2018 - 2019 Curriculum Catalog

Career and Technical Education Series

Network System Design

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Network System Design Course Overview

The Network System Design course will provide students with an understanding of computer networks and how they operate, as well as a basic understanding of how to manage and maintain computer networks. These skills will provide students with the ability to design, configure, and troubleshoot networks of all sizes.

Students will learn the basics of network design, including how to identify network requirements and determine the proper network architecture. They will be instructed on the requirements of network models, as well as be introduced to local area networks. Students will also learn about Internet Protocol and the basics of routing data on a network.

Students will be introduced to wide area networks and network security issues. In addition, students will learn about network management, including monitoring and troubleshooting. Last, students will learn about network operating systems and their role in connecting computers and facilitating communications.

Objectives

- Understand computer networks and their functions, as well as know how to analyze business and technical goals of a network to effectively meet customer needs.
- Identify requirements to successfully support network users, applications, and devices. They will also understand network architecture and topology, protocols, and services of local and wide area networks.
- Identify principles and operation of equipment like wire and circuits, as well as of standards such as open system interconnection, TCP/IP, and high-speed networking.
- Demonstrate knowledge of security requirements and data protection on a network, as well as the role of security tools such as routers, firewalls, and virtual private networks.
- Understand network operating systems and be able to support computer networks.

For topics in this course, it is helpful for students to be familiar with the basics of computer hardware (desktop and laptop), as well as desktop operating systems.

If students are not familiar with these topics, it is recommended, though not required, that they be introduced to computer hardware and desktop or workstation operating systems before starting this course. That includes examining hardware devices such as motherboards, hard drives, and processing chips and exploring the features and functions of a workstation operating system.

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Unit 1: Introduction to Network Design

Assignments

1. Course Overview
2. Customer Needs and Goals
3. Project: Designing a Business Network
4. Network Design: Network Infrastructure
5. Network Design: Physical and Functional Network Requirements
6. Project: Office Planning
7. Quiz 1: Network Requirements
8. Network Architecture Components – Physical and Functional
9. Project: Connecting Physical to Function
10. Logical Network Design – Addressing and Routing Protocols
11. Project: Exploring Higher Math
12. Network Architectural Models – Topologies and Classifications
13. Quiz 2: Network Architecture
14. Special Project*
15. Unit 1 Test
16. Course Project Part 1: Physical and Functional Requirements of a Network*
17. Glossary and Credits

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Unit 2: Networking Models and Local Area Networks

Assignments

1. The Network Reference Models
2. Project: Port Sniffing
3. The OSI Networking Model
4. The TCP/IP Networking Model
5. Project: Researching TCP/IP
6. Quiz 1: TCP/IP and OSI Networking – The Fundamentals
7. LAN Fundamentals: Media, Topologies and Protocols
8. LAN Technologies: Ethernet
9. Project: State Your Case, Argue For Each
10. Wireless LANs and Security
11. Project: Playing With Wireless
12. Quiz 2: Local Area Networks – Topologies, Transmission Media and Technologies
13. Special Project*
14. Unit 2 Test
15. Course Project Part 2: Local Area Network*
16. Glossary and Credits

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Unit 3: Internet Protocol (IP): Addressing and Routing

Assignments

1. Addressing Fundamentals
2. IP Address: Classful Addressing
3. Project: IP Address Ranges and Subnetting
4. Subnetting, Supernetting and Classless Addressing
5. Project: Researching Classless Inter-Domain Routing
6. Quiz 1: IP Addressing
7. Routing Basics
8. IP Routing Protocols: Distance Vector Routing
9. Project: Routing Tables
10. IP Routing Protocols: Link State Routing
11. Project: Router Security
12. Quiz 2: IP Routing
13. Special Project*
14. Unit 3 Test
15. Course Project Part 3: Internet Protocol*
16. Glossary and Credits

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Unit 4: Wide Area Networks and Network Security

Assignments

1. WAN Concepts
2. WAN Technologies
3. Project: Connecting to the Internet Backbone
4. WAN Configuration
5. Project: What Do All These Boxes Look Like?
6. Quiz 1: Wide Area Networks
7. Understanding Network Security
8. Project: Creating a Network Security Policy
9. Network Security Threats
10. Network Security Techniques
11. Project: Analyzing Network Security
12. Quiz 2: Network Security
13. Special Project*
14. Unit 4 Test
15. Course Project Part 4: Network Security*
16. Glossary and Credits

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Unit 5: Network Management and Network Operating Systems

Assignments

1. Network Management Design
2. Project: Designing a Network Management Plan
3. Network Management Architecture
4. Network Management Tools and Protocols
5. Project: Using Network Troubleshooting Tools
6. Quiz 1: Network Management Strategies and Design
7. Network Operating Systems
8. Project: Researching Network Operating Systems
9. The Windows Server
10. The Linux Operating System
11. Project: Installing and Using Linux OS
12. Quiz 2: Network Operating Systems
13. Special Project*
14. Unit 5 Test
15. Course Project Part 5: Network Management Protocols*
16. Glossary and Credits

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Unit 6: Course Review, And Exam

Assignments

1. Course Project Part 6: Network Administration*
2. Review
3. Exam

(*) Indicates alternative assignment