Maryland CTE Programs of Study

Networking II (2025)

GENERAL REQUIREMENTS. This course is recommended for students in Grades 10-12, and Networking I is the prerequisite. 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 II focuses on deeper networking concepts, advanced configurations, security configuration, and troubleshooting skills. introduces students to advanced networking concepts, IP routing, cloud networking, and troubleshooting in diverse network 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 cocurricular requirement in the Carl D. Perkins Act, and alignment to CTSO activities is an expectation for CTE programs in the state of Maryland. 2.F

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he student demonstrates the necessary skills for career development, naintenance 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. Utilize 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 Students will develop skills to design and implement advanced network architectures, including hybrid and enterprise networks. The student is expected to: 3.E

1 Explain and design network segmentation (VLANs, subnets) and use cases for network scalability. 3.E.1

2 Differentiate and configure WAN and remote access technologies (MPLS, VPNs, leased lines). 3.E.2

3 Create network diagrams that include hybrid and cloud-based network components, considering redundancy and load balancing. 3.E.3

4 Identify and use various cloud simulation tools (e.g., Cisco Packet Tracer with AWS/Azure emulation)to enhance understanding of hybrid network activities. 3.E.4

F Students will understand and apply advanced IP addressing schemes and routing protocols to support complex network infrastructure. The student is expected to: 3.F

1 Implement IPv6 addressing, subnetting, and address management in a dual-stack environment. 3.F.1

2 Configure and analyze dynamic routing protocols (RIP, OSPF, EIGRP) and understand their differences. 3.F.2

3 Troubleshoot advanced routing issues using routing tables and diagnostic tools. 3.F.3

G Students will apply security principles to protect networks, emphasizing access control and encryption. The student is expected to: 3.G

1 Configure and manage firewall settings, ACLs (Access Control Lists), and VPNs for secure remote access. 3.G.1

2 Understand and apply security protocols like IPSec and SSL/TLS in network communications. 3.G.2

3 Identify and mitigate network security risks, including those associated with IoT and cloud networks. 3.G.3

H Students will perform advanced network management, including monitoring and maintaining network performance using network management protocols and tools. The student is expected to: 3.H

1 Use SNMP (Simple Network Management Protocol) and NetFlow for network performance monitoring and data collection. 3.H.1

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2 Implement network baselining and alerting to identify and resolve performance issues. 3.H.2

3 Introduce Quality of Service (QoS) for traffic prioritization as consideration for performance issues in real-time applications. 3.H.3

4 Apply change management protocols and document network configurations and incidents for continuity. 3.H.4

I Students will understand and configure virtual network infrastructure and explain how cloud networking principles integrate with traditional networks. The student is expected to: 3.I

1 Configure virtual LANs (VLANs) and understand virtual private networks (VPNs) and SD- WAN (Software-Defined Wide Area Networking). 3.I.1

2 Describe the principles of cloud service models (IaaS, PaaS, SaaS) and their network requirements. 3.I.2

3 Explain and demonstrate the configuration of virtualized network components in a lab setting. 3.I.3

J Students will refine their troubleshooting skills to address complex networking issues across multi-layer network architectures. The student is expected to: 3.J

1 Use advanced diagnostic tools and commands (traceroute, netstat, Wireshark) to analyze network issues. 3.J.1

2 Develop and follow a systematic approach for resolving connectivity and performance issues in complex network environments. 3.J.2

3 Troubleshoot common issues in cloud-based, hybrid, and virtual networks. 3.J.3