Maryland CTE Programs of Study

Networking III (2025)

GENERAL REQUIREMENTS. This course is recommended for students in Grades 11-12, and Networking I and II are the prerequisites. 1

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INTRODUCTION 2

A Career and Technical Education (CTE) instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions. 2.A

B The Digital Technology Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services. 2.B

C The Networking Systems program of study emphasizes careers and educational pathways related to the design and implementation of computer and information networks, including local area networks (LAN), wide area networks (WAN), intranets, extranets, and other data communication systems. It covers the analysis of data processing challenges involved in developing and enhancing computer network systems. 2.C

D Networking III advances students' knowledge of network infrastructure by focusing on secure network design, advanced routing and switching, and hybrid network models. Students will gain hands-on experience with virtualized networking, cloud integration, and advanced security protocols, preparing them to manage and secure complex networks in business and enterprise environments. 2.D

E Students will participate in at least two Career-Connected Education and Work-Based Learning experiences in this course, which might include informational interviews or job shadowing relevant to the program of study. 2.E

F Students are encouraged to participate in extended learning experiences through aligned Career and Technical Student Organizations (CTSOs). CTSOs are a ocurricular requirement in the Carl D. Perkins Act, and alignment to CTSO ctivities is an expectation for CTE programs in the state of Maryland. 2.F

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KNOWLEDGE AND SKILLS 3

A The student demonstrates the necessary skills for career development, maintenance of employability, and successful completion of course outcomes. The student is expected to: 3.A

1. Identify and demonstrate positive work behaviors that enhance employability and job advancement, such as regular attendance, promptness, proper attire, maintenance of a clean and safe work environment, and pride in work. 3.A.1
2. Demonstrate positive personal qualities such as flexibility, open-mindedness, initiative, active listening, and a willingness to learn. 3.A.2
3. Employ effective reading, writing, and technical documentation skills. 3.A.3
4. Solve problems using critical thinking techniques and structured troubleshooting methodologies. 3.A.4
5. Demonstrate leadership skills and collaborate effectively as a team member. 3.A.5
6. Implement safety procedures, including proper handling of hardware and following cybersecurity guidelines. 3.A.6
7. Exhibit an understanding of legal and ethical responsibilities in the IT field, following data privacy laws and best practices for security. 3.A.7
8. Demonstrate time-management skills and the ability to prioritize tasks in a technical setting. 3.A.8

B The student identifies various career pathways in the information technology field. The student is expected to: 3.B

1. Develop a career plan that includes the necessary education, certifications, job skills, and experience for specific roles in IT networking. 3.B.1
2. Create a professional resume and portfolio that reflect skills, projects, certifications, and recommendations. 3.B.2
3. Demonstrate effective interview skills for roles in IT and networking. 3.B.3

C The student develops technology and digital literacy skills. The student is expected to: 3.C

1. Use technology as a tool for research, organization, communication, and problem-solving. 3.C.1
2. Use digital tools, including computers, mobile devices, collaboration platforms, and cloud services, to access, manage, and create information. 3.C.2
3. Demonstrate proficiency in using emerging and industry-standard technologies, including virtualization tools, network management software, and cybersecurity applications. 3.C.3
4. Understand ethical and legal considerations for technology use, including the principles of data protection, copyright, and responsible technology use. 3.C.4

D The student integrates core academic skills into networking practices. The student is expected to: 3.D

1. Demonstrate the use of clear communication techniques, both written and verbal, that are consistent with industry standards. 3.D.1

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2 Apply mathematical concepts such as binary conversion, subnetting, and data rate calculations in network configuration and troubleshooting. 3.D.2

3 Use scientific principles, such as signal properties and electromagnetic interference, in network design and troubleshooting. 3.D.3

E The student applies advanced security principles to network design and operation, preparing for the CompTIA Security+ certification. The student is expected to: 3.E

1 Identify and configure secure network access policies, such as multi-factor authentication (MFA) and role-based access controls (RBAC). 3.E.1

2 Implement and manage security features on network devices, including firewalls, intrusion detection systems (IDS), and intrusion prevention systems (IPS). 3.E.2

3 Conduct risk assessments and develop mitigation strategies for common threats like malware, ransomware, and unauthorized access. 3.E.3

4 Explain and apply cryptographic protocols (e.g., TLS, SSL, IPsec) and encryption standards for data protection. 3.E.4

5 Identify compliance requirements for network security, including GDPR, HIPAA, and PCI- DSS, and apply best practices for maintaining compliance. 3.E.5

6 Use security information and event management (SIEM) tools for proactive threat monitoring and response. 3.E.6

F The student demonstrates advanced routing and switching techniques suitable for complex network infrastructures, aligning with the Cisco 100-490 RSTECH and CCNA certifications. The student is expected to: 3.F

1 Implement and troubleshoot inter-VLAN routing and VLAN trunking protocols for segmented networks. 3.F.1

2 Describe and configure advanced dynamic routing protocols (e.g., EIGRP, OSPF) for efficient data flow across networks. 3.F.2

3 Configure high-availability solutions, such as load balancing and failover, to ensure network redundancy and reliability. 3.F.3

4 Use advanced Layer 2 protocols, including spanning tree protocol (STP) variations (e.g., RSTP) and VLAN tagging. 3.F.4

5 Perform network diagnostics and troubleshooting using Cisco-specific tools (e.g., Cisco Packet Tracer). 3.F.5

G The student develops network architectures that integrate virtualized environments, cloud services, and hybrid network solutions. The student is expected to: 3.G

1 Describe and configure hybrid network models, integrating both on-premise and cloud- based components. 3.G.1

2 Implement virtual networking concepts, such as virtual LANs (VLANs), SD-WAN, and VPNs, for secure and flexible network access. 3.G.2

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3 Use cloud-based services (e.g., IaaS, SaaS, PaaS) in network design, understanding their security implications and requirements. 3.G.3

4 Explain the role of software-defined networking (SDN) and network functions virtualization (NFV) in modern network architectures. 3.G.4