



Course Description

CTS1134 | Networking Technologies | 4.00 credits

This course will provide an introduction to the technical areas of network connectivity, data communications, and communication protocols. Emphasis on understanding the foundation of networking technologies and data communication concepts. Topics covered will include an exploration of computer networking development, the OSI reference model, data signaling, data translation, standards for communications and data transmissions, network topologies and access methods.

Course Competencies:

Competency 1: The student will demonstrate understanding knowledge of computer network concepts by:

1. Explaining the purposes and uses of ports and protocols
2. Explaining devices, applications, protocols, and services at their appropriate OSI layers
3. Explaining the concepts and characteristics of routing and switching
4. Configuring the appropriate IP addressing components for a given scenario
5. Comparing and contrasting the characteristics of network topologies, types, and technologies
6. Implement the appropriate wireless technologies and configurations for a given scenario
7. Summarizing cloud concepts and their purposes
8. Explaining the functions of network services
9. Describing proper procedures for handling, safeguarding, and disposing of computer equipment
10. Describing the management of computer systems and peripherals following institutional protocol

Competency 2: The student will demonstrate an understanding of network infrastructure by:

1. Deploying the appropriate cabling solution, for a given scenario
2. Determine the appropriate placement of networking devices on a network and install/configure them, for a given scenario.
3. Comparing and contrasting the use of networking services and applications
4. Explaining the purposes and use cases for advanced networking devices
5. Explaining the purposes of virtualization and network storage technologies
6. Comparing and contrasting various network types (including WAN, PAN, LAN, WLAN) and technologies
7. Installing and configuring networking services and applications
8. Differentiating between common network topologies
9. Differentiating between network infrastructure implementations
10. Comparing the use of different protocols to accomplish routing tasks
11. Explaining the purpose of Virtual LANs (VLANs)
12. Describing supervisory control and data acquisition (SCADA) systems and critical infrastructures
13. Describing the Internet of Things (IoT)

Competency 3: The student will demonstrate an understanding of network operations by Using appropriate documentation and diagrams to manage the network for a given scenario

1. Comparing and contrasting business continuity and disaster recovery concepts
2. Explaining common scanning, monitoring, and patching processes and summarizing their expected outputs
3. Using remote access methods for a given scenario
4. Identifying policies and best practices
5. Differentiating between appropriate monitoring tools based on a given scenario
6. Analyzing metrics and reports from monitoring and tracking performance tools based on a given scenario
7. Choosing appropriate resources for configuration management based on a given scenario

8. Designing and implementing network segmentation
9. Installing and applying patches and updates based on a given scenario
10. Discuss the managed services approach to network management

Competency 4: The student will demonstrate an understanding of network security by:

1. Identifying the purposes of physical security devices
2. Explaining authentication and access controls
3. Securing a primary wireless network for a given scenario
4. Identifying common networking attacks
5. Implementing network device hardening for a given scenario
6. Explaining standard mitigation techniques and their purposes
7. Comparing and contrasting risk management concepts
8. Comparing and contrasting common network vulnerabilities and threats
9. Implementing network hardening techniques based on a given scenario
10. Comparing and contrasting physical security controls
11. Installing and configuring a basic firewall based on a given scenario
12. Explaining the purpose of various network access control models

Competency 5: The student will demonstrate an understanding of network troubleshooting and tools by:

1. Explaining the network troubleshooting methodology
2. Using the appropriate tool for a given scenario
3. Implementing the appropriate network troubleshooting methodology for common wired connectivity and performance issues for a given scenario
4. Implementing the appropriate network troubleshooting methodology for common wireless connectivity and performance issues for a given scenario
5. Implementing the appropriate network troubleshooting methodology for common network service issues for a given scenario
6. Implementing the appropriate network troubleshooting methodology for common cabling issues for a given scenario

Competency 6: The student will demonstrate an understanding of industry standards, practices, and network theory by:

1. Implementing the appropriate policies or procedures based on a given scenario
2. Selecting appropriate safety practices to address specific threats
3. Installing and configuring equipment in the appropriate location using best practices
4. Discussing change management procedures

Competency 7: The student will demonstrate an understanding of network communications by:

1. Describing the basic concepts of telecommunications and data communications
2. Explaining the use of binary numbers to represent instructions and data. Converting decimal, binary, and hexadecimal numbers and performing binary arithmetic.
3. Interpreting the different classes of IP addresses
4. and the public and private address ranges. Defining IPv6 Networking Suite
5. Explaining the functions of subnets. Performing subnetting of the various network classes
6. Identifying the function of routers, gateways, and other devices that perform path determination and packet switching. Identifying advanced routing algorithms and protocols
7. Explaining the purpose of Network Address Translation (NAT) and Port Address Translation (PAT)
8. Explaining data units at each Open Systems Interconnection (OSI) model layer, including bits, frames, packets, and segments
9. Identify source and destination data unit addresses at each OSI model layer, including Media Access control (MAC) and Internet Protocol (IP) addresses

10. Explaining the process of data encapsulation and transmission
11. Differentiating the functions of Local Area Network (LAN) hardware protocols, including Ethernet, token ring, and Fiber Distributed Data Interface (FDDI). Comparing LAN software protocols such as TCP/IP, User Datagram Protocol (UDP/IP), Internetwork Packet Exchange/Sequenced Packet Exchange (IPX/SPX), AppleTalk, and Network Basic Input/Output System (NetBEUI)
12. Identifying technical issues related to network performance, including load, bandwidth, latency, jitter, collision and broadcast domains, and security
13. Identifying Application protocols such as SMTP, HTTP, VoIP, SSH, etc

Competency 8: The student will demonstrate an understanding of network user support and professional development skills by:

1. Instruct users on login and security procedures, network organization, resource locations, and acceptable use and download policies
2. Discuss employee rights regarding network use, privacy, security, safety, and other network policies
3. Describing appropriate appearance and professional behavior for a business environment
4. Identifying organizational computing and network workplace competencies
5. Communicating effectively with individuals who lack a technical background
6. Preparing written reports documenting network topology, maintenance, performance, and scalability

Learning Outcomes:

- Formulate strategies to locate, evaluate, and apply information
- Solve problems using critical and creative thinking and scientific reasoning
- Use computer and emerging technologies effectively