
- **Professional Communicator – Produces industry-standard documentation**
- **Career Ready Technician – Demonstrates employability, ethics, and certification readiness**

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## Priority Standard 10.1: IT Safety, Security & Professional Ethics

**Big Ideas:**

- **Safety, security, and ethics are foundational to all professional IT work.**
- **Technical decisions have legal, ethical, and human consequences.**
- **Secure practices reduce risk before problems occur.**

**Essential Questions:**

- **How do safety and security practices protect users, data, and systems?**
- **What ethical responsibilities do IT professionals have when using AI and managing data?**
- **How do professional standards guide decision making during incidents?**

| Students will know | Students will be able to do – as evidenced by |
|---|---|
| **10.1.1 Safety** | **• Apply ESD and physical safety procedures in IT lab environments**<br>**• Follow equipment handling and workspace safety protocols**<br>**• Identify unsafe practices and correct them before system use** |
| **10.1.2 Security** | **• Identify common cybersecurity threats such as malware and phishing**<br>**• Apply mitigation strategies to protect systems and data**<br>**• Explain how secure practices reduce organizational risk** |
| **10.1.3 Ethics** | **• Apply ethical decision-making models to IT and AI scenarios**<br>**• Evaluate the legal and ethical implications of system use**<br>**• Justify professional actions using industry codes of conduct** |

**Key Vocabulary:**

- **Malware**
- **Phishing**
- **Authentication**

- **Authorization**
- **Least Privilege**
- **Data Breach**
- **Ethics**
- **Compliance**

**Alignment (as applicable):**

- **CompTIA *(per grade mapping): A+ Core 2* (220-1102) (Semester 2).**
- **Certiport** (ONLY if used for documentation artifacts)**: MOS Word/Adobe Acrobat *optional* for producing professional technical documentation (tickets, SOPs, user guides); not required for this Priority Standard.**
- **Code.org** / CodeHS**: Supplemental modules for cybersecurity concepts and ethical computing.**

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## Priority Standard 10.2: Hardware Installation, Maintenance & Troubleshooting

**Big Ideas:**

- **Hardware reliability depends on correct installation and preventive maintenance.**
- **Structured troubleshooting leads to efficient and accurate problem resolution.**
- **Documentation is essential to sustaining system support.**

**Essential Questions:**

- **How do hardware components work together to support user needs?**
- **Why is a systematic troubleshooting process critical in IT support?**
- **How does documentation improve future maintenance and support?**

| **Learning Outcomes** |
| --- |

| Students will know | Students will be able to do, as evidenced by: |
|---|---|
| **10.2.1 Hardware** | **• Assemble computer systems based on user and system requirements**<br>**• Install and upgrade internal components correctly**<br>**• Verify hardware compatibility and functionality** |
| **10.2.2 Maintenance** | **• Perform preventive maintenance on computer systems**<br>**• Apply cleaning, inspection, and replacement procedures**<br>**• Document maintenance activities using industry standards** |
| **10.2.3 Troubleshooting** | **• Use structured troubleshooting methodologies to isolate issues**<br>**• Identify failing hardware using diagnostic tools**<br>**• Implement and test corrective solutions** |

**Key Vocabulary:**

- **BIOS/UEFI**
- **POST**
- **Power Supply (PSU)**
- **Expansion Card**
- **Cooling System**
- **Preventive Maintenance**

**Alignment (as applicable):**

- **CompTIA *(per grade mapping): A+ Core* 2 (220-1102)** (Semester 2).**
- **Certiport** (ONLY if used for documentation artifacts)**: MOS Word/Adobe Acrobat *optional* for producing professional technical documentation (tickets, SOPs, user guides); not required for this Priority Standard.**

- **Code.org / **CodeHS: Supplemental modules for cybersecurity concepts and ethical computing.

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## Priority Standard 10.3: Operating Systems, Software & Virtualization

**Big Ideas:**

**Operating systems manage resources, security, and user interaction.**

**Software stability depends on correct configuration and updates.**

**Virtualization enables safe testing and flexible system management.**

**Essential Questions:**

**How do operating systems control and protect computing environments?**

**What causes software failures, and how can they be prevented?**

**Why is virtualization valuable for troubleshooting and system planning?**

| **Learning Outcomes** | |
|---|---|
| **Students will know** | **Students will be able to do, as evidenced by:** |
| **10.3.1 Operating Systems** | **• Install and upgrade operating systems**<br>**• Configure system settings, users, and permissions**<br>**• Apply OS security and update policies** |

| | |
|---|---|
| **10.3.2 Software** | **• Install, configure, and update application software**<br>**• Diagnose common software failures**<br>**• Apply recovery and remediation techniques** |
| **10.3.3 Virtualization** | **• Create and manage virtual machines**<br>**• Use virtualization tools for testing and troubleshooting**<br>**• Explain virtualization benefits and limitations** |

**Key Vocabulary:**

- **Virtual Machine**
- **Hypervisor**
- **Patch Management**
- **User Account Control**
- **Registry**
- **System Image**

**Alignment (as applicable):**

- **CompTIA *(per grade mapping): A+ Core 2* (220-1102) (Semester 2).Core 2 exam window: mid to late Semester 2.**
- **Certiport: *Only if appropriate* for documentation/productivity artifacts (e.g., MOS Word for configuration notes; PDF workflows for user guides). Not required for OS mastery.**
- **CodeHS: Supplemental OS concepts modules (optional).**

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## Priority Standard 10.4: Networking & Connectivity

**Big Ideas:**

- **Networks enable communication between devices and users.**
- **Connectivity problems often have multiple possible causes.**
- **Foundational networking knowledge prepares students for advanced infrastructure work.**

**Essential Questions:**

- **How do data and devices move across a network?**
- **What steps should be taken to diagnose connectivity issues?**
- **Where does A+ networking end and Network+ networking begin?**

| **Learning Outcomes** | |
|---|---|
| **Students will know** | **Students will be able to do, as evidenced by:** |
| **10.4.1 Networking** | **• Identify network components and their functions**<br>**• Explain how data moves across networks**<br>**• Distinguish between wired and wireless technologies** |
| **10.4.2 Configuration** | **• Configure IP addressing and wireless security settings**<br>**• Set up basic wired and wireless networks**<br>**• Verify network connectivity and performance** |
| **10.4.3 Diagnostics** | **• Diagnose common connectivity problems**<br>**• Apply systematic troubleshooting steps** |

| | |
|---|---|
| | • **Resolve network issues using appropriate tools** |

**Key Vocabulary:**

- **TCP/IP**
- **DNS**
- **DHCP**
- **Router**
- **Switch**
- **Wi-Fi Standards**
- **Network Topology**

**Alignment (as applicable):**

- **CompTIA *(per grade mapping): A+ Core 2* (220-1102) (Semester 2) plus introductory Network+ coverage (N10-008/N10-009) in Semester 2.**
- **Certiport: Not applicable.**
- ****Code.org / **CodeHS: Supplemental lessons for Internet concepts, protocols, and network troubleshooting.**

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## Priority Standard 10.5: Artificial Intelligence & Automation in IT

**Big Ideas**

- **AI can enhance productivity but requires human verification.**
- **Automation improves efficiency while introducing new risks.**
- **Ethical use of AI is a professional responsibility.**

**Essential Questions:**

- **How can AI support troubleshooting without replacing human judgment?**
- **What risks arise when automation is used incorrectly?**
- **How should IT professionals verify AI generated recommendations?**

| **Learning Outcomes** | |
|---|---|
| **Students will know** | **Students will be able to do, as evidenced by:** |
| **10.5.1 Artificial Intelligence** | **• Use AI tools to support troubleshooting and documentation**<br>**• Generate AI-assisted diagnostic pathways**<br>**• Explain AI capabilities and limitations in IT contexts** |
| **10.5.2 Verification** | **• Validate AI-generated recommendations through testing**<br>**• Compare AI outputs against technical knowledge**<br>**• Reject inaccurate or biased AI suggestions** |
| **10.5.3 Automation** | **• Identify IT tasks suitable for automation**<br>**• Explain automation risks and safeguards**<br>**• Apply automation concepts to workflow design** |

**Key Vocabulary:**

- **Automation**
- **Prompt Engineering**
- **AI Bias**
- **Verification**
- **Workflow**
- **Human Oversight**

**Alignment (as applicable):**

- **CompTIA: Not listed as a standalone CompTIA course in the Grade 10 pacing; integrated as an instructional overlay during **A+ Core ****1/Core ****2 **labs to strengthen troubleshooting, documentation quality, and verification habits.**
- **Certiport: Not applicable (unless students are creating optional documentation artifacts in Word/PDF).**
- **Code.org** / CodeHS**: Supplemental AI/data literacy and automation concept modules ****(.**

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## Priority Standard 10.6: Career Readiness & Certification Preparation

**Big Ideas:**

- **Technical skills must be paired with professionalism and communication.**
- **Industry certifications validate knowledge and readiness.**
- **Career preparation is an ongoing, reflective process.**

**Essential Questions:**

- **How do certifications support career and postsecondary pathways?**
- **What professional behaviors are expected in IT workplaces?**
- **How can students evaluate their readiness for industry exams and careers?**

| Students will know | Students will be able to do, as evidenced by: |
|---|---|
| **10.6.1 Certification** | **• Complete certification-aligned practice exams**<br>**• Perform performance-based labs**<br>**• Evaluate readiness for industry exams** |
| **10.6.2 Communication** | **• Communicate technical information clearly to users**<br>**• Produce professional IT documentation**<br>**• Collaborate effectively in team-based environments** |
| **10.6.3 Career Planning** | **• Create resumes aligned to IT career pathways**<br>**• Develop postsecondary and workforce plans**<br>**• Reflect on skills and career readiness** |

**Key Vocabulary:**

- **Certification**
- **Service Level Agreement (SLA)**

- **Professionalism**
- **Resume**
- **Career Pathway**

**Alignment (as applicable):**

- **CompTIA *(per* grade mapping): **A+ Core **1 (220-1101) certification window late Semester 1 and **A+ Core **2 (220-1102) certification window mid to late Semester 2.**
- **Certiport: Optional / student-choice only (use if your program expects MOS/Adobe credentials; not required for A+ readiness).**
- **Code.org / CodeHS: Career exploration, technical communication practice, and portfolio/capstone support.**

# Grade 11 Information Technology Course Map (Two-Semester Model)

**Course Length:** Full Year
**Structure:** 2 Semesters (18–20 weeks each)
**Approach:** Progressive development of programming, systems, networking, data, cybersecurity, and AI foundations in preparation for Grade 12 advanced study

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**Semester 1 – Programming, Data, Systems & Support Foundations**

*Focus: Core technical skills, structured problem solving, data literacy, and professional IT practices*

| Unit | Grade 11 Goals | Focus Areas | Estimated Duration |
|---|---|---|---|
| **Unit 1: IT Shop Safety & Professional Practices** | 11.1 | OSHA safety, PPE/ESD, ergonomics, hazard awareness, emergency procedures | 2 weeks |
| **Unit 2: Intermediate Programming & Computational Thinking** | 11.2 | Functions, loops, conditionals, arrays, debugging, algorithm design, AI logic simulation | 4 weeks |
| **Unit 3: Game Development & Interactive Systems (Unity)** | 11.3 | Unity scenes, C# scripting, physics, user input, basic AI behaviors | 4 weeks |
| **Unit 4: Data Analysis & Dashboards** | 11.4 | Data organization, analysis, visualization, dashboards, AI-ready datasets | 3 weeks |
| **Unit 5: IT Support, Help Desk & Chromebook Repair** | 11.5 | Ticketing systems, troubleshooting workflows, device repair, professional communication | 3 weeks |

| | | | |
|---|---|---|---|
| **Semester 1 Culminating Experience** | Integrated | Multi-skill performance task (programming, data, support documentation) | 2 weeks |

**Semester 1 Outcomes**

Students will:

- Apply **safe and professional practices** in IT lab environments
- Write, test, and debug **structured programs**
- Build interactive systems using **game engines and scripting**
- Analyze and communicate insights using **data and dashboards**
- Demonstrate **help desk and technical support competencies**

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**Semester 2 – Networks, Cloud, Automation, Security & AI Systems**

*Focus: Infrastructure, cybersecurity, automation, ethical innovation, and AI/ML foundations*

| Unit | Grade 11 Goals | Focus Areas | Estimated Duration |
|---|---|---|---|
| **Unit 6: Emerging Technologies & Ethical Innovation** | 11.6 | AI, IoT, automation, ethics, societal impact, career pathways | 2–3 weeks |
| **Unit 7: Networking & Systems Administration** | 11.7 | Network hardware, IP addressing, diagnostics, DNS/DHCP, packet flow | 4 weeks |
| **Unit 8: Cloud Computing & Virtualization** | 11.8 | Servers, directory services, permissions, policies, documentation | 3 weeks |
| **Unit 9: Scripting & Robotics Automation** | 11.9 | Scripting structures, logic flow, sensors, automation testing, AI-driven responses | 3 weeks |
| **Unit 10: Cybersecurity & Penetration Testing** | 11.10 | Threat analysis, ethical testing, vulnerability reporting, AI-assisted detection | 3 weeks |

| | | | |
|---|---|---|---|
| **Unit 11: Artificial Intelligence & Machine Learning Systems** | 11.11 | Data preparation, ML concepts, model training, evaluation, ethical AI | 3–4 weeks |
| **Semester 2 Culminating Experience** | Integrated | Systems + security + AI performance task | 2 weeks |

**Semester 2 Outcomes**

Students will:

- Configure and troubleshoot **networks and systems**
- Manage **cloud and directory-based environments**
- Automate tasks using **scripting and logic**
- Analyze and report **cybersecurity risks ethically**
- Build and evaluate **introductory AI and machine learning systems**

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**Year-at-a-Glance Summary**

| Semester | Primary Emphasis |
|---|---|
| **Semester 1** | Programming, game development, data analysis, IT support |
| **Semester 2** | Networking, cloud systems, automation, cybersecurity, AI/ML |

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**Assessment & Evidence (Across Both Semesters)**

- Coding projects and debug logs
- Unity game builds or simulations
- Data dashboards and visualizations
- Help desk tickets and repair documentation
- Network diagrams and command outputs
- Security vulnerability and penetration reports
- AI/ML datasets, models, and evaluations

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**Grade 11 → Grade 12 Transition**

This course map intentionally prepares students for **Grade 12 Advanced IT**, including:

- Enterprise cybersecurity & risk management
- Advanced AI foundations and machine learning
- AI governance, security, and enterprise integration
- Professional capstone and workforce-ready documentation

# Grade 11 Information Technology Curriculum

## Goal 11.1 – IT Shop Safety

**Big Ideas**

1. OSHA-aligned safety practices protect people, equipment, and learning environments.
2. Safe work habits reduce risk during repair, troubleshooting, and lab operations.
3. Safety leadership builds accountability and professionalism in technical settings.

**Essential Questions**

- What are the essential safety procedures for working in an IT shop?
- How does OSHA support workplace health and safety?
- How can students model safety leadership in a shop setting?

| Students will know… | Students will be able to do… |
|---|---|
| **11.1.1 OSHA regulations and compliance** | **• Explain OSHA safety rules in written and verbal formats**<br>**• Identify OSHA violations in shop scenarios**<br>**• Apply OSHA standards during lab activities** |
| **11.1.2 PPE and ESD protection** | **• Select appropriate PPE for specific tasks**<br>**• Demonstrate correct PPE and ESD procedures**<br>**• Explain the risks of improper PPE use** |
| **11.1.3 Ergonomic standards** | **• Adjust workstations to meet ergonomic guidelines**<br>**• Evaluate workstation setups using a checklist**<br>**• Recommend improvements to reduce strain** |

| | |
|---|---|
| **11.1.4 Hazard identification** | **• Identify physical and electrical hazards**<br>**• Document hazards using safety forms**<br>**• Propose corrective actions** |
| **11.1.5 Emergency procedures** | **• Follow emergency response protocols**<br>**• Demonstrate correct actions during simulations**<br>**• Explain consequences of improper response** |

**Technical Vocabulary**

OSHA, PPE, Ergonomics, MSDS/SDS, Lockout/Tagout, Hazard, Compliance, Fire Safety, ESD, Risk Assessment

**Credential / Platform Alignment**

- **Credential:** OSHA 10
- **CompTIA:** Professional safety expectations
- **Certiport:** Not applicable
- **CodeHS / Code.org:** Not applicable

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## Goal 11.2 – Intermediate Programming

**Big Ideas**

1. Programming is a structured process for solving real-world problems.
2. Well-designed code emphasizes readability, reuse, and efficiency.
3. Debugging and testing are essential for reliable software development.

**Essential Questions**

- How do functions, loops, and conditionals work together?
- What makes code efficient and reusable?

How do programmers test and debug software?

**Learning Outcomes**

| Students will know... | Students will be able to do... |
|---|---|
| 11.2.1 Functions and parameters | • Write reusable functions with parameters<br>• Document function purpose and outputs<br>• Call functions appropriately within programs |
| 11.2.2 Loops and conditionals | • Build programs using loops and branching logic<br>• Trace program flow through conditional paths<br>• Modify logic to change program behavior |
| 11.2.3 Arrays and data structures | • Store and retrieve data from arrays<br>• Iterate through lists to process data<br>• Explain when arrays are more efficient than single variables |
| 11.2.4 Debugging techniques | • Identify syntax and logic errors<br>• Use IDE debugging tools<br>• Correct errors and verify program output |
| 11.2.5 Algorithm design | • Break problems into logical steps<br>• Design algorithms using pseudocode<br>• Implement algorithms in code |
| **11.2.6 Artificial Intelligence** | **• Use conditionals/functions to simulate decision logic used in ML pipelines**<br><br>**•Embed AI Behaviors into coding** |

**Technical Vocabulary**

Function, Loop, Array, Object, Method, Class, Condition, Debug, Algorithm, Parameter, IDE

**Credential / Platform Alignment**

- **CompTIA:** Tech+ (coding foundations)

- **Certiport:** ITS – JavaScript
- **CodeHS:** Programming Pathway + platform certifications
- **Code.org:** CS Principles Units 4–5

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## Goal 11.3 – Game Development with Unity

**Big Ideas**

1. Game engines combine programming and visual design.
2. Scripts, physics, and input systems control interactivity.
3. Playtesting and publishing transform prototypes into finished products.

**Essential Questions**

- What components make up a Unity game scene?
- How do scripts control gameplay behavior?
- What makes a game publishable and user-friendly?

**Learning Outcomes**

| Students will know… | Students will be able to do… |
|---|---|
| **11.3.1 Unity scene structure** | • **Build a functional scene**<br>• **Organize scene objects logically**<br>• **Explain scene hierarchy** |
| **11.3.2 Asset and prefab management** | • **Import and organize assets**<br>• **Create and reuse prefabs**<br>• **Modify prefab instances** |
| **11.3.3 C# scripting** | • **Write scripts to control objects**<br>• **Attach scripts to game objects**<br>• **Debug script behavior** |
| **11.3.4 Collision and input logic** | • **Implement player movement**<br>• **Configure colliders and triggers**<br>• **Test interaction responses** |

| | |
|---|---|
| **11.3.5 Publishing workflow** | **• Configure build settings**<br>**• Export a playable build**<br>**• Test builds for usability** |
| **11.3.6 Artificial Intelligence** | **• Implement basic AI behaviors (state machines, rule-based agents, pathfinding logic)** |

**Technical Vocabulary**

Scene, Asset, Prefab, Rigidbody, Script, Collider, Input, UI, Build, Export, Transform

**Credential / Platform Alignment**

- **CompTIA:** Not applicable
- **Certiport:** Not applicable
- **CodeHS:** Unity modules
- **Code.org:** Not applicable

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## Goal 11.4 – Data Analysis & Dashboards

**Big Ideas**

1. Organized data enables accurate analysis and insights.
2. Visualizations communicate patterns and trends clearly.
3. Dashboards support technical and business decision-making.

**Essential Questions**

- How is data collected and organized?
- What insights can be found in datasets?
- How do dashboards support decisions?

**Learning Outcomes**

| Students will know... | Students will be able to do... |
|---|---|
| **11.4.1 Dataset organization** | • **Collect and structure datasets**<br>• **Clean data for accuracy**<br>• **Label data clearly** |
| **11.4.2 Analysis techniques** | • **Apply filters and formulas**<br>• **Identify trends and outliers**<br>• **Compare data sets** |
| **11.4.3 Visualization methods** | • **Select appropriate chart types**<br>• **Create readable visualizations**<br>• **Revise visuals for clarity** |
| **11.4.4 Dashboard components** | • **Design dashboard layouts**<br>• **Combine multiple visuals**<br>• **Update dashboards with new data** |
| **11.4.5 Data storytelling** | • **Interpret data findings**<br>• **Present insights verbally**<br>• **Support claims with evidence** |
| **11.4.6 Artificial Intelligence** | • **Prepare datasets, identify bias, analyze trends feeding ML models** |

**Technical Vocabulary**

Dataset, Filter, Chart, Graph, Pivot Table, Dashboard, Visualization, Correlation, Trend, Spreadsheet

**Credential / Platform Alignment**

- **CompTIA:** Tech+ (data concepts)
- **Certiport / CodeHS / Code.org:** Not specified

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## Goal 11.5 – IT Support / Help Desk & Chromebook Support

**Big Ideas**

1. Structured troubleshooting improves technical support outcomes.
2. Professional communication builds trust with users.
3. Documentation ensures consistency and accountability.

**Essential Questions**

- How do help desk systems operate?
- What makes a support technician effective?
- How are Chromebooks maintained and repaired?

**Learning Outcomes**

| Students will know… | Students will be able to do… |
|---|---|
| **11.5.1 Ticketing workflows** | • **Log tickets accurately**<br>• **Update and close tickets**<br>• **Follow escalation procedures** |
| **11.5.2 Troubleshooting steps** | • **Diagnose common hardware issues**<br>• **Resolve software and login problems**<br>• **Apply structured troubleshooting flowcharts** |
| **11.5.3 Chromebook components** | • **Identify internal hardware parts**<br>• **Perform safe disassembly and repair**<br>• **Reassemble and test devices** |
| **11.5.4 Professional communication** | • **Communicate clearly with users**<br>• **Use appropriate technical language**<br>• **Demonstrate customer service skills** |
| **11.5.5 Documentation standards** | • **Write troubleshooting reports**<br>• **Record repair actions**<br>• **Maintain service logs** |

**Technical Vocabulary**

Ticket, Workflow, Troubleshoot, Warranty, Diagnostic, Powerwash, Asset Tag, SLA, Reimage

**Credential / Platform Alignment**

- **CompTIA:** A+ Core 1 & Core 2
- **Certiport / CodeHS / Code.org:** Not specified

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## Goal 11.6 – Emerging Technologies

**Big Ideas**

1. Emerging technologies drive innovation and new careers.
2. New technologies introduce ethical and societal challenges.
3. Responsible innovation requires evaluation of risks and benefits.

**Essential Questions**

- What technologies are emerging today?
- How do new technologies impact society?
- What responsibilities come with innovation?

**Learning Outcomes**

| Students will know… | Students will be able to do… |
|---|---|
| **11.6.1 Emerging technology fields** | • **Research emerging technologies**<br>• **Summarize real-world applications**<br>• **Classify technologies by category** |
| **11.6.2 Benefits and risks** | • **Compare advantages and drawbacks**<br>• **Analyze societal impacts**<br>• **Defend positions with evidence** |
| **11.6.3 Ethical considerations** | • **Identify ethical concerns**<br>• **Evaluate responsible use cases**<br>• **Propose ethical guidelines** |

| | |
|---|---|
| **11.6.4 Innovation processes** | **• Design conceptual products**<br>**• Create mock prototypes**<br>**• Explain innovation steps** |
| **11.6.5 Career pathways** | **• Research technology careers**<br>**• Match skills to careers**<br>**• Present career findings** |
| **11.6.6 Artificial Intelligence** | **Ethics, Careers, Social Impact** |

**Technical Vocabulary**

AI, IoT, Blockchain, Quantum Computing, Biotechnology, Automation, Ethics, Disruption, Prototype

**Credential / Platform Alignment**

- **CompTIA:** Tech+ (future technology concepts)
- **CodeHS:** Emerging Technologies course

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## Goal 11.7 – Networking & Systems Administration

**Big Ideas**

1. Networks enable communication between devices and systems.
2. Network design impacts performance and security.
3. Diagnostic tools provide evidence for troubleshooting.

**Essential Questions**

- How do networks function?
- How does data travel across networks?
- How are networks maintained and secured?

**Learning Outcomes**

| Students will know… | Students will be able to do… |
|---|---|
| **11.7.1 Network hardware** | • **Identify network devices**<br>• **Create labeled network diagrams**<br>• **Explain device roles** |
| **11.7.2 Addressing concepts** | • **Configure IP settings**<br>• **Validate addresses with commands**<br>• **Troubleshoot addressing issues** |
| **11.7.3 Diagnostic tools** | • **Use ping and tracert**<br>• **Interpret command results**<br>• **Identify connectivity problems** |
| **11.7.4 Network services** | • **Explain DHCP and DNS functions**<br>• **Troubleshoot name resolution**<br>• **Analyze service failures** |
| **11.7.5 Packet flow** | • **Capture network traffic**<br>• **Identify packet types**<br>• **Explain data transmission paths** |

**Technical Vocabulary**

LAN, WAN, IP Address, MAC Address, Router, Switch, Packet, Protocol, DHCP, DNS, Ethernet, Firewall

**Credential / Platform Alignment**

- **CompTIA:** Network+
- **CodeHS:** Networking modules

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## Goal 11.8 – Cloud & Virtualization

**Big Ideas**

1. Server-based systems centralize control and access.

2. Permissions and policies protect systems and data.
3. Virtualization supports scalability and efficiency.

**Essential Questions**

- How do directory services manage access?
- How are permissions applied?
- What are differences between client and server OS?

**Learning Outcomes**

| Students will know... | Students will be able to do... |
|---|---|
| **11.8.1 Server roles** | **• Identify common server functions**<br>**• Configure basic services**<br>**• Explain server responsibilities** |
| **11.8.2 Directory services** | **• Create user and group accounts**<br>**• Manage authentication**<br>**• Organize directory structures** |
| **11.8.3 Permission models** | **• Assign file and folder permissions**<br>**• Test access levels**<br>**• Explain least privilege** |
| **11.8.4 Group policies** | **• Apply sample policies**<br>**• Test policy effects**<br>**• Document policy settings** |
| **11.8.5 Documentation** | **• Capture configuration evidence**<br>**• Write setup summaries**<br>**• Maintain system records** |

**Technical Vocabulary**

Server, Domain, Client, Active Directory, Group Policy, Permissions, Authentication, File Sharing, OU, DNS

**Credential / Platform Alignment**

- **CompTIA:** A+ (Core 2), Tech+, pathway to Server+/Cloud+

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## Goal 11.9 – Scripting & Robotics Automation

**Big Ideas**

1. Scripting automates repetitive tasks.
2. Sensors and logic enable intelligent systems.
3. Testing improves automation reliability.

**Essential Questions**

- How does scripting support automation?
- How do sensors influence decisions?
- How is automation tested and refined?

**Learning Outcomes**

| Students will know… | Students will be able to do… |
|---|---|
| **11.9.1 Scripting structures** | • **Write scripts using variables and loops**<br>• **Modify scripts to change behavior**<br>• **Debug syntax errors** |
| **11.9.2 Sensors and actuators** | • **Connect sensors and outputs**<br>• **Test sensor responses**<br>• **Adjust thresholds** |
| **11.9.3 Logic flow** | • **Create flowcharts**<br>• **Translate flowcharts into code**<br>• **Explain decision paths** |
| **11.9.4 Debugging methods** | • **Test automation cycles**<br>• **Identify logic faults**<br>• **Document corrections** |

| | |
|---|---|
| **11.9.5 Automation use cases** | **• Explain real-world applications**<br>**• Evaluate efficiency gains**<br>**• Reflect on impact** |
| **11.9.6 Artificial Intelligence** | **• Automate Data processing, simulate intelligent responses** |

**Technical Vocabulary**

Script, Loop, Condition, Variable, Sensor, Actuator, Automation, Logic, Flowchart, Debug

**Credential / Platform Alignment**

- **CompTIA:** Linux+ (automation exposure)
- **CodeHS:** Robotics & Automation modules

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## Goal 11.10 – Cybersecurity & Pen Testing

**Big Ideas**

1. Identifying vulnerabilities strengthens system security.
2. Ethical guidelines define responsible cybersecurity work.
3. Reporting and mitigation reduce future risk.

**Essential Questions**

- What cybersecurity threats exist?
- How is penetration testing conducted ethically?
- How are vulnerabilities reported and mitigated?

**Learning Outcomes**

| Students will know… | Students will be able to do… |
|---|---|

| | |
|---|---|
| **11.10.1 Threat types** | **• Identify cyber threats**<br>**• Classify attack methods**<br>**• Analyze threat scenarios** |
| **11.10.2 Testing tools** | **• Perform safe vulnerability scans**<br>**• Interpret scan results**<br>**• Identify system weaknesses** |
| **11.10.3 Ethical standards** | **• Explain legal boundaries**<br>**• Evaluate ethical dilemmas**<br>**• Follow responsible testing rules** |
| **11.10.4 Password security** | **• Conduct safe password audits**<br>**• Evaluate password strength**<br>**• Recommend improvements** |
| **11.10.5 Reporting methods** | **• Write vulnerability reports**<br>**• Propose mitigation strategies**<br>**• Present findings** |
| **11.10.6 Artificial Intelligence** | **•Discuss AI Threats detection and anomaly analysis**<br>**•Analise Cyber defenses and detect intrusion points**<br>**•Conduct Network assessment for vulnerabilities and propose solutions for defenses** |

**Technical Vocabulary**

Threat, Vulnerability, Exploit, Firewall, Penetration Testing, Ethical Hacking, Social Engineering, Port Scan, Encryption

**Credential / Platform Alignment**

- **CompTIA:** Security+
- **CodeHS:** Cybersecurity modules

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## Goal 11.11 – Artificial Intelligence & Machine Learning Systems

**Big Ideas**

- AI systems rely on data, models, and algorithms to make decisions.
- Machine learning models are built, trained, tested, and refined.
- Responsible AI development requires technical accuracy and ethical judgment.

**Essential Questions**

- How do machine learning models learn from data?
- How does data quality affect model performance?
- How can AI systems be tested, evaluated, and improved?

**Learning Outcomes**

| Students will know… | Students will be able to do… |
|---|---|
| **11.11.1 Machine learning concepts** | • Explain supervised vs. unsupervised learning • Identify model inputs and outputs • Describe training vs. inference |
| **11.11.2 Data preparation** | • Collect and clean datasets • Label or categorize data • Explain how bias impacts results |
| **11.11.3 Model training** | • Build or configure a simple ML model • Train a model using sample data • Adjust parameters to improve accuracy |
| **11.11.4 Model evaluation** | • Test model performance • Interpret accuracy or confidence results • Identify limitations or errors |
| **11.11.5 Ethical AI practices** | • Identify bias and misuse risks • Propose mitigation strategies • Apply responsible-use guidelines |

**Credential / Platform Alignment**

- CompTIA Tech+ (AI concepts)
- CodeHS AI / ML modules
- Prepares for Grade 12 advanced AI, data science, or cybersecurity analysis

# Grade 12 Information Technology Curriculum

## Grade 12 Information Technology Course Map (Two-Semester Model)

**Course Length:** Full Year
**Structure:** 2 Semesters (18–20 weeks each)
**Approach:** Evenly paced, scaffolded from professional practice and enterprise IT → advanced AI, security, integration, and capstone

**Semester 1 – Professional Practice, Cybersecurity & Enterprise Foundations**

*Focus: Workforce readiness, leadership, cybersecurity, enterprise systems, and responsible AI awareness*

| Unit | Priority Standards | Focus Areas | Estimated Duration |
|---|---|---|---|
| **Unit 1: Professional Practice & Career Readiness** | 12.1 | Professional communication, leadership, ethics, career pathways, capstone planning | 3–4 weeks |
| **Unit 2: Advanced Cybersecurity & Risk Management** | 12.2 | Threat analysis, risk assessment, compliance, AI-supported security analytics | 4 weeks |

| | | | |
|---|---|---|---|
| **Unit 3: Artificial Intelligence & Emerging Technologies** | 12.3 | AI system behavior, bias, ethical use, emerging tech impact | 3 weeks |
| **Unit 4: Advanced Systems, Automation & Enterprise Technologies** | 12.4 | Enterprise architecture, automation, monitoring, documentation, AI-assisted optimization | 4 weeks |
| **Semester 1 Culminating Experience** | Integrated | Professional artifacts, security case study, system documentation, career portfolio check | 1–2 weeks |

**Semester 1 Outcomes**

Students will:

- Demonstrate **professional readiness** through communication, leadership, and ethical decision-making
- Analyze and manage **cybersecurity risks** using real-world frameworks
- Understand **enterprise-scale IT systems and automation**
- Apply AI **responsibly** as a professional support tool

**Semester 2 – Artificial Intelligence, Machine Learning & Capstone Integration**

*Focus: AI foundations, machine learning, governance, security, system integration, and professional capstone execution*

| Unit | Priority Standards | Focus Areas | Estimated Duration |
|---|---|---|---|
| **Unit 5: AI Foundations** | 12.5 | Data quality, algorithms, feature engineering, AI pipelines | 3–4 weeks |
| **Unit 6: Machine Learning** | 12.6 | Training, evaluation metrics, deployment, optimization, drift monitoring | 4 weeks |

| | | | |
|---|---|---|---|
| **Unit 7: AI Ethics & Governance** | 12.7 | Accountability, transparency, fairness, regulatory frameworks | 2–3 weeks |
| **Unit 8: AI Security** | 12.8 | AI-specific vulnerabilities, adversarial threats, resilience, monitoring | 3 weeks |
| **Unit 9: AI Integration & Enterprise Automation** | 12.9 | AI integration, validation, automation workflows, system maintenance | 3 weeks |
| **Unit 10: AI Project & Culmination** | 12.10 | End-to-end AI solution, documentation, professional defense, portfolio artifacts | 4 weeks |

**Semester 2 Outcomes**

Students will:

- Build and evaluate **AI and machine learning solutions**
- Apply **ethical, secure, and governed AI practices**
- Integrate AI into **enterprise IT environments**
- Demonstrate **career and postsecondary readiness** through a professional capstone project

**Year-at-a-Glance Summary**

| Semester | Primary Emphasis |
|---|---|
| **Semester 1** | Professional practice, cybersecurity, enterprise systems, AI awareness |
| **Semester 2** | AI foundations, machine learning, governance, AI security, capstone |

**Assessment & Evidence (Across Both Semesters)**

- Professional communication artifacts (resume, interview, documentation)
- Cybersecurity & AI ethics case studies

- Enterprise system documentation and automation workflows
- AI datasets, models, and evaluations
- **Culminating AI Project** (portfolio-quality)

## Priority Standard 12.1 – Professional Practice, Leadership, Career Readiness, and Capstone

**Big Ideas**

- Professional success requires technical skill, leadership, and communication.
- Capstone experiences demonstrate real-world problem solving and accountability.
- Industry credentials validate readiness for employment and postsecondary pathways.
- AI can support professional growth, reflection, and preparation when used ethically.

**Essential Questions**

- How do professionals communicate technical knowledge effectively?
- What responsibilities do mentors and leaders have in technical environments?
- How does a capstone project demonstrate career readiness?
- How can AI support career planning and certification preparation responsibly?

| **Learning Outcomes** | |
|---|---|
| 12.1.1 Communication | • Conduct professional interviews using appropriate technical and workplace language<br>• Communicate technical information clearly to diverse audiences<br>• Apply workplace communication norms in written, verbal, and digital formats |
| **12.1.2 Leadership** | • **Demonstrate leadership behaviors within technical teams**<br>• **Support peers through mentorship and collaborative problem solving**<br>• **Model professional responsibility and accountability in project work** |

| | |
|---|---|
| 12.1.3 Pathways | • Analyze career pathways within information technology fields<br>• Identify relevant industry certifications and postsecondary options<br>• Align personal career goals with required skills and credentials |
| 12.1.4 Capstone | • Plan a capstone project that addresses a real-world problem<br>• Execute a capstone project using industry aligned practices<br>• Present and defend capstone outcomes through professional artifacts |
| 12.1.5 Ethics | • Apply ethical guidelines to professional and workplace scenarios<br>• Evaluate appropriate and inappropriate uses of AI in professional contexts<br>• Demonstrate responsible decision making when using emerging technologies |

**Technical Vocabulary**

Capstone, Portfolio, Certification, Mentorship, Leadership, Interview, Resume, Artifact, Professional Practice, Reflection

**Vision of the Graduate**

**Work Ready – Effective Communicator – Ethical Leader – Lifelong Learner**

**Credential & Framework Alignment**

- **CompTIA:** Network+, Security+ (exam preparation)
- **Cisco:** CCNA (optional pathway)
- **Certiport:** MOS (professional documentation and productivity)

- **AI Integration:** AI supported career planning, interview prep, and capstone reflection

## Priority Standard 12.2 – Advanced Cybersecurity & Risk Management

**Big Ideas**

- Cybersecurity protects systems, data, and people at scale.
- Risk management balances security, usability, and organizational needs.
- Ethical decision making is critical in cybersecurity practice.
- AI plays a growing role in threat detection and analysis.

**Essential Questions**

- How do organizations identify and manage cybersecurity risk?
- What ethical responsibilities do cybersecurity professionals hold?
- How can AI support cybersecurity without increasing risk or bias?
-

| **Learning Outcomes** | |
|---|---|
| 12.2.1 Threats | • Identify advanced cybersecurity threats and attack vectors<br>• Analyze how threat actors exploit system vulnerabilities<br>• Explain the organizational impact of cybersecurity incidents |
| 12.2.2 Risks | • Conduct a cybersecurity risk assessment<br>• Prioritize risks based on likelihood and impact<br>• Recommend mitigation strategies aligned to organizational needs |
| 12.2.3 Compliance | • Explain legal and regulatory cybersecurity requirements<br>• Analyze ethical implications of cybersecurity decisions |

| | |
|---|---|
| | • Apply compliance considerations to security scenarios |
| 12.2.4 Analytics | • Use AI supported tools to analyze security and threat data<br>• Interpret monitoring outputs to identify anomalies<br>• Evaluate the effectiveness of security controls using data |

**Technical Vocabulary**

Risk Assessment, Threat Actor, Vulnerability, Incident Response, Encryption, Zero Trust, SIEM, AI Security

**Vision of the Graduate**

**Critical Thinker – Ethical Citizen – Problem Solver**

**Credential & Framework Alignment**

- **CompTIA:** Security+
- **CodeHS:** Cybersecurity pathway
- **Cisco / TestOut:** Network Security modules
- **AI Integration:** AI assisted threat modeling and incident analysis

## Priority Standard 12.3 – Artificial Intelligence & Emerging Technologies

**Big Ideas**

- AI is a powerful tool that augments, not replaces, human decision making.
- Responsible AI use requires understanding limitations, bias, and ethics.
- Emerging technologies shape future careers and industries.

**Essential Questions**

- How do AI systems generate outputs and where do they fail?
- What ethical considerations guide AI use in education and industry?

- How do emerging technologies impact careers and society?

| **Learning Outcomes** | |
|---|---|
| 12.3.1 Models | • Explain how AI models generate outputs<br>• Compare strengths and limitations of different AI systems<br>• Identify scenarios where AI systems may fail or underperform |
| 12.3.2 Bias | • Detect bias and hallucinations in AI generated content<br>• Evaluate the reliability and accuracy of AI outputs<br>• Propose strategies to reduce bias and misuse of AI tools |
| 12.3.3 Ethics | • Apply ethical frameworks to AI use cases<br>• Defend ethical positions related to AI in education and industry<br>• Assess societal impacts of AI technologies |

**Technical Vocabulary**

Artificial Intelligence, Model, Bias, Hallucination, Prompt, Automation, Ethics, Emerging Technology

**Vision of the Graduate**

**Critical Thinker – Responsible Innovator – Lifelong Learner**

**Credential & Framework Alignment**

- **CompTIA:** AI concepts embedded in A+, Security+
- **CodeHS / Code.org:** AI and data concepts
- **AI Integration:** AI Prompting Essentials; AI Help Desk workflows

## Priority Standard 12.4 – Advanced Systems, Automation, and Enterprise Technologies

**Big Ideas**

- Enterprise systems require automation, monitoring, and documentation.
- Advanced infrastructure supports scalability and resilience.
- AI can enhance system administration and operational efficiency.

**Essential Questions**

- How do organizations manage complex IT systems?
- Why is automation essential at enterprise scale?
- How can AI assist system administration responsibly?

| **Learning Outcomes** | |
|---|---|
| 12.4.1 Architecture | • Describe enterprise system architecture components<br>• Analyze how infrastructure supports scalability and resilience<br>• Evaluate design choices in enterprise environments |
| 12.4.2 Automation | • Apply scripting or automation tools to solve technical problems<br>• Automate routine administrative or system management tasks<br>• Assess benefits and risks of automation at scale |
| 12.4.3 Monitoring | • Interpret system monitoring data to identify issues<br>• Implement monitoring strategies in simulated environments<br>• Evaluate system performance using monitoring outputs |
| 12.4.4 Documentation | • Produce professional documentation for enterprise systems |

| | |
|---|---|
| | • Maintain accurate configuration and change records<br>• Validate documentation for clarity, accuracy, and completeness<br>• **Optimization**<br>• Use AI tools to support troubleshooting and validation<br>• Analyze system performance to recommend improvements<br>• Apply AI assisted insights to enhance operational efficiency |

**Technical Vocabulary**

Enterprise Systems, Automation, Scripting, Monitoring, Virtualization, Infrastructure, Documentation

**Vision of the Graduate**

**Problem Solver – Work Ready – Technically Proficient**

**Credential & Framework Alignment**

- **CompTIA:** Network+, Server+, Security+
- **TestOut:** Hybrid Server Pro
- **AI Integration:** AI assisted scripting and system analysis

## Priority Standard 12.5 – AI Foundations

**Big Ideas**

- AI systems rely on high quality data, algorithms, and engineered features.
- Data preparation and pipeline design directly affect model performance and reliability.
- Foundational AI concepts support advanced machine learning and enterprise integration.
- Responsible AI development begins with data integrity and transparency.

**Essential Questions**

- How does data quality influence AI system outcomes?
- What roles do algorithms and features play in model behavior?
- Why are pipelines critical for scalable and repeatable AI workflows?
- How can foundational AI decisions introduce or reduce bias?

| **Learning Outcomes** | |
|---|---|
| 12.5.1 Data | • Classify structured, unstructured, and semi structured data used in AI systems<br>• Prepare, clean, and normalize datasets for AI workflows<br>• Validate data quality, bias, and suitability for model training |
| 12.5.2 Algorithms | • Explain how search, classification, and optimization algorithms function<br>• Compare rule-based systems with learning based algorithms<br>• Analyze algorithmic efficiency and limitations |
| 12.5.3 Features | • Identify relevant features for machine learning tasks<br>• Engineer and transform features to improve model performance<br>• Evaluate feature impact on predictions |
| 12.5.4 Pipelines | • Describe end to end AI data pipelines<br>• Implement basic preprocessing and training pipelines<br>• Document pipeline design decisions |

**Technical Vocabulary**

Data, Dataset, Structured Data, Unstructured Data, Algorithm, Feature Engineering, Pipeline, Normalization, Bias, Training Data

**Vision of the Graduate**

**Critical Thinker – Responsible Innovator – Technically Proficient**

**Credential & Framework Alignment**

- **CompTIA:** AI concepts embedded in A+, Data+, Security+
- **CodeHS / Code.org:** AI Foundations and Data Concepts
- **AI Integration:** Dataset preparation, feature engineering, pipeline documentation

## Priority Standard 12.6 – Machine Learning

**Big Ideas**

- Machine learning models learn patterns from data through training and evaluation.
- Model performance must be measured, validated, and optimized.
- Deployment introduces real-world constraints and risks.
- Continuous monitoring is required to maintain reliability over time.

**Essential Questions**

- How do different machine learning approaches affect outcomes?
- What metrics best evaluate model effectiveness?
- What risks emerge when models are deployed?
- How do professionals balance performance, efficiency, and resources?

| **Learning Outcomes** |
|---|

| | |
|---|---|
| 12.6.1 Training | • Configure training datasets using appropriate features and labels<br>• Train machine learning models using supervised and unsupervised methods<br>• Adjust hyperparameters to improve model performance |
| 12.6.2 Evaluation | • Calculate accuracy, precision, recall, and error rates<br>• Interpret confusion matrices and validation results<br>• Compare model performance across datasets and scenarios |
| 12.6.3 Deployment | • Deploy trained models in controlled or simulated environments<br>• Test model behavior under real-world constraints<br>• Monitor model outputs for reliability and drift |
| 12.6.4 Optimization | • Refine models based on evaluation feedback<br>• Balance performance, efficiency, and resource constraints<br>• Document optimization decisions and outcomes |

**Technical Vocabulary**

Machine Learning, Supervised Learning, Unsupervised Learning, Model, Training, Validation, Accuracy, Precision, Recall, Drift

**Vision of the Graduate**

**Problem Solver – Critical Thinker – Lifelong Learner**

**Credential & Framework Alignment**

- **CompTIA:** Data+, AI concepts embedded in Security+
- **CodeHS:** Machine Learning Pathways

- **AI Integration:** Model training, evaluation metrics, drift monitoring

## Priority Standard 12.7 – AI Ethics and Governance

**Big Ideas**

- Ethical AI requires governance, accountability, and transparency.
- AI systems can reinforce inequities without intentional safeguards.
- Regulatory and organizational policies guide responsible AI use.
- Documentation and explainability support trust and compliance.

**Essential Questions**

- Who is responsible for AI system outcomes?
- How can transparency reduce risk and misuse?
- What governance structures guide ethical AI deployment?
- How do professionals promote fairness in AI systems?

| **Learning Outcomes** | |
|---|---|
| 12.7.1 Governance | • Explain organizational and regulatory frameworks governing AI<br>• Apply ethical standards to AI system design and use<br>• Assess compliance risks related to AI deployment |
| 12.7.2 Accountability | • Document AI decision logic and data sources<br>• Identify responsibility for AI outcomes and failures<br>• Defend ethical choices using evidence and policy |
| 12.7.3 Transparency | • Explain model interpretability techniques |

| | |
|---|---|
| | • Communicate AI limitations to stakeholders<br>• Evaluate transparency requirements for different AI uses |
| 12.7.4 Equity | • Analyze fairness concerns in AI systems<br>• Identify disparate impact in AI outputs<br>• Recommend strategies to promote equitable AI use |

**Technical Vocabulary**

Governance, Accountability, Transparency, Interpretability, Compliance, Equity, Fairness, Explainability, Policy

**Vision of the Graduate**

**Ethical Citizen – Responsible Innovator – Effective Communicator**

**Credential & Framework Alignment**

- **CompTIA:** Security+, Ethics domains
- **ISTE:** Ethical AI Practices
- **AI Integration:** AI policy analysis, ethics case studies, governance documentation

## Priority Standard 12.8 – AI Security

**Big Ideas**

- AI systems introduce unique security vulnerabilities.
- Protecting data and models is critical to system integrity.
- Adversarial threats require specialized defenses.
- Monitoring and response sustain long-term AI resilience.

**Essential Questions**

- How are AI systems attacked and exploited?
- What controls protect AI data and models?
- How do organizations test AI system resilience?
- Why is continuous monitoring essential for AI security?

| **Learning Outcomes** | |
|---|---|
| 12.8.1 Vulnerabilities | • Identify attack vectors specific to AI systems<br>• Analyze risks such as data poisoning and model inversion<br>• Assess system exposure to adversarial threats |
| 12.8.2 Protection | • Apply security controls to AI data and models<br>• Validate integrity of datasets and model artifacts<br>• Implement access controls and monitoring |
| 12.8.3 Resilience | • Test AI systems against adversarial inputs<br>• Evaluate system robustness and failure modes<br>• Recommend resilience improvements |
| 12.8.4 Monitoring | • Monitor AI systems for misuse or drift<br>• Analyze logs and alerts related to AI behavior<br>• Respond to detected security incidents |

**Technical Vocabulary**

Adversarial Attack, Data Poisoning, Model Inversion, Integrity, Access Control, Resilience, Monitoring, Incident Response

**Vision of the Graduate**

**Problem Solver – Ethical Citizen – Technically Proficient**

**Credential & Framework Alignment**

- **CompTIA:** Security+
- **Cisco / TestOut:** Network and Security Concepts
- **AI Integration:** AI threat modeling, adversarial testing, security monitoring

## Priority Standard 12.9 – AI Integration

**Big Ideas**

- AI systems must integrate seamlessly with enterprise environments.
- Automation reshapes workflows and professional roles.
- Validation ensures reliability and trust.
- Long-term maintenance sustains system value.

**Essential Questions**

- How do AI systems integrate with existing infrastructure?
- What operational changes result from AI automation?
- How are integrated systems validated and maintained?
- How do professionals manage AI systems over time?

| **Learning Outcomes** | |
|---|---|
| 12.9.1 Integration | • Integrate AI components into existing IT systems<br>• Align AI solutions with organizational requirements<br>• Evaluate interoperability and scalability |

| | |
|---|---|
| 12.9.2 Automation | • Design AI driven automation workflows<br>• Implement decision support or process automation solutions<br>• Assess automation impact on operations and roles |
| 12.9.3 Validation | • Test integrated AI systems for reliability<br>• Validate outputs against expected outcomes<br>• Document integration results |
| 12.9.4 Maintenance | • Update models and data pipelines over time<br>• Manage version control for AI assets<br>• Monitor long-term system performance |

**Technical Vocabulary**

Integration, Interoperability, Automation, Validation, Scalability, Version Control, Maintenance, Performance Monitoring

**Vision of the Graduate**

**Work Ready – Problem Solver – Technically Proficient**

**Credential & Framework Alignment**

- **CompTIA:** Network+, Server+, Security+
- **TestOut:** Enterprise and Automation Modules
- **AI Integration:** AI driven workflows, enterprise system validation

## Priority Standard 12.10 – AI Application and Integrations Culmination

**Big Ideas**

- Culminating Content Topic project demonstrate full AI workflows and professionalism.
- Real-world problems require ethical, secure, and effective AI solutions.
- Evaluation and iteration strengthen technical outcomes.
- Culminating Content Topic project validate workforce and postsecondary readiness.

**Essential Questions**

- How can AI solve authentic problems responsibly?
- How do professionals justify technical design decisions?
- What metrics demonstrate solution effectiveness?
- How does a capstone project show career readiness?

| **Learning Outcomes** | |
|---|---|
| 12.10.1 Innovation | • Design AI supported solutions to authentic problems<br>• Develop and refine AI prototypes<br>• Present technical solutions to expert audiences |
| 12.10.2 Implementation | • Apply full AI workflows from data to deployment<br>• Integrate security, ethics, and performance considerations<br>• Test solutions under real-world constraints |
| 12.10.3 Evaluation | • Measure solution effectiveness using defined metrics<br>• Analyze strengths and limitations of capstone projects<br>• Iterate designs based on feedback |
| 12.10.4 Professionalism | • Produce technical documentation and artifacts<br>• Defend design decisions using evidence |

| | |
|---|---|
| | • Demonstrate readiness for postsecondary or workforce pathways |

**Technical Vocabulary**

Capstone, Prototype, Workflow, Deployment, Metrics, Evaluation, Documentation, Artifact, Professional Presentation

**Vision of the Graduate**

**Work Ready – Critical Thinker – Responsible Innovator – Effective Communicator**

**Credential & Framework Alignment**

- **CompTIA:** Data+, Security+ (capstone alignment)
- **Certiport:** MOS (documentation and presentation)
- **AI Integration:** End to end AI solution design, professional defense, portfolio artifacts