



Burlington County Institute of Technology

Medford Campus

Westampton Campus

Career and Technical Programs

Career Cluster: *Information Technology*

Program Name: *Computer Science*

Program Title: *Computer Science*

CIP Code: *110701*

Board Approval Date: August, 2023



Program of Study

- Grade 9
 - ◆ Introduction to Computers
 - ◆ Computer Applications
- Grade 10
 - ◆ IT Essentials A+ I
 - ◆ IT Essentials A+ II
 - ◆ Fundamentals of Web Design
- Grade 11
 - ◆ Networking Fundamentals I
 - ◆ Networking Fundamentals II
- System Administrator
 - ◆ Network & System Administrator I
 - ◆ Network & System Administrator II
 - ◆ Intro to Cisco Networking
- CyberSecurity
 - ◆ Introduction to Cybersecurity
 - ◆ Computer Forensics I
 - ◆ Computer Forensics II
- Web Development/Programming



- ◆ Computer Science I
- ◆ Computer Science II
- ◆ Fundamentals of Web Design II

→ Additional Electives:

- ◆ Introduction to Operating Systems
- ◆ Introduction to Python

→ Program Descriptor

- ◆ Computer Science involves the exploration of computer-based problem-solving. In this field, we harness the capabilities of computers to tackle various problems while also considering their limitations. Our program provides students with a diverse range of foundational and contemporary Computer Science courses. These include subjects like computer architecture, operating systems, programming languages, theory of computing, computer networking, database systems, information management, artificial intelligence, bioinformatics, and numerical analysis.

→ Program Outcomes

- ◆ An ability to apply knowledge of computing and mathematics appropriate to the discipline.
- ◆ An ability to identify, formulate, and develop solutions to computational challenges.
- ◆ An ability to design, implement, and evaluate a computational system to meet desired needs within realistic constraints.
- ◆ An ability to function effectively on teams to accomplish shared computing design, evaluation, or implementation goals.
- ◆ An understanding of professional, ethical, legal, security, and social issues and responsibilities for the computing profession.
- ◆ An ability to communicate and engage effectively with diverse stakeholders.
- ◆ An ability to analyze impacts of computing on individuals, organizations, and society.
- ◆ Recognition of the need for and ability to engage in continuing professional development.
- ◆ An ability to use appropriate techniques, skills, and tools necessary for computing practice.



- ◆ An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computational systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.
- ◆ An ability to apply design and development principles in the construction of software systems of varying complexity.

→ Work Based Learning Opportunities

- ◆ Summer Cooperative Learning: Students will provide support to IT staff in the summer through the following: Setup new computers and their peripherals, installing or upgrading operating systems or hardware, manage and maintain local users and domain users, troubleshoot common computer problems that can be resolved without replacing internal components or software upgrades, and repairing hardware and configuring software to maintain operating systems.
- ◆ School-Based Enterprise: Information Technology students will provide help desk support for various stakeholders in the district to include staff, students, and the sending districts of the school community.
- ◆ School-Based Enterprise Cybersecurity Services: Information Technology students will provide help desk support for various stakeholders in the district to include staff, students, and the sending districts of the school community.

→ Industry Valued Credentials

- ◆ CompTIA A+
- ◆ Security +
- ◆ Network +
- ◆ CySA+
- ◆ PenTest+
- ◆ CCNA
- ◆ MCSA
- ◆ PCEP
- ◆ OSHA 10

→ Post-Secondary Articulations

- ◆ Rowan College at Burlington County



- Introduction to Computers
- Computer Applications*
- IT Essentials A+*
- Fundamentals of Web Design*
- Networking Fundamentals*

Course Descriptions

1. Grade 9

- Introduction to Computers:* This course is an overview of computer hardware, software, representation and processing of data, design of algorithms, systems, and procedures; and computer languages. The course presents and applies the fundamentals of problem solving and programming in a high-level computer language.
- Computer Applications:* This course provides an overview of using Microsoft Office applications and students learn the basics of computer technology. The course helps students acquire and retain the basic skills they need to become proficient in Computer and Internet Basics, Common Office Features, Microsoft Word, Excel, and PowerPoint to go along with other productivity applications.

2. Grade 10

- IT Essentials A+ I:* This course is an in-depth understanding of essential hardware, networking, mobile devices, virtualization and cloud computing, operating systems, troubleshooting & maintenance, security, and communication & professionalism skills that are necessary to support and maintain computer systems and networks.



- b. *IT Essentials A+ II*: This course builds upon the concepts covered in IT essentials A+ I with a focus on operating system configuration & customization, software installation & management, troubleshooting software problems, networking concepts & configurations, virtualization and cloud computing, network security, mobile device troubleshooting, advanced troubleshooting, and communication & professionalism skills that provide students with necessary to excel in the IT field.
- c. *Fundamentals of Web Design*: This course focuses on the overall production processes surrounding website design with particular emphasis on design elements involving layout, navigation and interactivity. Students are introduced to various web design applications such as HTML, CSS, and JavaScript.

3. Grade 11

- a. *Networking Fundamentals I*: This course emphasizes the knowledge and application of concepts of networking, networking technology, related equipment, and terminologies. The course presents networking concepts, infrastructure and protocols such as; OSI and TCP/IP models, network topologies & technologies, ethernet & wireless standards, network devices and components, routers, switches, wireless access points, network interface cards, hubs, bridges, and repeaters.
- b. *Networking Fundamentals II*: This course builds upon the concepts covered in Networking Fundamentals I with a focus on network addressing & subnetting, IPv4 and IPv6 addressing, Subnetting, network configuration, network troubleshooting, configuring & troubleshooting network devices, implementing VLANs, network security, authentication & access control, encryption, VPNs, and firewalls these skills will provide students with the necessary skills to support IT networking infrastructures.

4. Pathway System Administrator

- a. *Network & System Administrator I*: This course provides an advanced knowledge of networking as well as related equipment and terminologies. The course will cover implementing Domain Name System (DNS), DHCP, network connectivity & and remote access solutions, advanced network infrastructures. Advanced network management and environment customization techniques will be explored, including



creating users/groups, managing file permissions, configuring server roles, using group policies to configure and secure the network, routine system maintenance and troubleshooting.

- b. *Network & System Administrator II*: This course provides an advanced knowledge of networking as well as related equipment and terminologies. The course will cover installing windows servers, implementing storage solutions, implementing hyper -v, implementing windows containers, and maintaining and monitoring various server environments.
- c. *Intro to Cisco Networking*: This course provides an advanced knowledge of networking as well as related equipment and terminologies. The course will cover network fundamentals, network access, IP connectivity & services, security fundamentals, and automation & programmability.

5. Pathway Cybersecurity

- a. *Computer Forensics I&II*: This introductory course focuses on computer forensics principles and an exposure to computer technology concepts from operating systems and file types to data transmission. Students are introduced to the foundation of electronic evidence collection and handling, role of evidence in detecting and prosecuting computer crimes; cyberterrorism; traditional and violent crimes; incident response; civil cases; fraud and information security verification.
- b. *Introduction to Cybersecurity*: This Cybersecurity course provides a comprehensive introduction to the field of cybersecurity. Students will gain a strong foundation in cybersecurity concepts, principles, and practices, enabling them to understand and address modern security challenges. The course covers various aspects of cybersecurity, from threat landscape analysis to practical security measures and best practices.

6. Pathway Web Development/Programming

- a. *Computer Science I&II*: This course introduces the fundamental concepts of programming and problem solving. It focuses on simple data types, control structures, and introduction to array and string data structures and algorithms, as well as debugging techniques and the social implications of computing.



b. *Fundamentals of Web Design II*: Students then will learn how to implement the page layout for the Web site and apply advanced CSS styling. Students will learn how to enhance a Web site by creating and processing Web forms, incorporating video and audio, programming pages with JavaScript, and integrating social media tools. Students will also learn how to optimize the website for search engines and how to adapt the website for mobile devices.

7. Electives

a. *Introduction to Operating Systems*: This course introduces students to the basics of modern operating systems. Students learn concepts and skills required to deploy, configure, secure, manage, and monitor devices and client applications in an enterprise environment. The course will present concepts such as deploying & updating operating systems, managing policies & profiles, protecting devices, managing apps & data, and operating systems and application services.

b. *Introduction to Python*: This course introduces students to python programming, students learn concepts such as fundamentals of programming, data types, I/O operation, flow control, loops, conditional statements, functions, modules, and packages.



Curriculum Maps

Course: Safety

Unit: OSHA 10

Length: 1 Week

Standards

- 9.3.12.AG-FD.1 Develop and implement procedures to ensure safety, sanitation and quality in food product and processing facilities.
- 9.3.12.AC-CST.5 Apply practices and procedures required to maintain jobsite safety.
- 9.3.12.AR.2 Analyze the importance of health, safety and environmental management systems, policies and procedures common in arts, audio/video technology and communications activities and facilities.
- 9.3.12.ED.4 Evaluate and manage risks to safety, health and the environment in education and training settings.
- 9.3.HT-RFB.2 Demonstrate safety and sanitation procedures in food and beverage service facilities.
- 9.3.HU-ED.5 Evaluate safety and sanitation procedures associated with the early childhood education environment to assure compliance and prevent potential hazards.
- 9.3.LW.4 Conduct law, public safety, corrections and security work tasks in accordance with employee and employer rights, obligations and responsibilities, including occupational safety and health requirements.
- 9.3.LW-ENF.8 Explain the appropriate techniques for managing crisis situations in order to maintain public safety.
- 9.3.MN.3 Comply with federal, state and local regulations to ensure worker safety and health and environmental work practices.
- 9.3.MN-HSE.3 Demonstrates a safety inspection process to assure a healthy and safe manufacturing environment.
- 9.3.MN-HSE.5 Evaluate continuous improvement protocols and techniques in health, safety and/or environmental practices.



- 9.3.12.TD.5 Describe transportation, distribution and logistics employee rights and responsibilities and employers' obligations concerning occupational safety and health.
- 9.3.12.TD-HSE.1 Describe the health, safety and environmental rules and regulations in transportation, distribution and logistics workplaces.
- 9.3.12.TD-OPS.3 Comply with policies, laws and regulations in order to maintain safety, security and health and mitigate the economic and environmental risk of transportation operations.

Essential Question(s)

- Why is it important to practice safety?
- What do safe practices look like in my industry?
- How can I keep myself and others safe?

Content

- Walking working surfaces
- Emergency action plans
- Fire protection
- Electrocution hazards
- Personal protective equipment
- Hazard communication
- Materials handling, storage, use and disposal.

Skills

- Explain why OSHA is important to workers.
- Explain workers rights under OSHA
- Discuss employer responsibilities under OSHA.
- Discuss the use of OSHA standards.
- Explain how OSHA inspections are conducted.
- Utilize helpful worker safety and health resources.



- Identify hazards in the workplace associated with walking and working surfaces.
- Identify best practices for eliminating or controlling hazards associated with walking and working surfaces in the workplace.
- Recognize employer requirements to protect workers from walking and working surface hazards.
- Recognize benefits of an Emergency Action Plan.
- Identify elements of the Fire Protection Plan.
- Identify conditions under which evacuation actions may be necessary in an emergency situation.
- Identify conditions under which shelter-in-place may be necessary in an emergency situation.
- Identify characteristics of an effective emergency escape route.
- Recognize the five types of fire extinguishers, including the types of fires they can extinguish.
- Review requirements for proper maintenance of portable fire extinguishers.
- Identify major electrical hazards.
- Describe types of electrical hazards.
- Describe electrical protection methods.
- Recognize employer requirements to protect workers from electrical hazards.
- Recall employer responsibilities toward affected employees regarding PPE.
- Identify when face and head protection should be used.
- Recall which types of hand and foot protection should be used in a specific situation.
- Recognize the differences between respirator types.
- Identify the differences between full-body protection levels.
- Identify the employer's responsibilities under the HCS, including training requirements.
- Identify components of a Hazard Communication program.
- Describe requirements of the different types of Hazard Communication labels.
- Locate pertinent information about chemicals on labels, including other forms of hazard communication, to ensure "right to understanding" provisions of GHS requirements.
- Identify types of material handling equipment.
- Describe hazards associated with material handling activities (e.g., storage, use, and disposal).
- Identify methods to prevent hazards associated with material handling equipment.
- Recognize employer requirements to protect workers from material handling hazards



- Identify the main causes of machinery accidents.
- Recognize basic machinery parts that expose workers to hazards.
- Recognize workplace situations involving machinery that requires guarding.
- Identify the requirements for safeguards.
- Identify types of machine guards including types of devices used to safeguard machines.
- Identify strategies to control chemical hazards.
- Identify strategies to control biological hazards.
- Identify strategies to control physical hazards.
- Identify strategies to control ergonomic hazards.
- Identify OSHA requirements pertaining to bloodborne pathogens.
- List the potential routes of exposure from bloodborne pathogens.
- Identify the risks associated with Human Immunodeficiency Virus (HIV), Hepatitis B, and Hepatitis C Virus.
- Identify methods of preventing transmission of bloodborne pathogens & managing occupational exposures.
- Restate methods of the safe disposal of sharps.
- Recount steps which should be taken in the event of an exposure to a potential bloodborne pathogen.
- Recognize risk factors associated with work-related musculoskeletal disorders (MSD)s.
- Identify good posture.
- Describe safe lifting techniques.
- Identify ergonomic control methods for eliminating/reducing work-related MSDs.
- Identify the number one cause of death for U.S. teens.
- List eight risk factors for young drivers.
- Identify the biggest risk factor for young drivers.
- Define distracted driving.
- Provide examples and/or causes of distracted driving.
- Identify the biggest risk factor for distracted driving
- Discuss the risk of having other young passengers in the car.
- List some actions employers should take to keep employees safe while driving.
- List some actions employees can take to safely drive on the job.
- Define the term violence.



- Recall who is at risk for encountering workplace violence.
- Describe workplace violence prevention strategies.
- Identify how to StartSafe and StaySafe to prevent or lessen workplace violence.
- Recognize the costs of workplace accidents.
- Recognize the benefits of implementing an effective safety and health program.
- Describe the elements of an effective safety and health program.
- Identify three methods to prevent workplace hazards.

Assessments

- OSHA 10 Assessment and Certificate

Course: CTE

Unit: Career Awareness

Length: Woven Throughout

Standards

- 9.2.12.CAP.1: Analyze unemployment rates for workers with different levels of education and how the economic, social, and political conditions of a time period are affected by a recession.
- 9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.
- 9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.
- 9.2.12.CAP.4: Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment.
- 9.2.12.CAP.5: Assess and modify a personal plan to support current interests and postsecondary plans.
- 9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.
- 9.2.12.CAP.7: Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.



- 9.2.12.CAP.8: Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.
- 9.2.12.CAP.9: Locate information on working papers, what is required to obtain them, and who must sign them.
- 9.2.12.CAP.10: Identify strategies for reducing overall costs of postsecondary education (e.g., tuition assistance, loans, grants, scholarships, and student loans)
- 9.2.12.CAP.11: Demonstrate an understanding of Free Application for Federal Student Aid (FAFSA) requirements to apply for postsecondary education
- 9.2.12.CAP.12: Explain how compulsory government programs (e.g., Social Security, Medicare) provide insurance against some loss of income and benefits to eligible recipients.
- 9.2.12.CAP.13: Analyze how the economic, social, and political conditions of a time period can affect the labor market.
- 9.2.12.CAP.14: Analyze and critique various sources of income and available resources (e.g., financial assets, property, and transfer payments) and how they may substitute for earned income
- 9.2.12.CAP.15: Demonstrate how exemptions, deductions, and deferred income (e.g., retirement or medical) can reduce taxable income.
- 9.2.12.CAP.16: Explain why taxes are withheld from income and the relationship of federal, state, and local taxes (e.g., property, income, excise, and sales) and how the money collected is used by local, county, state, and federal governments. ·
- 9.2.12.CAP.17: Analyze the impact of the collective bargaining process on benefits, income, and fair labor practice. ·
- 9.2.12.CAP.18: Differentiate between taxable and nontaxable income from various forms of employment (e.g., cash business, tips, tax filing and withholding). ·
- 9.2.12.CAP.19: Explain the purpose of payroll deductions and why fees for various benefits (e.g., medical benefits) are taken out of pay, including the cost of employee benefits to employers and self-employment income.
- 9.2.12.CAP.20: Analyze a Federal and State Income Tax Return
- 9.2.12.CAP.21: Explain low-cost and low-risk ways to start a business.



- 9.2.12.CAP.22: Compare risk and reward potential and use the comparison to decide whether starting a business is feasible.
- 9.2.12.CAP.23: Identify different ways to obtain capital for starting a business

Essential Question(s)

- How does one prepare for a career?
- How does one improve marketability?
- Why is career planning important?
- What are the risks in starting a business?

Content

- There are strategies to improve one's professional value and marketability.
- Career planning requires purposeful planning based on research, self-knowledge, and informed choices.
- An individual's income and benefit needs and financial plan can change over time.
- Securing an income involve an understanding of the costs and time in preparing for a career field, interview and negotiation skills, job searches, resume development, prior experience, and vesting and retirement plans
- Understanding income involves an analysis of payroll taxes, deductions and earned benefits.
- There are ways to assess a business's feasibility and risk and to align it with an individual's financial goals

Skills

- Act as a responsible and contributing community member and employee.
- Attend to financial well-being.
- Consider the environmental, social and economic impacts of decisions.
- Demonstrate creativity and innovation.
- Utilize critical thinking to make sense of problems and persevere in solving them.
- Model integrity, ethical leadership and effective management.
- Plan education and career paths aligned to personal goals.
- Use technology to enhance productivity, increase collaboration and communicate effectively.



- Work productively in teams while using cultural/global competence.

Assessments

- Career Research Project
- Resume/Cover Letter

Course: Introduction to Computers

Length: Semester

Standards

- 9.3.IT.1 Demonstrate effective professional communication skills and practices that enable positive customer relationships.
- 9.3.IT.2 Use product or service design processes and guidelines to produce a quality information technology (IT) product or service.
- 9.3.IT.3 Demonstrate the use of cross-functional teams in achieving IT project goals.
- 9.3.IT.4 Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors.
- 9.3.IT.6 Describe trends in emerging and evolving computer technologies and their influence on IT practices.
- 9.3.IT.8 Recognize and analyze potential IT security threats to develop and maintain security requirements.
- 9.3.IT.12 Demonstrate knowledge of the hardware components associated with information systems.
- 9.3.IT-PRG.3 Analyze system and software requirements to ensure maximum operating efficiency.
- 9.3.IT-PRG.9 Perform software maintenance and customer support functions.
- 9.3.IT-PRG.10 Design, create and maintain a database.
- 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
- 9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).
- 9.4.12.DC.1: Explain the beneficial and harmful effects that intellectual property laws can have on the creation and sharing of content (e.g., 6.1.12.CivicsPR.16.a).
- 9.4.12.IML.1: Compare search browsers and recognize features that allow for filtering of information.



Essential Question(s)

- What is a Computer?
- What are the Basic Components of a Computer System?
- Explain the process of data processing in a computer, including input, processing, storage, and output. How do these components interact to perform various tasks?
- What is Software?
- What is an Operating System?
- How Does Computer Storage Work?
- What is Computer Networking?
- What is Computer Security?
- Discuss the importance of computer security and common threats such as viruses, malware, and hacking. What are some best practices for maintaining computer security?
- What is Programming?
- What is Cloud Computing?
- What are Ethical and Social Considerations in Computing?
- Explore ethical dilemmas related to technology, such as privacy, data security, and the impact of automation on jobs. How can individuals and society address these concerns?

Content

- Introduction to Computers and Computing
- Computer Hardware
- Computer Software
- Data and Information
- Computer Networking and the Internet
- Internet Security and Privacy



- Introduction to Programming
- Computer Ethics and Societal Impacts
- Cloud Computing and Emerging Technologies
- Future Trends in Computing
- Practical Computer Skills

Skills

- Identifying and using essential hardware components (CPU, RAM, storage devices)
- Navigating the computer's operating system (Windows, macOS, Linux)
- Basic keyboard and mouse skills for efficient navigation
- Creating, saving, and organizing files and folders
- Understanding file extensions and formats
- Copying, moving, and renaming files and folders
- Navigating web browsers and using search engines effectively
- Understanding website URLs and links
- Sending and receiving emails, including attachments
- Creating, editing, and formatting documents using word processing software
- Basic text formatting (font styles, sizes, colors, alignment)
- Inserting images and tables into documents
- Creating, formatting, and entering data into spreadsheets
- Performing basic calculations using formulas and functions
- Creating simple charts and graphs
- Creating engaging and informative slide presentations
- Adding text, images, and multimedia elements to slides
- Delivering a presentation effectively
- Identifying and resolving common computer issues (e.g., frozen applications)
- Troubleshooting internet connectivity problems
- Recognizing when to seek technical support



- Setting strong and secure passwords
- Recognizing phishing emails and online scams
- Adjusting privacy settings on social media and other platforms
- Understanding basic programming terminology (variables, loops, conditionals)
- Writing simple programs to perform basic tasks (e.g., printing messages)
- Evaluating online sources for credibility and accuracy
- Distinguishing between reliable and unreliable information
- Understanding copyright and fair use of digital content
- Storing and accessing files using cloud storage services
- Sharing and collaborating on documents online
- Backing up important data and files
- Exploring emerging technologies like artificial intelligence, virtual reality, and blockchain
- Understanding their potential applications and impact

Assessments

- IT Fundamentals Certification

Course: Computer Applications

Length: Semester

Standards

- 9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.



- 9.4.12.IML.4: Assess and critique the appropriateness and impact of existing data visualizations for an intended audience (e.g., S-ID.B.6b, HS-LS2-4).
- 9.4.12.IML.2: Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources (e.g., NJLSA.W8, Social Studies Practice: Gathering and Evaluating Sources).
- 9.4.12.DC.4: Explain the privacy concerns related to the collection of data (e.g., cookies) and generation of data through automated processes that may not be evident to users (e.g., 8.1.12.NI.3).
- 9.3.IT-PRG.1 Analyze customer software needs and requirements.
- 9.3.IT-PRG.1 Analyze customer software needs and requirements.
- 9.3.IT-PRG.2 Demonstrate the use of industry standard strategies and project planning to meet customer specifications.
- 9.3.IT-SUP.9 Employ technical writing and documentation skills in support of an information system.
- 9.3.IT.13 Compare key functions and applications of software and determine maintenance strategies for computer systems.
- 9.3.IT.12 Demonstrate knowledge of the hardware components associated with information systems.
- 9.3.IT.7 Perform standard computer backup and restore procedures to protect IT information.
- 9.3.IT.6 Describe trends in emerging and evolving computer technologies and their influence on IT practices.
- 9.3.IT.1 Demonstrate effective professional communication skills and practices that enable positive customer relationships.

Essential Question(s)

- How Can Computer Applications Enhance Personal and Professional Productivity?
- What are the Key Features and Functions of Word Processing Software?
- How Can Spreadsheet Applications Facilitate Data Analysis and Management?
- What Are the Benefits of Presentation Software in Effective Communication?
- How Can Database Applications Help in Organizing and Retrieving Information?
- What Are the Practical Applications of Graphics and Design Software?
- How Can Communication Software Facilitate Online Interaction and Collaboration?
- What Are the Uses of Project Management and Collaboration Tools?



- What Are the Basics of Using Accounting and Financial Software?
- How Can Productivity Apps and Mobile Applications Impact Daily Life?
- What Is Cloud Computing, and How Can Cloud Applications Benefit Users?
- What are Considerations for Ethical and Responsible Use of Computer Applications?

Content

- Understanding the importance of computer applications in various fields
- Overview of common software categories (word processing, spreadsheets, presentations, etc.)
- Navigating user interfaces and software menus
- Introduction to word processing software (e.g., Microsoft Word, Google Docs)
- Document creation, formatting, and editing
- Working with headers, footers, and page layout
- Collaboration features and version tracking
- Exploring spreadsheet software (e.g., Microsoft Excel, Google Sheets)
- Entering and formatting data
- Creating formulas and functions for calculations
- Generating charts and graphs
- Data validation and protection
- Understanding presentation software (e.g., Microsoft PowerPoint, Google Slides)
- Designing effective slides with text, images, and multimedia
- Animation and transition effects
- Delivering compelling presentations
- Introduction to databases and database software (e.g., Microsoft Access)
- Designing tables, forms, queries, and reports
- Importing, exporting, and managing data
- Basic database security considerations
- Exploring graphic design tools (e.g., Adobe Photoshop, Canva)
- Creating images, illustrations, and layouts
- Editing and enhancing visual content



- Principles of design and visual communication
- Using email clients and managing email communication
- Instant messaging and online chat applications
- Video conferencing tools for remote collaboration
- Sharing and collaborating on documents using cloud platforms
- Overview of project management software (e.g., Trello, Asana)
- Task organization, timelines, and progress tracking
- Team collaboration and communication within project management tools
- Introduction to accounting software (e.g., QuickBooks, Xero)
- Managing finances, budgets, and transactions
- Generating financial reports and statements
- Exploring productivity apps for task management, note-taking, and scheduling
- Mobile applications for health tracking, travel, and more
- Benefits of mobile apps for personal and professional use
- Understanding cloud computing and its advantages
- Using cloud-based software applications (e.g., Google Workspace, Microsoft 365)
- Collaboration, accessibility, and data synchronization in the cloud
- Addressing ethical considerations in using software and digital content
- Respecting copyright, intellectual property, and proper attribution
- Privacy concerns and data protection when using applications
- Hands-on projects and exercises using various software applications
- Creating documents, spreadsheets, presentations, and other content
- Applying learned skills to real-world scenarios

Skills

- Navigating operating systems and file management
- Understanding menus, icons, and keyboard shortcuts
- Familiarity with common interface elements
- Creating, formatting, and editing documents



- Applying styles, fonts, and paragraph formatting
- Inserting images, tables, and other elements
- Collaborating on documents using track changes and comments
- Entering, formatting, and manipulating data
- Creating and using formulas for calculations
- Building charts and graphs
- Data validation and conditional formatting
- Developing visually appealing slideshows
- Incorporating text, images, and multimedia
- Applying animation and transition effects
- Delivering presentations confidently
- Designing tables and forms for data entry
- Querying databases for specific information
- Generating reports and summaries
- Implementing basic database security measures
- Creating and editing images and graphics
- Applying filters, adjustments, and effects
- Composing visual layouts for documents and presentations
- Understanding basic principles of design
- Using email clients for effective communication
- Utilizing instant messaging and chat tools
- Participating in video conferences and virtual meetings
- Collaborating on documents in real-time using cloud platforms
- Organizing tasks and projects using software tools
- Assigning responsibilities and setting deadlines
- Tracking progress and managing team workflows
- Communicating within project management platforms
- Managing financial data and transactions
- Creating and maintaining budgets



- Generating financial reports and statements
- Understanding basic accounting principles
- Utilizing productivity apps for task management and note-taking
- Exploring mobile applications for health tracking, travel, and more
- Syncing data across devices using cloud services
- Creating and sharing documents in the cloud
- Collaborating on cloud-based projects
- Understanding version history and document recovery
- Managing file permissions and access
- Recognizing ethical considerations in using digital content
- Adhering to copyright and intellectual property guidelines
- Safeguarding personal and sensitive information online
- Applying learned skills to real-world scenarios
- Completing hands-on projects using various software applications
- Demonstrating proficiency in creating documents, spreadsheets, presentations, etc.

Assessments

- Office Pro Certification

Course: IT Essentials A+I

Length: Semester

Standards

- 9.3.IT.1 Demonstrate effective professional communication skills and practices that enable positive customer relationships.
- 9.3.IT.2 Use product or service design processes and guidelines to produce a quality information technology (IT) product or service.
- 9.3.IT.3 Demonstrate the use of cross-functional teams in achieving IT project goals.
- 9.3.IT.4 Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors.



- 9.3.IT.5 Explain the implications of IT on business development.
- 9.3.IT.6 Describe trends in emerging and evolving computer technologies and their influence on IT practices.
- 9.3.IT.7 Perform standard computer backup and restore procedures to protect IT information.
- 9.3.IT.8 Recognize and analyze potential IT security threats to develop and maintain security requirements.
- 9.3.IT.9 Describe quality assurance practices and methods employed in producing and providing quality IT products and services.
- 9.3.IT.10 Describe the use of computer forensics to prevent and solve information technology crimes and security breaches.
- 9.3.IT.12 Demonstrate knowledge of the hardware components associated with information systems.
- 9.3.IT.13 Compare key functions and applications of software and determine maintenance strategies for computer systems.
- 9.3.IT-SUP.1 Provide technology support to maintain service.
- 9.3.IT-SUP.2 Manage operating systems and software applications, including maintenance of upgrades, patches and service packs.
- 9.3.IT-SUP.3 Apply appropriate troubleshooting techniques in resolving computer hardware, software and configuration problems.
- 9.3.IT-SUP.4 Perform installation, configuration and maintenance of operating systems.
- 9.3.IT-SUP.5 Demonstrate the use of networking concepts to develop a network.
- 9.3.IT-SUP.6 Evaluate the effectiveness of an information system.
- 9.3.IT-SUP.7 Employ system installation and maintenance skills to setup and maintain an information system.
- 9.3.IT-SUP.8 Employ system administration and control skills to monitor the performance of an information system.
- 9.3.IT-SUP.9 Employ technical writing and documentation skills in support of an information system.
- 9.3.IT-SUP.10 Apply quality assurance processes to maximize information system operation.

Essential Question(s)

- How do computer components interact to create a functional system?
- What are the key principles of hardware compatibility and selection?



- How does the operating system manage hardware and software resources?
- What measures are taken to maintain data security and user privacy?
- How does networking technology enable communication and resource sharing?
- What strategies are used to troubleshoot hardware and software issues effectively?
- How do emerging technologies impact the IT industry and user experiences?
- Why is professional communication and customer service important in IT support roles?
- What ethical and legal considerations apply to IT professionals?
- How can ongoing learning and certification contribute to a successful IT career?

Content

- Overview of IT concepts and terminology
- Role and responsibilities of IT professionals
- Basics of computer hardware and software components
- Understanding internal components (CPU, RAM, motherboard, etc.)
- Storage devices and technologies (HDD, SSD, optical drives)
- Peripheral devices (printers, monitors, input devices)
- Operating systems and their functions
- Software installation, updates, and patches
- Application software and licenses
- Introduction to networking concepts
- TCP/IP, IP addressing, and subnetting
- Wireless networking technologies and security
- Mobile device features and capabilities
- Configuring and securing mobile devices
- Synchronization and data transfer
- Troubleshooting theory and techniques
- Diagnosing and resolving common hardware issues
- Identifying and troubleshooting network connectivity problems
- Threats, vulnerabilities, and attacks



- Implementing security best practices
- Data protection and encryption
- Windows and other operating systems
- Installation, configuration, and management
- Command-line tools and utilities
- Identifying and troubleshooting software-related issues
- Application crashes and error messages
- Malware removal and prevention
- Professionalism and communication skills
- Documentation and record-keeping
- Safety and environmental considerations
- Effective communication with users and clients
- Active listening and problem-solving techniques
- Managing customer expectations
- Cloud computing and virtualization
- Internet of Things (IoT) devices
- Impact of emerging technologies on IT roles
- Review of key exam topics and objectives
- Practice exams and test-taking strategies
- Exam registration and logistics

Skills

- Define basic IT terminology and concepts
- Explain the role and responsibilities of IT professionals
- Identify and explain the function of internal components (CPU, RAM, motherboard, etc.)
- Differentiate between storage devices and technologies (HDD, SSD, optical drives)
- Describe peripheral devices and their functions (printers, monitors, input devices)
- Identify and differentiate between various operating systems
- Install, update, and patch operating systems and applications



- Explain the role and functions of software licenses
- Define basic networking concepts
- Configure TCP/IP settings and understand IP addressing and subnetting
- Describe wireless networking technologies and their security considerations
- Describe the features and capabilities of mobile devices
- Configure and secure mobile devices
- Explain synchronization and data transfer methods
- Apply troubleshooting techniques and theory
- Diagnose and resolve common hardware issues
- Identify and troubleshoot network connectivity problems
- Identify various threats, vulnerabilities, and attacks
- Implement security best practices
- Explain data protection and encryption methods
- Install, configure, and manage operating systems (Windows, other OS)
- Use command-line tools and utilities effectively
- Understand the basics of virtualization and cloud computing
- Identify and troubleshoot software-related issues
- Diagnose application crashes and error messages
- Implement malware removal and prevention strategies
- Demonstrate professionalism and effective communication
- Maintain documentation and records
- Consider safety and environmental factors in IT work
- Practice effective communication with users and clients
- Utilize active listening and problem-solving techniques
- Manage customer expectations and provide quality support
- Explain the concepts of cloud computing and virtualization
- Understand the impact of IoT devices on IT environments
- Recognize how emerging technologies affect IT roles
- Review key exam topics and objectives



- Practice with sample exams and test-taking strategies
- Understand the exam registration process and logistics

Assessments

- PC pro certification - Testout
- CompTia A+ Certification 1101

Course: IT Essentials A+II

Length: Semester

Standards

- 9.3.IT.1 Demonstrate effective professional communication skills and practices that enable positive customer relationships.
- 9.3.IT.2 Use product or service design processes and guidelines to produce a quality information technology (IT) product or service.
- 9.3.IT.3 Demonstrate the use of cross-functional teams in achieving IT project goals.
- 9.3.IT.4 Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors.
- 9.3.IT.5 Explain the implications of IT on business development.
- 9.3.IT.6 Describe trends in emerging and evolving computer technologies and their influence on IT practices.
- 9.3.IT.7 Perform standard computer backup and restore procedures to protect IT information.
- 9.3.IT.8 Recognize and analyze potential IT security threats to develop and maintain security requirements.
- 9.3.IT.9 Describe quality assurance practices and methods employed in producing and providing quality IT products and services.
- 9.3.IT.10 Describe the use of computer forensics to prevent and solve information technology crimes and security breaches.
- 9.3.IT.12 Demonstrate knowledge of the hardware components associated with information systems.



- 9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).
- 9.4.12.CI.3: Investigate new chal
- 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).
- 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
- 9.3.IT.13 Compare key functions and applications of software and determine maintenance strategies for computer systems.
- 9.3.IT-SUP.1 Provide technology support to maintain service.
- 9.3.IT-SUP.2 Manage operating systems and software applications, including maintenance of upgrades, patches and service packs.
- 9.3.IT-SUP.3 Apply appropriate troubleshooting techniques in resolving computer hardware, software and configuration problems.
- 9.3.IT-SUP.4 Perform installation, configuration and maintenance of operating systems.
- 9.3.IT-SUP.5 Demonstrate the use of networking concepts to develop a network.
- 9.3.IT-SUP.6 Evaluate the effectiveness of an information system.
- 9.3.IT-SUP.7 Employ system installation and maintenance skills to setup and maintain an information system.
- 9.3.IT-SUP.8 Employ system administration and control skills to monitor the performance of an information system.
- 9.3.IT-SUP.9 Employ technical writing and documentation skills in support of an information system.
- 9.3.IT-SUP.10 Apply quality assurance processes to maximize information system operation.

Essential Question(s)

- What are the key differences between Windows, macOS, and Linux operating systems?
- How do you navigate and customize the user interface in Windows and macOS?
- What are the steps to install, upgrade, and uninstall software in Windows and macOS?
- How do you manage and troubleshoot common operating system errors and crashes?



- What are the essential principles of security, and how do they apply to personal computers and networks?
- What are the steps to configure and manage firewalls and antivirus software?
- How do you secure wireless networks and prevent unauthorized access?
- How do you diagnose and resolve common software issues, such as application crashes or slow performance?
- What are the steps to troubleshoot printer problems and document printing issues?
- How do you troubleshoot browser-related issues, such as slow loading times or inability to connect to websites?
- What are the methods to troubleshoot problems related to driver compatibility and updates?
- How do you configure and troubleshoot basic network settings in Windows and macOS?
- What are common network connectivity issues, and how do you troubleshoot them?
- How do you set up and secure a wireless network, including password protection and encryption?
- How do you install, configure, and troubleshoot RAM, hard drives, and SSDs?
- What are the steps to install and configure peripherals like printers, scanners, and external storage devices?
- How do you troubleshoot common hardware problems, such as no power, overheating, or display issues?

Content

- Introduction to Operating Systems
 - Definition and purpose of an operating system
 - Types of operating systems (Windows, macOS, Linux)
- Windows Operating System
 - Versions of Windows (Windows 10, Windows 11)
 - User interface and navigation
 - Control Panel and Settings app
- macOS Operating System
 - Features and interface elements
 - System Preferences and Finder
- Linux Operating System
 - Basics of Linux distributions (Ubuntu, CentOS, Fedora)
 - Command-line interface (CLI) and graphical user interface (GUI)



- Software Installation and Management
- Installing and uninstalling software
- Updating software and operating systems
- System Utilities
- Task Manager (Windows)
- Activity Monitor (macOS)
- Disk Cleanup and Defragmentation
- Troubleshooting Operating Systems
- Startup issues and boot process
- Safe Mode and Recovery Mode
- Using system restore points
- Principles of Security
- Confidentiality, integrity, availability (CIA)
- Authentication and authorization
- Malware and Threats
- Types of malware (viruses, worms, Trojans, ransomware)
- Social engineering and phishing attacks
- Security Tools
- Firewalls and antivirus software
- Windows Defender and macOS Security & Privacy settings
- Data Encryption
- File and folder encryption
- BitLocker (Windows) and FileVault (macOS)
- Networking Security
- Securing wireless networks (WPA2, WPA3)
- MAC filtering and disabling SSID broadcast
- User Account Management
- User roles and permissions
- Password policies and multi-factor authentication (MFA)



- Diagnosing Software Issues
- Identifying common software problems
- Using system logs and error messages
- Application Troubleshooting
- Application crashes and freezes
- Compatibility issues with older software
- Printers and Printing Issues
- Installing and configuring printers
- Print queue and spooler issues
- Email Troubleshooting
- Setting up email accounts
- Sending and receiving problems
- Browser Issues
- Clearing cache and cookies
- Browser extensions and plugins
- Driver Issues
- Updating and installing drivers
- Troubleshooting driver-related problems
- Networking Fundamentals
- TCP/IP and OSI model
- IPv4 vs. IPv6
- Network Configuration
- IP addressing and subnetting
- DHCP and DNS configuration
- Wireless Networking
- Configuring wireless routers
- SSID, security, and encryption settings
- Network Troubleshooting
- Connectivity issues and ping tests



- Tracert and pathping commands
- Remote Access and Virtual Private Networks (VPNs)
- Remote desktop and VPN setup
- Security considerations
- Motherboards and Components
- Motherboard components and form factors
- CPU, RAM, and expansion slots
- Storage Devices
- Hard drives (HDD) and solid-state drives (SSD)
- RAID configurations and storage options
- CPUs and Cooling
- CPU types and specifications
- Cooling solutions and thermal paste
- Peripherals and Input/Output
- Keyboards, mice, monitors
- USB, HDMI, and other connectors
- Troubleshooting Hardware Issues
- No power and POST failures
- Overheating and component replacement

Skills

- Navigate Operating Systems:
- Use Windows, macOS, and Linux user interfaces effectively.
- Software Installation and Management:
- Install and uninstall software on different operating systems.
- Upgrade and update software and operating systems.
- System Utilities:
- Use task manager and activity monitor to monitor system performance.
- Perform disk cleanup and defragmentation.



- Troubleshoot Operating Systems:
- Identify and resolve common startup and boot issues.
- Use safe mode and recovery mode effectively.
- Security Principles:
- Understand confidentiality, integrity, and availability (CIA) concepts.
- Implement authentication and authorization mechanisms.
- Malware and Threats:
- Recognize different types of malware and threats.
- Implement best practices to prevent malware infections.
- Security Tools:
- Configure firewalls and antivirus software.
- Utilize security settings in Windows Defender and macOS Security & Privacy.
- Data Encryption:
- Encrypt files and folders using built-in tools.
- Set up BitLocker (Windows) and FileVault (macOS) for full-disk encryption.
- Networking Security:
- Secure wireless networks with proper encryption and access controls.
- Implement MAC filtering and disable SSID broadcast.
- User Account Management:
- Manage user accounts, roles, and permissions.
- Enforce password policies and implement multi-factor authentication (MFA).
- Diagnose Software Issues:
- Analyze error messages and logs to identify software problems.
- Apply systematic troubleshooting methodologies.
- Application Troubleshooting:
- Resolve application crashes, freezes, and compatibility issues.
- Apply compatibility modes when necessary.
- Printers and Printing Issues:
- Install, configure, and troubleshoot printers.



- Clear print queues and resolve spooler issues.
- Email Troubleshooting:
 - Set up and troubleshoot email accounts.
 - Diagnose problems related to sending and receiving emails.
- Browser Issues:
 - Address browser-related problems, such as slow loading and missing features.
 - Clear cache, cookies, and manage browser extensions.
- Driver Issues:
 - Update and install drivers for various hardware components.
 - Solve problems caused by outdated or incompatible drivers.
- Networking Fundamentals:
 - Understand TCP/IP, OSI model, and IP addressing.
 - Differentiate between IPv4 and IPv6.
- Network Configuration:
 - Configure IP addressing, subnetting, DHCP, and DNS settings.
 - Understand NAT (Network Address Translation) and port forwarding.
- Wireless Networking:
 - Set up and secure wireless routers.
 - Configure SSID, encryption, and access control settings.
- Network Troubleshooting:
 - Troubleshoot network connectivity issues using tools like ping and tracert.
 - Identify and resolve common network problems.
- Remote Access and VPNs:
 - Establish remote desktop connections and set up VPNs.
 - Address security considerations when using remote access.
- Motherboards and Components:
 - Identify key components on a motherboard.
 - Understand CPU, RAM, and expansion slot types.
- Storage Devices:



- Differentiate between hard drives (HDD) and solid-state drives (SSD).
- Understand RAID configurations and storage options.
- CPUs and Cooling:
- Identify different CPU types and their specifications.
- Install CPUs and manage cooling solutions.
- Peripherals and Input/Output:
- Install and troubleshoot peripherals like keyboards, mice, and monitors.
- Understand various types of connectors and ports.
- Troubleshooting Hardware Issues:
- Diagnose and solve hardware problems such as no power and overheating.
- Replace and upgrade hardware components when needed

Assessments

- PC pro certification - Testout
- CompTia A+ Certification 1102

Course: Fundamentals of Web Design

Length: Semester

Standards



- 9.3.IT-WD.1 Analyze customer requirements to design and develop a Web or digital communication product.
- 9.3.IT-WD.2 Apply the design and development process to produce user-focused Web and digital communications solutions.
- 9.3.IT-WD.3 Write product specifications that define the scope of work aligned to customer requirements.
- 9.3.IT-WD.4 Demonstrate the effective use of tools for digital communication production, development and project management.
- 9.3.IT-WD.5 Develop, administer and maintain Web applications.
- 9.3.IT-WD.6 Design, create and publish a digital communication product based on customer needs.
- 9.3.IT-WD.7 Evaluate the functionality of a digital communication product using industry accepted techniques and metrics.
- 9.3.IT-WD.8 Implement quality assurance processes to deliver quality digital communication products and services.
- 9.3.IT-WD.9 Perform maintenance and customer support functions for digital communication products.
- 9.3.IT-WD.10 Comply with intellectual property laws, copyright laws and ethical practices when creating Web/digital communications.
- 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas
- Identify career pathways that highlight personal talents, skills, and abilities .
- 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice

Essential Question(s)

- What is the role of web design in creating effective websites?
- How does web design contribute to user experience and engagement?
- Who is the target audience for the website?
- What are the key elements of user-centered design?
- How can you ensure that the website meets the needs of its users?
- What is the importance of typography in web design?
- How do you choose appropriate fonts for a website?



- What principles should be followed for effective text readability?
- How does color impact user perception and emotions?
- What is the significance of color harmony in web design?
- How can you choose a color scheme that aligns with the website's purpose?
- What are the principles of effective layout design?
- How can you create a balanced and visually appealing website layout?
- What is the importance of whitespace in design?
- How can you design intuitive navigation menus?
- What is information architecture and why is it crucial for web design?
- How can you ensure easy access to different sections of a website?

Content

- Evolution of Web Design
- Role of Web Design in User Experience
- Basic Terminology and Concepts
- Understanding Target Audience
- User-Centered Design Principles
- Persona Development
- Conducting User Research
- Typography and Fonts
- Color Theory and Color Psychology
- Layout and Composition
- Visual Hierarchy and Balance
- Importance of Clear Navigation
- Types of Navigation Menus
- Information Architecture and Sitemaps
- Designing User-Friendly Page Structures
- Introduction to Responsive Design
- Media Queries and Viewports



- Fluid Grids and Flexible Images
- Mobile-First vs. Desktop-First Approach
- Selecting and Optimizing Images
- Image File Formats (JPEG, PNG, GIF, SVG)
- Using Icons and SVG Graphics
- Creating Visual Consistency

Skills

- Understand the role of web design in creating effective websites.
- Define key terminology and concepts related to web design.
- Identify and analyze target audience characteristics and preferences.
- Create user personas to guide design decisions.
- Conduct basic user research to inform design choices.
- Apply typography principles to choose and combine fonts effectively.
- Utilize color theory to create visually appealing color palettes.
- Create balanced and visually engaging layouts using composition principles.
- Design intuitive and user-friendly navigation menus.
- Develop site structures and sitemaps for improved user experience.
- Arrange content to establish clear hierarchies and information flow.
- Design responsive layouts that adapt to various screen sizes.
- Implement media queries to ensure a consistent user experience.
- Understand the principles of mobile-first and progressive enhancement.
- Select and optimize images for optimal website performance.
- Differentiate between image file formats and choose appropriately.
- Incorporate icons and SVG graphics for scalable and resolution-independent visuals.



Assessments

- Website Design Project and Portfolio Assessment

Course: Networking Fundamentals I

Length: Semester

Standards

- 9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities .
- .4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice .
- 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving
- 9.4.12.CT.3: Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice).
- 9.4.12.CT.4: Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.
- 9.4.12.DC.1: Explain the beneficial and harmful effects that intellectual property laws can have on the creation and sharing of content .
- 9.4.12.DC.2: Compare and contrast international differences in copyright laws and ethics.
- 9.4.12.DC.3: Evaluate the social and economic implications of privacy in the context of safety, law, or ethics
- 9.3.IT-NET.1 Analyze customer or organizational network system needs and requirements.
- 9.3.IT-NET.2 Analyze wired and wireless network systems to determine if they meet specifications (e.g., IEEE, power and security).
- 9.3.IT-NET.3 Design a network system using technologies, tools and standards.
- 9.3.IT-NET.4 Perform network system installation and configuration.
- 9.3.IT-NET.5 Perform network administration, monitoring and support to maintain a network system.



Essential Question(s)

- What are the key components of the OSI model, and how does it relate to networking protocols and communication?
- Explain the differences between IPv4 and IPv6 addressing schemes, including their formats and benefits.
- What is subnetting, and how is it used to divide IP address ranges for efficient network management?
- Describe the purpose and functionality of DHCP (Dynamic Host Configuration Protocol) in IP address assignment.
- How does NAT (Network Address Translation) enable multiple devices to share a single public IP address?
- What are the primary differences between a hub, a switch, and a router in a network infrastructure?
- How do VLANs (Virtual LANs) enhance network segmentation and security?
- Explain the concept of QoS (Quality of Service) and how it influences network performance for specific types of traffic.
- Describe the process of ARP (Address Resolution Protocol) and how it helps resolve IP addresses to MAC addresses.
- What is a proxy server, and how does it work to provide security and caching benefits in a network?
- What are TCP (Transmission Control Protocol) and UDP (User Datagram Protocol), and how do they differ in terms of reliability and functionality?
- How does DNS (Domain Name System) facilitate domain-to-IP address resolution on the internet?
- Explain how SMTP (Simple Mail Transfer Protocol) and POP3/IMAP (Post Office Protocol 3/Internet Message Access Protocol) work in email communication.
- Describe the purpose of SNMP (Simple Network Management Protocol) and its role in managing network devices.
- What is HTTPS (Hypertext Transfer Protocol Secure), and why is it important for secure web communication?

Content

- Introduction to Networking
- Network concepts, devices, and protocols.
- Common network topologies and their advantages.



- OSI Model and TCP/IP
- Explanation of the OSI model layers and their functions.
- Overview of TCP/IP protocol suite and its role in networking.
- IPv4 and IPv6
- Understanding IPv4 addressing, subnetting, and CIDR notation.
- Introduction to IPv6 addressing and benefits over IPv4.
- Network Infrastructure
- Hubs, switches, routers, and their functions in a network.
- VLANs (Virtual LANs) and their use in network segmentation.
- Networking Devices and Services
- Overview of network devices: access points, bridges, gateways, etc.
- Explanation of network services: DNS, DHCP, NTP, etc.
- Cabling and Connectors
- Types of network cables (Ethernet, fiber-optic) and connectors.
- Proper cable installation techniques and cable testing.
- Network Management
- Network monitoring tools and protocols.
- SNMP (Simple Network Management Protocol) and its role in managing network devices.
- Introduction to Network Security
- Security concepts: confidentiality, integrity, availability (CIA).
- Authentication, authorization, and accounting (AAA).
- Network Threats and Mitigation
- Understanding common network threats: malware, phishing, DoS attacks.
- Security measures: firewalls, IDS/IPS, access control lists.
- Network Access Control
- MAC filtering, port security, and 802.1X authentication.
- Network segmentation and DMZ (Demilitarized Zone) concepts.



Skills

- Network Basics:
 - Describe the purpose of networking concepts and components.
 - Differentiate between network types, such as LAN, WAN, PAN.
- OSI Model and TCP/IP:
 - Explain the layers of the OSI model and their functions.
 - Describe the TCP/IP protocol suite and its role in networking.
- IPv4 and IPv6:
 - Configure and troubleshoot IPv4 and IPv6 addresses.
 - Perform subnetting and CIDR calculations.
- Network Devices:
 - Identify and differentiate between network devices like switches, routers, firewalls, etc.
 - Explain the purpose of load balancers and proxy servers.
- Network Ports and Protocols:
 - Identify common network ports and their associated protocols.
 - Describe how ports and protocols facilitate communication.
- Network Services:
 - Configure and troubleshoot common network services such as DNS, DHCP, NTP.
 - Explain the purpose of SNMP and its use for network management.
- Cabling and Connectivity:
 - Select appropriate cabling and connectors for specific network setups.
 - Install and terminate network cables correctly.
- Network Security Concepts:
 - Describe security concepts: confidentiality, integrity, availability (CIA).
 - Explain the importance of user authentication and authorization.
- Network Threats and Mitigation:
 - Identify and address common network threats like malware and social engineering.
 - Implement security measures including firewalls, IDS/IPS, and access control lists.



o

Assessments

- o Network Pro Certification - Testout
- o CompTia Network + Certification

Course: Networking Fundamentals II

Length: Semester

Standards

- o 9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities .
- o .4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice .
- o 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving
- o 9.4.12.CT.3: Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice).
- o 9.4.12.CT.4: Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.
- o 9.4.12.DC.1: Explain the beneficial and harmful effects that intellectual property laws can have on the creation and sharing of content .
- o 9.4.12.DC.2: Compare and contrast international differences in copyright laws and ethics.
- o 9.4.12.DC.3: Evaluate the social and economic implications of privacy in the context of safety, law, or ethics
- o 9.3.IT-NET.1 Analyze customer or organizational network system needs and requirements.
- o 9.3.IT-NET.2 Analyze wired and wireless network systems to determine if they meet specifications (e.g., IEEE, power and security).
- o 9.3.IT-NET.3 Design a network system using technologies, tools and standards.
- o 9.3.IT-NET.4 Perform network system installation and configuration.



- 9.3.IT-NET.5 Perform network administration, monitoring and support to maintain a network system. "

Essential Question(s)

- How does a firewall function to protect a network by filtering incoming and outgoing traffic?
- What is the difference between an IDS (Intrusion Detection System) and an IPS (Intrusion Prevention System) in terms of threat detection and response?
- Explain the concept of VPN (Virtual Private Network) and how it establishes secure connections over untrusted networks.
- How can you secure a wireless network using WPA2/WPA3 encryption and proper authentication methods?
- Describe the concept of network segmentation and its significance in enhancing security and minimizing the impact of breaches.
- What steps should you take to troubleshoot common network connectivity issues, including no internet access and intermittent connection?
- How do you use command-line tools like ping, tracer, and nslookup to diagnose network problems?
- Explain the purpose of a cable tester and how it helps identify cable faults in a network infrastructure.
- What is a network loop, and how can it lead to broadcast storms? How can you prevent and resolve loop-related issues?
- How do you troubleshoot and mitigate network performance problems caused by bandwidth congestion and latency?
- Describe the key differences between 802.11 standards such as 802.11a, 802.11b, 802.11g, 802.11n, 802.11ac, and 802.11ax.
- How do SSIDs, MAC filtering, and WPA/WPA2 encryption contribute to wireless network security?
- Explain the concept of wireless channels and how channel overlap can impact network performance.
- What is the purpose of WPS (Wi-Fi Protected Setup), and what security risks are associated with it?
- How can you optimize the placement of access points to ensure good coverage and minimal interference in a wireless network?

Content



- Troubleshooting Methodologies
- Step-by-step approach to diagnosing and resolving network issues.
- Importance of documentation in troubleshooting.
- Common Network Problems
- Addressing connectivity issues, slow performance, and intermittent connectivity.
- Identifying and resolving hardware and software problems.
- Network Troubleshooting Tools
- Command-line tools: ping, tracert, ipconfig, ifconfig.
- Network analyzers: Wireshark, tcpdump.
- DHCP and DNS
- DHCP operation and configuration.
- DNS concepts, record types, and DNSSEC (DNS Security Extensions).
- Remote Access Protocols
- Overview of remote access protocols: RDP, SSH, Telnet.
- Implementing secure remote access.
- Virtualization and Cloud Computing
- Virtualization concepts and benefits.
- Cloud service models: IaaS, PaaS, SaaS.
- Wireless Networking Concepts
- Understanding wireless standards: 802.11a/b/g/n/ac/ax.
- Wireless frequencies, channels, and interference.
- Wireless Security
- Authentication methods: WEP, WPA, WPA2, WPA3.
- EAP (Extensible Authentication Protocol) types and methods.
- Wireless Site Surveys
- Importance of site surveys in designing efficient wireless networks.
- Factors affecting signal strength and coverage.
- Network Design Principles
- Designing networks for scalability, redundancy, and fault tolerance.



- Considerations for network segmentation and performance optimization.
- Implementing a Network
- Planning and executing network installation and upgrades.
- Documentation, labeling, and testing after deployment.

Skills

- Wireless Security:
 - Configure wireless security settings such as encryption and authentication.
 - Implement security protocols for wireless networks.
- Troubleshooting Methodologies:
 - Use systematic troubleshooting processes to diagnose network issues.
 - Identify and resolve connectivity, performance, and hardware-related problems.
- Common Network Problems:
 - Troubleshoot issues related to network connectivity, slow performance, and intermittent connectivity.
 - Identify and resolve problems in network hardware and software.
- Network Troubleshooting Tools:
 - Use command-line tools like ping, tracert, ipconfig, ifconfig.
 - Utilize network analyzers such as Wireshark for packet analysis.
- DHCP and DNS Configuration:
 - Configure and troubleshoot DHCP server settings.
 - Set up and manage DNS records and zones.
- Remote Access Protocols:
 - Configure and secure remote access protocols such as RDP, SSH, Telnet.
 - Implement VPNs for secure remote connections.
- Wireless Standards and Frequencies:
 - Describe different wireless standards (802.11a/b/g/n/ac/ax) and their characteristics.
 - Explain wireless frequency bands and channel selection.
- Wireless Security Implementation:
 - Setup and configure wireless security mechanisms like WEP, WPA, WPA2, WPA3.



- Implement secure authentication methods for wireless networks.
- Network Design Principles:
 - Design networks considering scalability, redundancy, and fault tolerance.
 - Plan network segmentation and performance optimization.
- Network Implementation:
 - Execute network installation and upgrades according to design.
 - Perform testing and documentation of the implemented network.

Assessments

- Network Pro Certification - Testout
- CompTia Network + Certification

Course: Network & System
Administrator I

Pathway: System
Administrator

Length: Semester

Standards

- 9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities .
- 9.4.12.CT.3: Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice).
- 9.4.12.CT.4: Participate in online strategy and planning sessions for course-based, school-based, or other projects and determine the strategies that contribute to effective outcomes.
- 9.4.12.DC.1: Explain the beneficial and harmful effects that intellectual property laws can have on the creation and sharing of content .
- 9.4.12.DC.8: Explain how increased network connectivity and computing capabilities of everyday objects allow for innovative technological approaches to climate protection.
- 9.4.12.DC.2: Compare and contrast international differences in copyright laws and ethics.
- 9.4.12.DC.3: Evaluate the social and economic implications of privacy in the context of safety, law, or ethics



- 9.3.IT-NET.1 Analyze customer or organizational network system needs and requirements.
- 9.3.IT-NET.2 Analyze wired and wireless network systems to determine if they meet specifications (e.g., IEEE, power and security).
- 9.3.IT-NET.3 Design a network system using technologies, tools and standards.
- 9.3.IT-NET.4 Perform network system installation and configuration.
- 9.3.IT-NET.5 Perform network administration, monitoring and support to maintain a network system.

"

Essential Question(s)

- What are the different editions of Windows Server 2016, and what are their key features and capabilities?
- What are the hardware requirements and considerations for installing Windows Server 2016?
- How do you perform a clean installation of Windows Server 2016 using different installation options?
- What is Nano Server, and how is it installed and managed?
- What are the steps involved in upgrading previous versions of Windows Server to Windows Server 2016?
- What is the Storage Spaces Direct feature, and how does it provide scalable and resilient storage solutions?
- How do you create and configure virtual hard disks and virtual machines in Hyper-V environments?
- What is Storage Quality of Service (QoS), and how can it be configured to manage storage performance?
- How do you implement Data Deduplication to optimize storage utilization?
- What are the benefits of using iSCSI and Fibre Channel in a Windows Server storage environment?
- What is Hyper-V and how does it provide virtualization capabilities?
- How do you create, configure, and manage virtual machines in Hyper-V?
- What are checkpoints (formerly known as snapshots) in Hyper-V, and how are they used?
- How can you implement high availability for virtual machines using Hyper-V clustering?
- What is Nested Virtualization, and how can it be useful in certain scenarios?
- What are Windows Containers, and how do they differ from traditional virtualization?
- How do you install and manage Windows Containers using Docker?
- What are the advantages of using Containers for application deployment and management?
- How can you orchestrate and manage Containers using tools like Kubernetes?
- What security considerations should be taken into account when working with Windows Containers?



- What is the role of failover clustering in achieving high availability for applications and services?
- How do you create, configure, and manage a failover cluster in Windows Server 2016?
- What are cluster-aware updating and rolling upgrades, and how can they minimize downtime?
- How does Network Load Balancing (NLB) enhance availability for network services?
What are the considerations for deploying highly available VMs within a Hyper-V cluster?
- What is DNS and how does it resolve domain names to IP addresses?
- How do you install and configure DNS servers on Windows Server 2016?
- What are the different types of DNS zones, and how are they configured?
- What is DNSSEC and why is it important for DNS security?
- How do you troubleshoot common DNS resolution issues?
- What is DHCP and how does it assign IP addresses to network clients?
- How do you install and configure DHCP servers and scopes on Windows Server 2016?
- What is DHCP failover and how does it enhance DHCP availability?
- How do you configure DHCP options and reservations?
- What are common DHCP troubleshooting techniques?
- What is IPAM and how does it help manage IP address space?
- How do you install and configure IPAM servers on Windows Server 2016?
- What are IPAM provisioning and management capabilities?
- How does IPAM integrate with DHCP and DNS management?
- What are the benefits of using IPAM in large network environments?
- What is DirectAccess and how does it provide secure remote access to corporate resources?
- How do you configure and manage Virtual Private Network (VPN) connections?
- What is Network Address Translation (NAT) and how is it used for address translation?
- How do you implement Routing and Remote Access Services (RRAS)?
- What are common troubleshooting techniques for remote access and network connectivity?
- What are IPv4 and IPv6 addressing schemes, and how do they differ?
- How do you configure and manage IPv6 on Windows Server 2016?
- What are Distributed File System (DFS) and BranchCache, and how are they used for branch office solutions?
- What is Network Interface Card (NIC) Teaming and how does it enhance network performance?



- What are common network performance and connectivity troubleshooting strategies?

Content

- Windows Server 2016 editions and installation options.
- Hardware requirements and considerations.
- Installation using various deployment methods.
- Configuring Windows Server Core and Nano Server installations.
- Upgrading and migrating to Windows Server 2016.
- Overview of Storage Spaces Direct (S2D).
- Configuring and managing Storage Spaces and volumes.
- Implementing Data Deduplication.
- Managing Server Message Block (SMB) shares.
- Configuring iSCSI and Fibre Channel storage.
- Hyper-V overview and virtualization concepts.
- Installing and configuring Hyper-V on Windows Server 2016.
- Creating and configuring virtual machines.
- Virtual machine settings, checkpoints, and replication.
- Implementing high availability for Hyper-V.
- Introduction to Windows Containers.
- Installing and configuring Docker on Windows Server 2016.
- Creating, managing, and maintaining Windows Containers.
- Implementing Hyper-V containers.
- Orchestrating and managing containers using Kubernetes.
- Overview of high availability and disaster recovery solutions.
- Configuring failover clustering and network load balancing.
- Implementing and managing Hyper-V VM migration.
- Performing rolling upgrades and cluster-aware updating.
- Monitoring and managing cluster workloads.



- DNS concepts and components.
- Installing and configuring DNS servers.
- Creating and configuring DNS zones and records.
- Implementing DNSSEC and DNS socket pooling.
- Configuring DNS forwarding and conditional forwarding.
- DHCP concepts and deployment options.
- Installing and configuring DHCP servers and scopes.
- Managing DHCP reservations and options.
- Implementing DHCP failover and split scope.
- Configuring DHCP policies and filters.
- IPAM concepts and features.
- Installing and configuring IPAM servers.
- Managing IP address space using IPAM.
- Auditing and managing DHCP and DNS using IPAM.
- Integrating IPAM with Active Directory.
- Overview of DirectAccess and VPN solutions.
- Implementing Network Address Translation (NAT).
- Configuring Routing and Remote Access Services (RRAS).
- Implementing VPN reconnect.
- Troubleshooting network connectivity and remote access.
- Implementing IPv4 and IPv6 addressing.
- Deploying and managing DHCPv6 and DNSv6.
- Configuring branch office solutions using DFS and BranchCache.
- Implementing NIC Teaming and SMB Multichannel.
- Troubleshooting network connectivity and performance issues.

Skills

- Select appropriate Windows Server 2016 editions based on requirements.
- Determine hardware requirements for Windows Server 2016 installations.



- Choose the appropriate installation option for different scenarios.
- Install and configure Windows Server Core and Nano Server installations.
- Perform upgrades and migrations to Windows Server 2016.
- Create and manage volumes using Storage Spaces and Storage Spaces Direct (S2D).
- Configure and manage Data Deduplication.
- Manage Server Message Block (SMB) shares and permissions.
- Implement and manage iSCSI and Fibre Channel storage solutions.
- Configure and optimize Storage QoS (Quality of Service).
- Install and configure Hyper-V on Windows Server 2016.
- Create and manage virtual machines (VMs) using Hyper-V Manager and PowerShell.
- Configure VM settings, including memory, networking, and hardware resources.
- Implement checkpoint and snapshot management for VMs.
- Implement high availability for VMs using failover clustering.
- Understand and differentiate between Windows Server and Hyper-V containers.
- Install and configure Docker on Windows Server 2016.
- Manage and maintain Windows Containers.
- Implement and manage Hyper-V containers.
- Orchestrate container deployments using Kubernetes.
- Understand the concepts of high availability and disaster recovery.
- Configure and manage failover clustering.
- Implement Network Load Balancing (NLB) for high availability.
- Perform rolling upgrades and cluster-aware updating.
- Monitor and manage workloads on clustered hosts.
- Configure DNS server settings, forwarders, and root hints.
- Create and configure DNS zones, records, and resource records.
- Configure DNS replication and zones for Active Directory-integrated DNS.
- Implement DNSSEC and DNS Socket Pooling.
- Troubleshoot common DNS resolution issues.
- Install and configure DHCP servers and scopes.



- Configure DHCP options, reservations, and filters.
- Implement DHCP failover and split scope.
- Troubleshoot DHCP-related issues.
- Install and configure IPAM servers and features.
- Manage IP address space using IPAM.
- Audit and manage DHCP and DNS settings using IPAM.
- Integrate IPAM with Active Directory.
- Implement IPAM provisioning.
- Implement DirectAccess and VPN solutions.
- Configure Network Address Translation (NAT).
- Configure Routing and Remote Access Services (RRAS).
- Implement VPN reconnect.
- Troubleshoot network connectivity and remote access issues.
- Implement IPv4 and IPv6 addressing and subnetting.
- Configure DHCPv6 and DNSv6.
- Implement Distributed File System (DFS) and BranchCache.
- Implement NIC Teaming and SMB Multichannel.
- Troubleshoot network connectivity and performance issues.

Assessments

- Server Pro - Networking Certification - Testout
 - Server Pro - Identity Certification - Testout
 - Server Pro - Install & Storage Certification - Testout
-



Course: Network & System Administrator II

Pathway: System Administrator

Length: Semester

Standards

- 9.4.12.DC.2: Compare and contrast international differences in copyright laws and ethics.
- 9.4.12.DC.3: Evaluate the social and economic implications of privacy in the context of safety, law, or ethics
- 9.3.IT-NET.1 Analyze customer or organizational network system needs and requirements.
- 9.3.IT-NET.2 Analyze wired and wireless network systems to determine if they meet specifications (e.g., IEEE, power and security).
- 9.3.IT-NET.3 Design a network system using technologies, tools and standards.
- 9.3.IT-NET.4 Perform network system installation and configuration.
- 9.3.IT-NET.5 Perform network administration, monitoring and support to maintain a network system.
- 9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities .
- 9.4.12.CT.3: Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice).
- 9.4.12.CT.4: Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.
- 9.4.12.DC.1: Explain the beneficial and harmful effects that intellectual property laws can have on the creation and sharing of content .
- 9.4.12.DC.8: Explain how increased network connectivity and computing capabilities of everyday objects allow for innovative technological approaches to climate protection.

Essential Question(s)

- How do you configure and manage advanced DNS features like DNSSEC and DNS policies?
- What are software-defined networking (SDN) solutions and how are they implemented?
- How does Hyper-V Network Virtualization (HNV) provide isolation and multi-tenancy in virtualized networks?



- How do you configure advanced load balancing using Windows Server 2016 features?
- What are best practices for ensuring high availability in DNS and networking solutions?
- How do you configure Windows Firewall settings and manage advanced security settings?
- What is IPsec and how is it used to secure network communications?
- How do you implement security policies and auditing on network resources?
- What is server and domain isolation, and how is it implemented?
- How do you use certificates to enhance network security, and what role does PKI play?
- What are packet filtering and analysis, and how are they used for network monitoring?
- How do you use performance monitoring tools to monitor network performance?
- How is Windows Server 2016 used for network monitoring and troubleshooting?
- What are some common network-related issues that can be resolved using monitoring tools?
- What are best practices for identifying and resolving network connectivity and performance problems?
- What is Active Directory Domain Services (AD DS) and how does it provide authentication and directory services?
- How do you install and configure domain controllers on Windows Server 2016?
- What are the different Active Directory objects and their attributes?
- How do you manage users, groups, and computers in Active Directory?
- What are the security considerations when installing and configuring AD DS?
- How do you implement and manage Group Policy Objects (GPOs)?
- What are the key components of Group Policy processing and inheritance?
- How do you configure security policies and auditing in Active Directory?
- What is the process of backing up, restoring, and troubleshooting AD DS?
- What tools are available for managing and maintaining Active Directory objects?
- What are Group Policy Objects (GPOs) and how are they used for centralized configuration management?
- How do you implement GPO settings for user and computer configuration?
- How is Group Policy scope defined and managed?
- What is the role of Group Policy processing order in determining policy application?
- What strategies are effective for troubleshooting Group Policy-related issues?
- What is Active Directory Certificate Services (AD CS) and how does it provide certificate management?



- How do you install and configure Certification Authority (CA) hierarchy on Windows Server 2016?
- What is the purpose of certificate templates, and how are they managed?
- How do you manage certificate enrollment and revocation?
- What is key archival and recovery, and why is it important in AD CS?
- What is identity federation and how does it enable single sign-on across organizations?
- How do you implement Active Directory Federation Services (AD FS)?
- What is Web Application Proxy (WAP) and how is it used to publish applications externally?
- How do you implement Workplace Join and Device Registration?
- What is the role of Active Directory Rights Management Services (AD RMS) in access control?
- What is the role of Active Directory Federation Services (AD FS) in identity access management?
- How do you configure and manage Web Application Proxy (WAP)?
- How do you implement hybrid identity solutions using Azure AD Connect?
- What are the benefits of using Azure AD in identity management?
- What considerations are important when implementing identity access solutions?
- How do you configure AD DS sites and subnets for optimized replication?
- What is the process of configuring and monitoring replication in AD DS?
- What is the purpose of Read-Only Domain Controllers (RODCs) and how are they implemented?
- How do you manage and troubleshoot AD DS replication issues?
- What are best practices for optimizing AD DS replication?
- How do you configure and manage certification authorities (CAs) in AD CS?
- What are certificate templates and how are they used for issuing certificates?
- How do you manage certificate enrollment, revocation, and CRL distribution points?
- What is the process of configuring key archival and recovery in AD CS?
- What considerations are important for maintaining a secure PKI infrastructure?

Content

- Configuring advanced DNS settings.
- Implementing software-defined networking (SDN) solutions.
- Implementing Hyper-V Network Virtualization (HNV).



- Implementing advanced load balancing.
- Implementing high availability in DNS and networking solutions.
- Configuring Windows Firewall settings.
- Implementing IPsec and connection security rules.
- Implementing Windows Firewall with Advanced Security.
- Configuring server and domain isolation policies.
- Using certificates for network security.
- Monitoring network traffic using packet filtering and analysis.
- Monitoring network performance using performance monitoring tools.
- Implementing Windows Server 2016 monitoring solutions.
- Troubleshooting network-related issues using monitoring tools.
- Implementing network performance optimization.
- Overview of AD DS and its role in identity management.
- Installing and configuring domain controllers.
- Managing Active Directory users, groups, and computers.
- Configuring AD DS security settings.
- Installing and configuring Active Directory Certificate Services (AD CS).
- Managing Active Directory objects and attributes.
- Implementing Group Policy Objects (GPOs) and settings.
- Managing Group Policy processing and inheritance.
- Configuring security policies and auditing.
- Backing up, restoring, and troubleshooting AD DS.
- Understanding GPOs and their importance in centralized management.
- Implementing GPO settings for users and computers.
- Managing Group Policy scope and processing order.
- Troubleshooting Group Policy issues.
- Understanding AD CS and its role in certificate management.
- Installing and configuring Certification Authority (CA) hierarchy.
- Managing certificate templates.



- Enabling and managing certificate enrollment and revocation.
- Implementing and managing AD CS role services.
- Understanding identity federation and its benefits.
- Implementing Active Directory Federation Services (AD FS).
- Using Web Application Proxy (WAP) and AD FS.
- Implementing Workplace Join and Device Registration.
- Understanding Active Directory Rights Management Services (AD RMS).
- Understanding the role of AD FS in identity access.
- Configuring and managing Web Application Proxy (WAP).
- Implementing hybrid identity solutions with Azure AD Connect.
- Understanding and utilizing Azure Active Directory (Azure AD) features.
- Configuring AD DS sites and subnets for optimized replication.
- Monitoring and managing AD DS replication.
- Implementing Read-Only Domain Controllers (RODCs).
- Configuring and managing certification authorities (CAs) in AD CS.
- Managing certificate templates.
- Enabling and managing certificate enrollment, revocation, and CRL distribution points.

Skills

- Configure advanced DNS settings, DNS policies, and DNS-based authentication of named devices (DANE).
- Implement software-defined networking (SDN) solutions.
- Implement Hyper-V Network Virtualization (HNV) and Network Controller.
- Implement advanced load balancing using Windows Server 2016 features.
- Implement high availability for DNS and networking solutions.
- Configure Windows Firewall and advanced security settings.
- Implement IPsec and connection security rules.
- Configure Windows Firewall with Advanced Security.
- Implement server and domain isolation policies.



- Use certificates for network security.
- Monitor network traffic using packet filtering and analysis.
- Monitor network performance using performance monitoring tools.
- Implement Windows Server 2016 monitoring solutions.
- Troubleshoot network-related issues using monitoring tools.
- Implement network performance optimization.
- Install and configure domain controllers.
- Create and manage Active Directory users and computers.
- Configure domain controller security settings.
- Install and configure Active Directory Certificate Services (AD CS).
- Manage Active Directory objects and their attributes.
- Implement and manage Group Policy Objects (GPOs).
- Configure security policies and auditing.
- Implement backup, restore, and troubleshooting of AD DS.
- Implement Group Policy settings for users and computers.
- Manage Group Policy scope and Group Policy processing.
- Troubleshoot Group Policy issues.
- Install and configure Certification Authority (CA) hierarchy.
- Manage certificate templates.
- Manage certificate enrollment and revocation.
- Implement Active Directory Federation Services (AD FS) and Web Application Proxy (WAP).
- Implement Workplace Join and Device Registration.
- Implement Active Directory Rights Management Services (AD RMS).
- Implement Active Directory Federation Services (AD FS).
- Implement Web Application Proxy (WAP).
- Implement Azure AD Connect for hybrid identity.
- Configure AD DS sites and subnets for optimized replication.
- Monitor and manage replication.
- Implement Read-Only Domain Controllers (RODCs).



- Configure and manage certification authorities (CAs).
- Manage certificate templates.
- Manage certificate enrollment and revocation.

Assessments

- Server Pro - Networking Certification - Testout
- Server Pro - Identity Certification - Testout
- Server Pro - Install & Storage Certification - Testout

Course: Intro to Cisco
Networking

Pathway: System
Administrator

Length: Semester

Standards

- 9.4.12.DC.2: Compare and contrast international differences in copyright laws and ethics.
- 9.4.12.DC.3: Evaluate the social and economic implications of privacy in the context of safety, law, or ethics
- 9.3.IT-NET.1 Analyze customer or organizational network system needs and requirements.
- 9.3.IT-NET.2 Analyze wired and wireless network systems to determine if they meet specifications (e.g., IEEE, power and security).
- 9.3.IT-NET.3 Design a network system using technologies, tools and standards.
- 9.3.IT-NET.4 Perform network system installation and configuration.
- 9.3.IT-NET.5 Perform network administration, monitoring and support to maintain a network system.
- 9.3.IT-SUP.1 Provide technology support to maintain service.
- 9.3.IT-SUP.2 Manage operating systems and software applications, including maintenance of upgrades, patches and service packs.
- 9.3.IT-SUP.3 Apply appropriate troubleshooting techniques in resolving computer hardware, software and configuration problems.



- 9.3.IT-SUP.4 Perform installation, configuration and maintenance of operating systems.
- 9.3.IT-SUP.5 Demonstrate the use of networking concepts to develop a network.
- 9.3.IT-SUP.6 Evaluate the effectiveness of an information system.
- 9.3.IT-SUP.7 Employ system installation and maintenance skills to setup and maintain an information system.
- 9.3.IT-SUP.8 Employ system administration and control skills to monitor the performance of an information system.

Essential Question(s)

- What are the key components of a network architecture?
- How does the OSI model help in understanding network communication?
- What is the difference between TCP and UDP, and when would you use each?
- What is NAT (Network Address Translation), and why is it used in networking?
- How do IPv4 and IPv6 address formats differ, and why is IPv6 important?
- What is Ethernet, and how does it function at the Data Link layer?
- What are the roles of switches and their forwarding mechanisms?
- How do Spanning Tree Protocol (STP) and Rapid Spanning Tree Protocol (RSTP) prevent loops?
- What is the purpose of Dynamic Host Configuration Protocol (DHCP) and Domain Name System (DNS)?
- How does routing work in a network?
- What is the purpose of administrative distance in routing?
- How does a router make forwarding decisions using routing tables?
- What is Network Address Translation (NAT), and why is it used?
- How does Quality of Service (QoS) impact network traffic?
- What are the benefits of Network Time Protocol (NTP)?
- How does Simple Network Management Protocol (SNMP) facilitate network management?
- What are common network security threats and vulnerabilities?
- What is a Virtual Private Network (VPN), and how does it enhance security?
- How does port security help in preventing unauthorized access?



- What is network automation, and why is it important?
- How can you use Python scripting to automate network tasks?
- What are the advantages of network monitoring and management tools

Content

- Networking fundamentals and concepts
- The OSI (Open Systems Interconnection) model
- TCP/IP and the Internet Protocol suite
- Data encapsulation and de-encapsulation
- Ethernet and LAN technologies
- Virtual LANs (VLANs) and trunking
- Switch operation and configuration
- Spanning Tree Protocol (STP) and Rapid Spanning Tree Protocol (RSTP)
- IP addressing and subnetting
- Routing concepts and protocols
- Static and dynamic routing
- OSPF (Open Shortest Path First) routing protocol
- DHCP (Dynamic Host Configuration Protocol)
- NAT (Network Address Translation)
- Access Control Lists (ACLs)
- Quality of Service (QoS) principles
- Common network security threats and vulnerabilities
- AAA (Authentication, Authorization, and Accounting)
- Firewalls and intrusion detection/prevention systems
- VPN (Virtual Private Network) technologies
- Network automation and its benefits
- Python scripting for network tasks
- Introduction to SDN (Software-Defined Networking)



- Network monitoring and management tools
- WAN technologies and concepts
- Point-to-Point Protocol (PPP) and HDLC
- Frame Relay and MPLS (Multiprotocol Label Switching)
- WAN security and VPN implementation
- Troubleshooting methodology
- Using network diagnostic tools
- Common network issues and their resolutions
- Network documentation and best practices
- Wireless LAN standards and technologies
- WLAN components and configuration
- Wireless security and encryption
- Network design principles and considerations
- Implementing and verifying IPv4 and IPv6 addressing
- Network segmentation and scalability
- Network redundancy and high availability
- IPv6 addressing and subnetting
- IPv6 routing and OSPFv3
- Transitioning from IPv4 to IPv6
- Introduction to cloud computing models
- Network services in the cloud
- Virtualization technologies and network implications
- SNMP (Simple Network Management Protocol)
- Syslog and NetFlow for network monitoring
- Network troubleshooting and analysis tools
- IoT (Internet of Things) and its impact on networking
- Network security implications of IoT
- Cloud services and their role in networking



Skills

- Understanding the OSI model and its layers.
- Configuring and verifying IP addresses, subnetting, and CIDR notation.
- Differentiating between TCP and UDP and their appropriate use cases.
- Configuring and verifying VLANs and trunking.
- Configuring and verifying basic switch operation.
- Implementing and troubleshooting Spanning Tree Protocol (STP) and Rapid Spanning Tree Protocol (RSTP).
- Configuring and verifying basic router operation.
- Understanding and configuring static and dynamic routing.
- Implementing and troubleshooting OSPF routing protocol.
- Configuring and verifying DHCP and DNS services.
- Configuring Network Address Translation (NAT).
- Implementing and troubleshooting access control lists (ACLs).
- Identifying common network security threats and implementing mitigation strategies.
- Configuring and verifying port security.
- Configuring and verifying VPN technologies.
- Writing and executing basic Python scripts for network tasks.
- Understanding the concept of network automation.
- Exploring Software-Defined Networking (SDN) and its benefits.
- Configuring and verifying serial connections using PPP and HDLC.
- Configuring and troubleshooting Frame Relay and MPLS.
- Developing a structured approach to network troubleshooting.
- Using diagnostic tools to analyze and resolve network issues.
- Identifying and resolving common network problems.
- Configuring and verifying basic wireless LAN settings.
- Implementing and troubleshooting wireless security and encryption.
- Applying network design principles for scalability and redundancy.
- Configuring and verifying IPv4 and IPv6 addressing.



- Implementing network segmentation and high availability solutions.
- Configuring and verifying IPv6 addressing and routing.
- Implementing and troubleshooting OSPFv3.
- Understanding cloud computing models and services.
- Configuring network services in a cloud environment.
- Exploring virtualization technologies and their networking implications.
- Configuring and using SNMP for network monitoring.
- Analyzing network data using syslog and NetFlow.
- Identifying and using network troubleshooting tools.
- Understanding the impact of IoT on networking.
- Exploring network security considerations for IoT devices.
- Understanding the role of cloud services in networking.

Assessments

- Routing and Switching Pro Certification - testout
- Cisco CCNA 200-301

Course: Introduction to Cybersecurity

Pathway: Cybersecurity

Length: Semester

Standards

- 9.3.IT.1 Demonstrate effective professional communication skills and practices that enable positive customer relationships.
- 9.3.IT.2 Use product or service design processes and guidelines to produce a quality information technology (IT) product or service.
- 9.3.IT.3 Demonstrate the use of cross-functional teams in achieving IT project goals.
- 9.3.IT.4 Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors.
- 9.3.IT.5 Explain the implications of IT on business development.



- 9.3.IT.6 Describe trends in emerging and evolving computer technologies and their influence on IT practices.
- 9.3.IT.7 Perform standard computer backup and restore procedures to protect IT information.
- 9.3.IT.8 Recognize and analyze potential IT security threats to develop and maintain security requirements.
- 9.3.IT.9 Describe quality assurance practices and methods employed in producing and providing quality IT products and services.
- 9.3.IT.10 Describe the use of computer forensics to prevent and solve information technology crimes and security breaches.
- 9.3.IT.12 Demonstrate knowledge of the hardware components associated with information systems.
- 9.3.IT.13 Compare key functions and applications of software and determine maintenance strategies for computer systems.
- 9.4.12.DC.3: Evaluate the social and economic implications of privacy in the context of safety, law, or ethics (e.g., 6.3.12.HistoryCA.1).
- 9.4.12.DC.4: Explain the privacy concerns related to the collection of data (e.g., cookies) and generation of data through automated processes that may not be evident to users (e.g., 8.1.12.NI.3).
- 9.4.12.DC.5: Debate laws and regulations that impact the development and use of software.
- 9.4.12.DC.6: Select information to post online that positively impacts personal image and future college and career opportunities.
- 9.4.12.DC.7: Evaluate the influence of digital communities on the nature, content and responsibilities of careers, and other aspects of society

Essential Question(s)

- What are the differences between viruses, worms, and Trojans?
- How can you identify indicators of compromise on a system?
- What is the difference between a DoS and a DDoS attack?
- How does a phishing attack differ from a spear phishing attack?
- What psychological techniques are commonly used in social engineering attacks?
- How can users be trained to recognize and resist social engineering attempts?
- How can you defend against deauthentication attacks on a wireless network?
- What is the purpose of a SQL injection attack?



- How can developers prevent cross-site scripting (XSS) vulnerabilities in web applications?
- What tactics might organized crime groups use in cyberattacks?
- What is the difference between a white-box and a black-box penetration test?
- How does a penetration tester determine the scope of a test?
- How can load balancers contribute to network availability and security?
- What information can be obtained through packet analysis?
- How do vulnerability scanners help identify potential security weaknesses?
- What is the purpose of network segmentation in security architecture?
- How does the principle of "defense in depth" enhance network security?
- What is the shared responsibility model in cloud security?
- How can you secure containers in a virtualized environment?
- What are the security risks associated with BYOD (Bring Your Own Device)?
- How can you secure Internet of Things (IoT) devices from unauthorized access?
- What is the goal of integrating security into the DevOps process?

Content

- Types of Malware and Indicators of Compromise
- Types of Attacks
- Social Engineering Attacks
- Wireless Attacks
- Application Attacks
- Threat Actor Types and Attributes
- Penetration Testing Concepts
- Network Components and Security Devices
- Network Tools for Security
- Secure Network Design and Implementation
- Cloud and Virtualization Security
- Mobile Device and IoT Security
- Secure Application Development and Deployment



- Secure Network Architecture Concepts
- Security Implications of Embedded Systems
- Security Implications of Web and Cloud-based Services
- Secure Application Development and Deployment Concepts
- Risk Management Processes and Concepts
- Identity and Access Management Concepts
- Access Control Methods
- Authentication Factors and Requirements
- Public Key Infrastructure (PKI)
- Importance of Policies, Plans, and Procedures
- Business Impact Analysis Concepts
- Risk Management Processes and Concepts
- Disaster Recovery and Continuity of Operations Concepts
- Basic Cryptographic Concepts
- Cryptographic Algorithms and Their Characteristics
- Implementing Public Key Infrastructure (PKI)
- Using Certificates

Skills

- Explain types of malware and common indicators of compromise.
- Compare and contrast types of attacks.
- Summarize various types of social engineering attacks.
- Explain types of wireless attacks.
- Describe types of application attacks.
- Explain threat actor types and attributes.
- Explain penetration testing concepts.
- Install and configure network components.
- Use appropriate network tools to facilitate security.
- Explain secure network design and implementation concepts.



- Explain cloud and virtualization concepts.
- Explain mobile device and IoT security concepts.
- Summarize secure application development and deployment concepts.
- Implement secure network architecture concepts.
- Explain security implication of embedded systems.
- Explain security implications of web and cloud-based services.
- Summarize secure application development and deployment concepts.
- Summarize risk management processes and concepts.
- Compare and contrast identity and access management concepts.
- Explain access control concepts and methodologies.
- Compare and contrast authentication factors and requirements.
- Implement public key infrastructure.
- Explain the importance of policies, plans, and procedures.
- Summarize business impact analysis concepts.
- Explain risk management processes and concepts.
- Explain disaster recovery and continuity of operations concepts.
- Compare and contrast basic concepts of cryptography.
- Explain cryptography algorithms and their basic characteristics.
- Implement public key infrastructure.
- Explain the use of certificates.

Assessments

- Security Pro Certification - Testout
- CompTIA Security+ SY0-601

Course: Computer Forensics I

Pathway: Cybersecurity

Length: Semester

Standards



- 9.3.IT.12 Demonstrate knowledge of the hardware components associated with information systems.
- 9.3.IT.13 Compare key functions and applications of software and determine maintenance strategies for computer systems.
- 9.4.12.DC.3: Evaluate the social and economic implications of privacy in the context of safety, law, or ethics (e.g., 6.3.12.HistoryCA.1).
- 9.4.12.DC.4: Explain the privacy concerns related to the collection of data (e.g., cookies) and generation of data through automated processes that may not be evident to users (e.g., 8.1.12.NI.3).
- 9.4.12.DC.5: Debate laws and regulations that impact the development and use of software.
- 9.4.12.DC.6: Select information to post online that positively impacts personal image and future college and career opportunities.
- 9.3.IT.1 Demonstrate effective professional communication skills and practices that enable positive customer relationships.
- 9.3.IT.2 Use product or service design processes and guidelines to produce a quality information technology (IT) product or service.
- 9.3.IT.3 Demonstrate the use of cross-functional teams in achieving IT project goals.
- 9.3.IT.4 Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors.
- 9.3.IT.5 Explain the implications of IT on business development.
- 9.3.IT.6 Describe trends in emerging and evolving computer technologies and their influence on IT practices.
- 9.3.IT.7 Perform standard computer backup and restore procedures to protect IT information.
- 9.3.IT.8 Recognize and analyze potential IT security threats to develop and maintain security requirements.
- 9.3.IT.9 Describe quality assurance practices and methods employed in producing and providing quality IT products and services.
- 9.3.IT.10 Describe the use of computer forensics to prevent and solve information technology crimes and security breaches.
- 9.4.12.DC.7: Evaluate the influence of digital communities on the nature, content and responsibilities of careers, and other aspects of society
-

Essential Question(s)



- What is computer forensics and why is it important in modern investigations?
- What are the key differences between traditional crime scene investigations and digital forensics?
- What types of digital evidence can be collected during an investigation?
- How do legal considerations, such as the Fourth Amendment, impact digital evidence collection?
- What is the chain of custody in digital forensics, and why is it crucial?
- How do you ensure the integrity and admissibility of digital evidence in court?
- What are the phases of a digital forensic investigation?
- How do you identify, preserve, collect, analyze, and present digital evidence?
- What are some commonly used tools for acquiring and analyzing digital evidence?
- How do you recover deleted files and uncover hidden data?
- What are the characteristics of different file systems (FAT, NTFS, ext4) and their impact on investigations?
- How can you recover files from damaged or corrupted storage media?
- What is memory forensics and why is it important in investigations?

Content

- Overview of computer forensics and its role in investigations
- Differences between traditional and digital crime scene investigations
- Digital evidence and its importance
- Legal considerations and ethical issues in computer forensics
- Types of digital evidence (physical, logical, testimonial)
- Legal framework and Fourth Amendment considerations
- Digital evidence admissibility in court
- Roles of digital forensics experts in legal proceedings
- Chain of custody and its significance
- Preserving evidence integrity during collection, transportation, and storage
- Documentation and labeling of evidence
- Establishing and maintaining the chain of custody
- Identification and Assessment
- Collection and Preservation



- Analysis
- Reporting and Presentation
- Digital forensic software and hardware tools
- Image acquisition and duplication methods
- Hashing and integrity verification
- Data recovery techniques and forensic imaging
- File system fundamentals (FAT, NTFS, ext4, HFS+)
- Data storage devices (hard drives, SSDs, USB drives)
- File system analysis and recovery
- Data carving and undelete techniques
- Volatile data and its importance
- Live memory acquisition and analysis

Skills

- Understand the role of computer forensics in investigations.
- Identify the differences between digital and traditional crime scene investigations.
- Recognize the importance of digital evidence in legal proceedings.
- Apply proper techniques for collecting, preserving, and documenting digital evidence.
- Establish and maintain the chain of custody for digital evidence.
- Demonstrate knowledge of legal considerations and ethical issues related to evidence handling.
- Utilize forensic tools to create images of digital storage media.
- Conduct in-depth analysis of file systems and data structures.
- Identify hidden, deleted, or encrypted data within storage devices.
- Acquire volatile data from live systems using appropriate techniques.
- Analyze memory dumps to identify running processes, open files, and network connections.
- Recognize signs of malware or malicious activity in memory.
- Capture and analyze network traffic to reconstruct digital events.
- Identify communication patterns and potential security breaches.



- Apply network forensic techniques in incident response scenarios.

Assessments

- Quizzes and Tests:
- Lab Exercises
- Case Studies
- Practical Projects
- Research Papers
- Mock Courtroom Presentation
- Final Exam
- Certification

Course: Computer Forensics II

Pathway: Cybersecurity

Length: Semester

Standards

- 9.3.IT.12 Demonstrate knowledge of the hardware components associated with information systems.
- 9.3.IT.13 Compare key functions and applications of software and determine maintenance strategies for computer systems.
- 9.4.12.DC.3: Evaluate the social and economic implications of privacy in the context of safety, law, or ethics (e.g., 6.3.12.HistoryCA.1).
- 9.4.12.DC.4: Explain the privacy concerns related to the collection of data (e.g., cookies) and generation of data through automated processes that may not be evident to users (e.g., 8.1.12.NI.3).
- 9.4.12.DC.5: Debate laws and regulations that impact the development and use of software.
- 9.4.12.DC.6: Select information to post online that positively impacts personal image and future college and career opportunities.
- 9.3.IT.1 Demonstrate effective professional communication skills and practices that enable positive customer relationships.



- 9.3.IT.2 Use product or service design processes and guidelines to produce a quality information technology (IT) product or service.
- 9.3.IT.3 Demonstrate the use of cross-functional teams in achieving IT project goals.
- 9.3.IT.4 Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors.
- 9.3.IT.5 Explain the implications of IT on business development.
- 9.3.IT.6 Describe trends in emerging and evolving computer technologies and their influence on IT practices.
- 9.3.IT.7 Perform standard computer backup and restore procedures to protect IT information.
- 9.3.IT.8 Recognize and analyze potential IT security threats to develop and maintain security requirements.
- 9.3.IT.9 Describe quality assurance practices and methods employed in producing and providing quality IT products and services.
- 9.3.IT.10 Describe the use of computer forensics to prevent and solve information technology crimes and security breaches.

Essential Question(s)

- How can you extract volatile data from a live system's memory?
- What is network forensics and how is it used to investigate cybercrimes?
- How can you capture and analyze network traffic to reconstruct digital events?
- What challenges are unique to mobile device forensics?
- How can you recover data from smartphones, tablets, and other mobile devices?
- What is malware analysis and how does it assist in investigations?
- How can you reverse engineer malicious software to understand its behavior?
- How does digital forensics contribute to incident response?
- What steps should an organization take when responding to a cybersecurity incident?
- What ethical considerations are important for digital forensic professionals?
- How should digital forensic experts maintain professionalism and impartiality?
- How have real-world digital forensic cases been solved using the techniques learned?
- Can you apply your knowledge to practical exercises simulating investigation scenarios



Content

- Identifying running processes, network connections, and artifacts
- Memory dump analysis using tools
- Network protocols and packet analysis
- Capturing and analyzing network traffic
- Identifying and reconstructing digital events
- Network intrusion detection and incident response
- Challenges and considerations in mobile device forensics
- Acquiring and analyzing mobile device data
- Recovering deleted data from smartphones and tablets
- Mobile application analysis and data extraction
- Understanding malware and its types
- Static and dynamic malware analysis techniques
- Reverse engineering basics
- Analyzing malware behavior and identifying indicators of compromise
- Role of digital forensics in incident response
- Developing an incident response plan
- Responding to cybersecurity incidents using forensics techniques
- Post-incident analysis and reporting
- Ethical considerations and standards in computer forensics
- Maintaining impartiality and professionalism
- Reporting findings accurately and objectively
- Legal and ethical responsibilities of digital forensics professionals
- Analyzing real-world digital forensic cases
- Applying learned techniques to practical exercises
- Collaborative investigations and team dynamics
- Presenting findings and conclusions



Skills

- Acquire and analyze data from mobile devices, including smartphones and tablets.
- Recover deleted data and artifacts from mobile applications.
- Recognize challenges and considerations specific to mobile device forensics.
- Analyze malware behavior using both static and dynamic analysis techniques.
- Reverse engineer malicious software to understand its inner workings.
- Identify indicators of compromise (IoC) and potential attack vectors.
- Develop and implement incident response plans using digital forensic techniques.
- Collect and preserve evidence during incident response efforts.
- Prepare accurate and concise reports for use in legal proceedings.
- Adhere to ethical standards and legal obligations in computer forensics.
- Maintain professionalism and impartiality throughout investigations.
- Ensure the accuracy and reliability of findings presented in reports and court proceedings.
- Apply learned techniques to real-world scenarios through hands-on exercises.
- Analyze case studies to understand the application of computer forensics in investigations.
- Collaborate effectively with team members to solve complex forensic challenges.

Assessments

- Quizzes and Tests:
 - Lab Exercises
 - Case Studies
 - Practical Projects
 - Research Papers
 - Mock Courtroom Presentation
 - Final Exam
 - Certification
-



Course: Computer Science I

Pathway: Web
Development/Programming

Length: Semester

Standards

- 9.3.IT-PRG.1 Analyze customer software needs and requirements.
- 9.3.IT-PRG.2 Demonstrate the use of industry standard strategies and project planning to meet customer specifications.
- 9.3.IT-PRG.3 Analyze system and software requirements to ensure maximum operating efficiency.
- 9.3.IT-PRG.4 Demonstrate the effective use of software development tools to develop software applications.
- 9.3.IT-PRG.5 Apply an appropriate software development process to design a software application.
- 9.3.IT-PRG.6 Program a computer application using the appropriate programming language.
- 9.3.IT-PRG.7 Demonstrate software testing procedures to ensure quality products.
- 9.3.IT-PRG.8 Perform quality assurance tasks as part of the software development cycle.
- 9.3.IT-PRG.9 Perform software maintenance and customer support functions.
- 9.3.IT-PRG.10 Design, create and maintain a database.
- .4.12.IML.1: Compare search browsers and recognize features that allow for filtering of information.
- 9.4.12.IML.2: Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources (e.g., NJSLSA.W8, Social Studies Practice: Gathering and Evaluating Sources).
- ·9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8)
- 9.4.12.IML.4: Assess and critique the appropriateness and impact of existing data visualizations for an intended audience (e.g., S-ID.B.6b, HS-LS2-4).
- ·9.4.12.IML.5: Evaluate, synthesize, and apply information on climate change from various sources appropriately



Essential Question(s)

- What is Object-Oriented Programming, and why is it important?
- What are the core principles of OOP?
- How does OOP differ from procedural programming?
- What is a class in Java, and what role does it play in OOP?
- What are objects, and how are they related to classes?
- How do you create instances of a class (objects) in Java?
- What is encapsulation, and why is it important in OOP?
- How do access modifiers (public, private, protected) affect encapsulation?
- What are getters and setters, and how do they promote encapsulation?
- What is inheritance, and how does it support code reusability?
- How do you define a subclass (derived class) and a superclass (base class)?
- What are the benefits and potential pitfalls of using inheritance?
- What is polymorphism, and why is it a key concept in OOP?
- How does Java achieve polymorphism through method overriding and interfaces?
- What is dynamic method dispatch, and how does it relate to polymorphism?

Content

- Understanding the need for OOP
- Key concepts: classes, objects, methods, attributes
- Advantages of OOP over procedural programming
- Setting up the Java Development Kit (JDK)
- Writing and running a basic Java program
- Understanding Java's syntax and structure
- Defining classes and creating objects
- Instance variables and methods
- Constructors and overloading
- Using this keyword



- Access modifiers: public, private, protected
- Getters and setters methods
- Data hiding and information protection
- Creating a subclass and superclass relationship
- Method overriding and super keyword
- Using instanceof for type checking
- Understanding polymorphism and its types
- Method overloading and compile-time polymorphism
- Method overriding and runtime polymorphism
- Abstract classes and methods

Skills

- Proficiency in Java syntax, data types, and operators
- Ability to write and execute basic Java programs
- Understanding of class and method structures
- Creation and instantiation of classes and objects
- Defining and using instance variables and methods
- Implementing constructors and constructor chaining
- Grasp of access modifiers (public, private, protected)
- Skill in designing classes with proper encapsulation
- Effective use of getter and setter methods
- Understanding of the "is-a" relationship in inheritance
- Ability to create and extend classes using inheritance
- Proficiency in method overriding and using the super keyword
- Skill in implementing method overloading and overriding
- Proficiency in using polymorphism to achieve flexibility in code
- Understanding dynamic method dispatch and type casting

Assessments



- Test & Quizzes - Theory and Concepts
- Code Analysis and Correction
- Practical Implementation
- Problem-Solving and Design

Course: Computer Science II

Pathway: Web
Development/Programming

Length: Semester

Standards

- 9.3.IT-PRG.10 Design, create and maintain a database.
- 9.4.12.IML.2: Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources (e.g., NJSLA.W8, Social Studies Practice: Gathering and Evaluating Sources.
- 9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8)
- 9.4.12.IML.4: Assess and critique the appropriateness and impact of existing data visualizations for an intended audience (e.g., S-ID.B.6b, HS-LS2-4).
- 9.4.12.IML.5: Evaluate, synthesize, and apply information on climate change from various sources appropriately
- 9.3.IT-PRG.1 Analyze customer software needs and requirements.
- 9.3.IT-PRG.2 Demonstrate the use of industry standard strategies and project planning to meet customer specifications.
- 9.3.IT-PRG.3 Analyze system and software requirements to ensure maximum operating efficiency.
- 9.3.IT-PRG.4 Demonstrate the effective use of software development tools to develop software applications.
- 9.3.IT-PRG.5 Apply an appropriate software development process to design a software application.



- 9.3.IT-PRG.6 Program a computer application using the appropriate programming language.
- 9.3.IT-PRG.7 Demonstrate software testing procedures to ensure quality products.
- 9.3.IT-PRG.8 Perform quality assurance tasks as part of the software development cycle.
- 9.3.IT-PRG.9 Perform software maintenance and customer support functions.

Essential Question(s)

- What is abstraction, and why is it essential for managing complexity?
- How do abstract classes and methods help in achieving abstraction?
- How does Java support interfaces as a means of abstraction?
- What are different types of relationships between classes, like association, composition, and aggregation?
- How do you represent these relationships in Java code?
- What are the implications of choosing one relationship type over another?
- What is the Single Responsibility Principle (SRP)?
- What is the Open/Closed Principle (OCP)?
- What is the Liskov Substitution Principle (LSP)?
- What is the Interface Segregation Principle (ISP)?
- What is the Dependency Inversion Principle (DIP)?
- How does Java's exception handling mechanism work?
- What is the purpose of try, catch, finally, and throw statements?
- How can custom exceptions be defined and used in Java?
- What is the process of object-oriented analysis and design?
- How do you create UML diagrams to represent classes, relationships, and behaviors?
- How does OOAD contribute to the development of robust and maintainable software?

Content

- Abstract classes and interfaces
- Implementing interfaces and abstract methods



- Achieving abstraction to hide implementation details
- Understanding exceptions and errors
- Using try-catch blocks
- Throwing and catching exceptions
- Creating custom exceptions
- Single Responsibility Principle (SRP)
- Open/Closed Principle (OCP)
- Liskov Substitution Principle (LSP)
- Interface Segregation Principle (ISP)
- Dependency Inversion Principle (DIP)
- Understanding class relationships
- Aggregation and composition differences
- Role of association in OOP
- Organizing classes into packages
- Import statements and class visibility
- Access control modifiers and their effects
- Reading from and writing to files
- Using FileReader, FileWriter, BufferedReader, BufferedWriter
- Serialization and deserialization of objects
- Lists, Sets, and Maps
- Working with ArrayList, LinkedList, HashSet, HashMap
- Iterators and enhanced for loops
- Basics of multithreading
- Creating and managing threads
- Synchronization and thread safety
- Introduction to Java GUI Programming:
- Using Swing components
- Event handling and listeners
- Understanding the software development life cycle



- UML diagrams: class diagrams, sequence diagrams
- Design patterns and their application

Skills

- Creation of abstract classes and abstract methods
- Implementation of interfaces to achieve abstraction
- Ability to separate interfaces from their implementations
- Knowledge of Java's exception hierarchy
- Skill in using try-catch blocks and handling exceptions
- Ability to create custom exception classes
- Understanding and application of SOLID principles
- Skill in designing classes with single responsibilities
- Ability to create flexible and maintainable code using design patterns
- Proficiency in creating and managing class relationships
- Ability to distinguish between association, composition, and aggregation
- Skill in modeling complex relationships in code
- Familiarity with common collection classes (List, Set, Map)
- Proficiency in using collections to manage data
- Skill in iterating over collections using various techniques
- Basic understanding of multithreading and thread synchronization
- Ability to create and manage threads
- Skill in avoiding common pitfalls in concurrent programming
- Ability to read from and write to files
- Proficiency in using FileReader, FileWriter, ObjectOutputStream, etc.
- Skill in handling exceptions related to file operations
- Java GUI Programming (Optional):
 - Basic understanding of creating graphical user interfaces
 - Proficiency in using Swing components for GUI development
 - Skill in event handling and responding to user actions



- Familiarity with the software development life cycle
- Ability to create UML diagrams for class design
- Skill in applying design patterns to real-world scenarios

Assessments

- Test & Quizzes - Theory and Concepts
- Code Analysis and Correction
- Practical Implementation
- Problem-Solving and Design

Course: Fundamentals of Web
Design II

Pathway: Web
Development/Programming

Length: Semester

Standards

- 9.4.12.IML.2: Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources (e.g., NJSLSA.W8, Social Studies Practice: Gathering and Evaluating Sources).
- ·9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8)
- 9.4.12.IML.4: Assess and critique the appropriateness and impact of existing data visualizations for an intended audience (e.g., S-ID.B.6b, HS-LS2-4).
- 9.3.IT-WD.1 Analyze customer requirements to design and develop a Web or digital communication product.
- 9.3.IT-WD.2 Apply the design and development process to produce user-focused Web and digital communications solutions.
- 9.3.IT-WD.3 Write product specifications that define the scope of work aligned to customer requirements.
- 9.3.IT-WD.4 Demonstrate the effective use of tools for digital communication production, development and project management.



- 9.3.IT-WD.5 Develop, administer and maintain Web applications.
- 9.3.IT-WD.6 Design, create and publish a digital communication product based on customer needs.
- 9.3.IT-WD.7 Evaluate the functionality of a digital communication product using industry accepted techniques and metrics.
- 9.3.IT-WD.8 Implement quality assurance processes to deliver quality digital communication products and services.
- 9.3.IT-WD.9 Perform maintenance and customer support functions for digital communication products.
- 9.3.IT-WD.10 Comply with intellectual property laws, copyright laws and ethical practices when creating Web/digital communications.
- 9.4.12.IML.5: Evaluate, synthesize, and apply information on climate change from various sources appropriately

Essential Question(s)

- What is responsive design and why is it important?
- How can you create a website that looks and works well across various devices and screen sizes?
- What are the key techniques for implementing responsive design?
- How do you choose and optimize images for the web?
- What is the balance between image quality and page load speed?
- What are the different image file formats and their best use cases?
- Why is web accessibility important?
- What are the Web Content Accessibility Guidelines (WCAG) and how do they impact design decisions?
- How can you design for users with disabilities?
- What are the principles of interaction design?
- How can you create engaging and interactive user experiences?
- What role do animations and transitions play in web design?
- What is the purpose of wireframing and prototyping in the design process?
- How do these tools help in visualizing and refining the design before development?
- What are some commonly used tools for web design, such as design software and prototyping tools?
- How can these tools assist in the design process?



Content

- What is Web Accessibility?
- Importance of Accessibility for All Users
- Web Content Accessibility Guidelines (WCAG)
- Designing for Screen Readers and Assistive Technologies
- Principles of Interaction Design
- Creating Effective Call-to-Actions
- Using Microinteractions and Feedback
- Incorporating Animation and Transitions
- Purpose of Wireframes and Prototypes
- Sketching and Low-Fidelity Wireframing
- Creating High-Fidelity Prototypes
- User Testing and Iterative Design
- Introduction to Design Software (e.g., Adobe XD, Sketch, Figma)
- Prototyping Tools (e.g., InVision, Axure)
- HTML and CSS Basics for Designers
- Collaboration and Version Control Tools
- Applying Design Principles to a Real-World Project
- Developing a Website Prototype
- Refining Design Based on Feedback
- Creating a Design Portfolio
- Emerging Design Trends and Innovations
- Impact of Technology (e.g., AI, VR) on Design
- Continuous Learning and Professional Development

Skills

- Identify accessibility barriers and design with inclusivity in mind.
- Apply WCAG guidelines to create accessible web content.



- Design for screen readers and assistive technologies.
- Create effective calls-to-action (CTAs) for user engagement.
- Incorporate microinteractions and feedback mechanisms.
- Implement animations and transitions to enhance user experience.
- Develop low-fidelity wireframes for visualizing layout and structure.
- Construct high-fidelity prototypes to simulate user interactions.
- Gather user feedback and iteratively refine designs.
- Use design software (e.g., Adobe XD, Figma) to create visual designs.
- Utilize prototyping tools (e.g., InVision) to simulate interactive experiences.
- Apply basic HTML and CSS skills to understand design implementation.
- Apply design principles to a real-world project.
- Develop a functional website prototype based on design concepts.
- Create and present a design portfolio showcasing completed projects.
- Stay informed about emerging design trends and technologies.
- Adapt to the changing landscape of web design through continuous learning.
- Anticipate the impact of new technologies on design practices.

Assessments

- Website Design Project and Portfolio Assessment

Course: Introduction to
Operating Systems

Pathway: Electives

Length: Semester

Standards



- 9.3.IT.1 Demonstrate effective professional communication skills and practices that enable positive customer relationships.
- 9.3.IT.2 Use product or service design processes and guidelines to produce a quality information technology (IT) product or service.
- 9.3.IT.3 Demonstrate the use of cross-functional teams in achieving IT project goals.
- 9.3.IT.4 Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors.
- 9.3.IT.5 Explain the implications of IT on business development.
- 9.3.IT.6 Describe trends in emerging and evolving computer technologies and their influence on IT practices.
- 9.3.IT.7 Perform standard computer backup and restore procedures to protect IT information.
- 9.3.IT.8 Recognize and analyze potential IT security threats to develop and maintain security requirements.
- 9.3.IT.9 Describe quality assurance practices and methods employed in producing and providing quality IT products and services.
- 9.3.IT.10 Describe the use of computer forensics to prevent and solve information technology crimes and security breaches.
- 9.3.IT.12 Demonstrate knowledge of the hardware components associated with information systems.
- 9.3.IT.13 Compare key functions and applications of software and determine maintenance strategies for computer systems.
- 9.3.IT-SUP.1 Provide technology support to maintain service.
- 9.3.IT-SUP.2 Manage operating systems and software applications, including maintenance of upgrades, patches and service packs.
- 9.3.IT-SUP.3 Apply appropriate troubleshooting techniques in resolving computer hardware, software and configuration problems.
- 9.3.IT-SUP.4 Perform installation, configuration and maintenance of operating systems.
- 9.3.IT-SUP.5 Demonstrate the use of networking concepts to develop a network.
- 9.3.IT-SUP.6 Evaluate the effectiveness of an information system.
- 9.3.IT-SUP.7 Employ system installation and maintenance skills to setup and maintain an information system.
- 9.3.IT-SUP.8 Employ system administration and control skills to monitor the performance of an information system.
- 9.3.IT-SUP.9 Employ technical writing and documentation skills in support of an information system.



- 9.3.IT-SUP.10 Apply quality assurance processes to maximize information system operation.

Essential Question(s)

- What are the key steps to set up and configure Windows 10 devices for enterprise use?
- How can you manage local and Microsoft Azure Active Directory identities for authentication?
- What are the methods to protect devices using Windows Defender Antivirus and Windows Defender Firewall?
- How do you implement and manage BitLocker encryption for data protection?
- What tools and strategies are used for monitoring and managing device performance and security?
- What is the role of Group Policy and Mobile Device Management (MDM) policies in managing devices?
- How can you configure and enforce security policies, such as password policies and Windows Hello for Business?
- What are configuration profiles, and how are they used to manage device settings?
- How do you manage user profiles and settings using User Experience Virtualization (UE-V)?
- What is the process of implementing and managing application settings using Group Policy or MDM?
- What is Microsoft Intune, and how does it contribute to device management and protection?
- How do you enroll devices in Intune and manage their lifecycle?
- What are compliance policies and how do they ensure devices adhere to organizational standards?
- How can you configure app protection policies to secure company data on devices?
- What is conditional access, and how does it control access to corporate resources based on device compliance?
- How do you manage and distribute applications using Intune?
- What is Microsoft Store for Business, and how can it be used for app deployment?
- What is Microsoft 365 Apps for Enterprise (formerly Office 365 ProPlus), and how can it be deployed and managed?
- How do you implement and manage file access and sharing using OneDrive for Business and SharePoint Online?



- What is Windows Information Protection (WIP), and how does it help protect sensitive data?
- How can you provide secure remote access to resources using VPNs and DirectAccess?
- What is Always On VPN, and how does it improve remote connectivity and security?
- How can you use Remote Desktop Services (RDS) for remote application delivery?
- What is Azure RemoteApp, and how does it enable virtualized app delivery?
- What are the options for implementing and managing Windows Defender Remote Credential Guard?
- How do you manage Windows 10 updates using Windows Update for Business?
- What are the benefits of using Windows Update for Business over traditional update methods?
- How do you configure Windows Analytics to assess compatibility and monitor device health?
- What is Windows Defender Advanced Threat Protection (ATP), and how does it provide endpoint security?
- How can you use Windows Defender ATP to detect and respond to security threats?

Content

- Overview of modern desktop management concepts
- Configuring device settings and options
- Managing local and Microsoft Azure Active Directory identities
- Implementing device security with Windows Defender Antivirus and Firewall
- Encrypting data with BitLocker
- Monitoring and managing device performance and security
- Introduction to Group Policy and Mobile Device Management (MDM)
- Implementing device security policies
- Managing configuration profiles
- Managing user profiles and settings using User Experience Virtualization (UE-V)
- Implementing and managing application settings using Group Policy or MDM
- Introduction to Microsoft Intune
- Enrolling devices in Intune and managing their lifecycle
- Implementing compliance policies for devices
- Configuring app protection policies
- Implementing conditional access for secure device access



- Deploying applications using Intune
- Utilizing Microsoft Store for Business for app deployment
- Deploying Microsoft 365 Apps for Enterprise (formerly Office 365 ProPlus)
- Managing file access and sharing with OneDrive for Business and SharePoint Online
- Implementing Windows Information Protection (WIP) for data protection
- Providing secure remote access with VPNs and DirectAccess
- Implementing Always On VPN for improved remote connectivity
- Delivering remote applications with Remote Desktop Services (RDS)
- Exploring Azure RemoteApp for virtualized app delivery
- Implementing Windows Defender Remote Credential Guard for remote access security
- Managing Windows 10 updates using Windows Update for Business
- Leveraging Windows Analytics for compatibility assessment and monitoring
- Introduction to Windows Defender Advanced Threat Protection (ATP)
- Using Windows Defender ATP for endpoint security and threat detection
- Detecting and responding to security threats with Windows Defender ATP
- Introduction to advanced threat protection strategies
- Implementing and managing advanced threat protection solutions
- Configuring Windows Defender ATP for threat detection and response
- Responding to security incidents and mitigating threats
- Monitoring and evaluating the effectiveness of threat protection measures
- Introduction to co-management between Configuration Manager and Intune
- Transitioning from Configuration Manager to Intune for modern device management
- Integrating Windows Autopilot for streamlined device deployment
- Managing devices using Microsoft 365 Business
- Using Microsoft 365 for device and data protection
- Analyzing device compliance and preparing for deployment
- Configuring device compliance policies and profiles
- Monitoring and troubleshooting device compliance
- Managing device health and ensuring security compliance



- Resolving compliance issues and maintaining a secure environment
- Introduction to Windows 10 support and troubleshooting
- Diagnosing and resolving startup and hardware issues
- Troubleshooting networking, device connectivity, and driver problems
- Managing and recovering user data and profiles
- Implementing and managing Windows 10 security features
- Exploring modern desktop management concepts and principles
- Evaluating the benefits and challenges of modern management approaches
- Analyzing the impact of modern management on security and compliance
- Planning and implementing a modern management strategy
- Evaluating the effectiveness of modern management solutions

Skills

- Configure Windows 10 devices for enterprise use
- Manage local and Azure Active Directory identities
- Implement device security using Windows Defender Antivirus and Firewall
- Encrypt data using BitLocker
- Monitor and manage device performance and security
- Apply Group Policy and MDM policies
- Implement security policies and settings
- Configure and manage configuration profiles
- Manage user profiles using User Experience Virtualization (UE-V)
- Implement application settings using Group Policy or MDM
- Enroll devices in Microsoft Intune
- Manage device lifecycle using Intune
- Implement compliance policies for devices
- Configure app protection policies for secure data access
- Implement conditional access for secure device authentication
- Deploy applications using Intune



- Utilize Microsoft Store for Business for app deployment
- Deploy Microsoft 365 Apps for Enterprise (formerly Office 365 ProPlus)
- Manage file access and sharing with OneDrive for Business and SharePoint Online
- Implement Windows Information Protection (WIP) for data protection
- Provide secure remote access using VPNs and DirectAccess
- Implement Always On VPN for improved remote connectivity
- Deliver remote applications through Remote Desktop Services (RDS)
- Explore Azure RemoteApp for virtualized app delivery
- Implement Windows Defender Remote Credential Guard for remote access security
- Manage Windows 10 updates using Windows Update for Business
- Use Windows Analytics for compatibility assessment and monitoring
- Implement Windows Defender Advanced Threat Protection (ATP) for endpoint security
- Detect and respond to security threats using Windows Defender ATP
- Analyze threat protection measures and optimize security
- Implement and manage advanced threat protection solutions
- Configure Windows Defender ATP for threat detection and response
- Respond to security incidents and mitigate threats effectively
- Monitor and evaluate the effectiveness of threat protection measures
- Apply best practices for maintaining a secure environment
- Transition from Configuration Manager to Intune for modern device management
- Integrate Windows Autopilot for streamlined device deployment
- Manage devices using Microsoft 365 Business
- Use Microsoft 365 for comprehensive device and data protection
- Implement co-management strategies for efficient device management
- Analyze device compliance and prepare for deployment
- Configure device compliance policies and profiles
- Monitor and troubleshoot device compliance issues
- Manage device health and ensure security compliance
- Resolve compliance issues and maintain a secure environment



- Diagnose and resolve startup and hardware issues
- Troubleshoot networking, device connectivity, and driver problems
- Manage and recover user data and profiles
- Implement and manage Windows 10 security features
- Provide effective support and troubleshooting for Windows 10
- Understand modern desktop management concepts and principles
- Evaluate the benefits and challenges of modern management approaches
- Analyze the impact of modern management on security and compliance
- Plan and implement a modern management strategy effectively
- Evaluate the effectiveness of modern management solutions

Assessments

- Client Pro Certification - testout
- Microsoft MD-102 Certification

Course: Introduction to Python

Pathway: Electives

Length: Semester

Standards

- 9.3.IT-PRG.1 Analyze customer software needs and requirements.
- 9.3.IT-PRG.2 Demonstrate the use of industry standard strategies and project planning to meet customer specifications.
- 9.3.IT-PRG.3 Analyze system and software requirements to ensure maximum operating efficiency.
- 9.3.IT-PRG.4 Demonstrate the effective use of software development tools to develop software applications.
- 9.3.IT-PRG.5 Apply an appropriate software development process to design a software application.
- 9.3.IT-PRG.6 Program a computer application using the appropriate programming language.
- 9.3.IT-PRG.7 Demonstrate software testing procedures to ensure quality products.



- 9.3.IT-PRG.8 Perform quality assurance tasks as part of the software development cycle.
- 9.3.IT-PRG.9 Perform software maintenance and customer support functions.
- 9.3.IT-PRG.10 Design, create and maintain a database.
- 9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments.
- 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).
- 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving
- 9.4.12.CT.3: Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice).
- 9.4.12.CT.4: Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.

Essential Question(s)

- What is Python, and why is it popular for programming?
- How do you install and set up Python on your computer?
- What is the Python interpreter, and how do you run Python code?
- How do you declare variables in Python?
- What are the different data types in Python (int, float, string, boolean)?
- How can you perform basic arithmetic and string operations in Python?
- What are if statements and how do you use them?
- How do you implement if-else and nested if-else structures?
- What is the purpose of loops, and how do you use them in Python?
- What is a list, and how do you create and manipulate it?
- How are tuples different from lists, and when should you use them?
- What is a dictionary, and how can you use it to store key-value pairs?
- What is a function, and how do you define and call functions in Python?
- How do you pass parameters to functions and return values from them?
- What are modules, and how do you import and use them in your code?



- How can you read data from a file in Python?
- How do you write data to a file using different modes?
- What is exception handling, and how can you use it to manage errors?
- What are classes and objects, and how do you create them?
- How can you define attributes and methods in a class?
- What is encapsulation, and how do you achieve it in Python?
- How can you work with modules, packages, and libraries from the Python Standard Library?
- What is list comprehension, and how does it simplify list manipulation?
- How do you handle exceptions using try, except, and finally blocks?
- How do you take user input in Python?
- What are formatted strings, and how can you use them for output?
- How can you open, read, and write text files?
- What are CSV and JSON files, and how do you work with them?
- What are sets and how are they different from lists and dictionaries?
- How do you work with strings as sequences of characters?
- What are common string methods for manipulation and formatting?
- What is an algorithm, and how do you evaluate the efficiency of an algorithm?
- How can you implement common algorithms like sorting and searching in Python?
- What are libraries like Matplotlib and Seaborn used for?
- How can you create basic plots and charts using these libraries?

Content

- What is Python and its history?
- How to install and set up Python on various platforms?
- Running Python code using the interpreter and scripts.
- Understanding variables and data types (integers, floats, strings, booleans).
- Basic arithmetic operations and string manipulation.
- Using comments in code for documentation.
- Introduction to if, elif, and else statements.



- Nested conditionals and logical operators.
- The concept of indentation in Python.
- Using while and for loops for repetitive tasks.
- Loop control statements (break and continue).
- Iterating through sequences using loops.
- Creating and manipulating lists.
- Slicing and indexing lists.
- Introducing tuples and their immutability.
- Working with dictionaries (key-value pairs).
- Adding, updating, and deleting dictionary items.
- Understanding sets and their unique values.
- Defining and calling functions.
- Passing arguments and returning values.
- Importing and using modules from the Python Standard Library.
- Reading and writing text files.
- Using context managers (with statement) for file operations.
- Handling exceptions with try, except, and finally blocks.
- Understanding classes and objects.
- Defining attributes and methods in classes.
- Encapsulation and basic inheritance concepts.
- Working with libraries and packages using pip.
- List comprehension for concise list manipulation.
- Handling exceptions using custom error messages.
- Taking user input and converting data types.
- Formatted strings for customized output.
- Using print statements for output.
- Reading and writing CSV files.
- Working with JSON data.
- Managing file paths using os.path.



- Exploring sequences (strings, lists, tuples).
- Set operations and methods.
- Basic dictionary manipulation.
- Introduction to algorithmic thinking.
- Basic sorting algorithms (bubble sort, insertion sort).
- Linear search and binary search.
- Basic data visualization using libraries like Matplotlib.
- Creating line charts, bar charts, and scatter plots.
- Adding labels and titles to visualizations.
- Applying learned concepts to a small project.
- Implementing a program that solves a real-world problem.
- Demonstrating understanding of Python fundamentals.

Skills

- Installing Python and a code editor/IDE.
- Running Python programs using the interpreter.
- Understanding the basic structure of a Python program.
- Declaring variables and assigning values.
- Performing arithmetic operations and string manipulation.
- Using print statements for output.
- Using if, elif, and else statements for decision-making.
- Employing logical operators (and, or, not) in conditions.
- Writing code blocks with proper indentation.
- Using while and for loops for repetitive tasks.
- Employing range() to generate sequences.
- Employing loop control statements (break, continue) for control.
- Creating and modifying lists and tuples.
- Accessing elements using indexing and slicing.
- Understanding dictionaries and their key-value structure.



- Defining functions with parameters and return values.
- Understanding the concept of scope.
- Calling functions and passing arguments.
- Reading data from files using `open()` and file objects.
- Writing data to files with different modes.
- Working with context managers (with statement).
- Using `try`, `except`, and `finally` blocks.
- Handling specific exceptions and catching errors.
- Employing good error messages for debugging.
- Understanding classes and objects.
- Creating instances of classes and accessing attributes.
- Defining methods within a class.
- Importing and using modules from the Python Standard Library.
- Installing external libraries using `pip`.
- Exploring commonly used libraries (e.g., `math`, `random`).
- Using `input()` to get user input.
- Formatting output using `print` statements.
- Employing f-strings for customized output.
- Reading and writing data to CSV files.
- Working with JSON files for data storage.
- Understanding sequences (lists, strings, tuples).
- Basic linear search algorithm.
- Creating simple visualizations using `Matplotlib`.
- Plotting basic charts (line charts, bar charts).
- Developing a simple program or script.
- Applying learned concepts to solve a practical problem.
- Demonstrating understanding of Python basics.

Assessments



- Test & Quizzes - Theory and Concepts
 - Code Analysis and Correction
 - Practical Implementation
 - Problem-Solving and Design
-

Resources



→ Course Resources

- ◆ Testout Courseware
 - ISBN: 978-1-935080-67-1 - Server Pro
 - ISBN: 978-1-935080-45-9 - Client Pro
 - ISBN: 978-1-935080-73-2 - Cyber Defense Pro
 - ISBN: 978-1-935080-64-0 - Desktop Pro
 - ISBN: 978-1-935080-81-7 Digital Literacy Pro
 - ISBN: 978-1-935080-69-5 - Ethical Hacker Pro
 - ISBN: 978-1-935080-85-5 - Hybrid Server Pro
 - ISBN: 978-1-935080-70-1 - IT Fundamentals Pro
 - ISBN: 978-1-935080-38-1 - Linux Pro
 - ISBN: 978-1-935080-43-5 - Network Pro
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 - ISBN: 978-1-935080-44-2 - Security Pro
 - ISBN: 978-1-935080-68-8 - Server Pro
- ◆ ISBN-13: 978-0-357-67416-1 - CompTIA A+ Guide to Information Technology Technical Support , 11th Edition
- ◆ ISBN-13: 978-1-285-86011-4 - An Introduction to Programming, 8th Edition