Odysseyware®

CURRICULUM OVERVIEW

Introduction to Network Systems

Career and Technical Education Series

Table of Contents

Introduction to Network Systems Course Overview

How can we automate the transfer of information from one computer to another? To answer that question, this course introduces students to the fundamental technology and concepts that make networking systems possible. The question itself is a very practical one, and the concepts taught are more concerned with practices and processes rather than theoretical generalities.

The most important concept introduced is that of the OSI reference model and its bottom four layers, which are most directly concerned with networking instead of computing. Each networking layer is explored in a three-lesson chapter. By the end of the course, every student should be comfortable reading a sentence that says something like, “X is a protocol working at the third layer.”

The course also explores a good deal of technology, specifically the software and hardware supporting LANs, WANs, and Wi-Fi networks. Particularly important are the protocols in the TCP/IP stack that are used to communicate across a network, but the students are also introduced to the hardware, including hubs, switches, bridges, routers, and transmission media. The student is expected to learn that a network is not some mysterious idea out there in cyberspace. It is a mechanism that fully depends on properly working parts.

Once the students understand the fundamentals of the layers and network hardware, they can be introduced to questions of security, network management, and network operating systems. In particular, they should understand the role of the server. They have already encountered many examples of client-server relationships, and the material later in the course should introduce them to the many roles that a server can play as a part of a network.

Objectives

- State the purpose of a computer network and explain the role of network hardware in achieving that purpose.
- List at least four protocols from the TCP/IP stack and explain how each contributes to data transmission.
- Explain the technical differences between a LAN and a WAN.
- Explain the importance of technical standards in networks.
- List all seven layers of the OSI reference model and explain what each of the bottom four layers contributes to a network.
- Compare and contrast the Windows Server and Linux operating systems.

Students who are unfamiliar with computers and/or the Internet are likely to be at a disadvantage in this course. There are, however, no theoretical concepts required or expected for students entering the course.

Intro. to Network Systems

Unit 1: Networking Fundamentals

Assignments

1. Course Overview
2. Networking Concepts
3. Project: Report: Technology Devices
4. Network Devices and Components
5. Network Topologies
6. Project: Hardware Awareness
7. Quiz 1: Computer Networks
8. The OSI Reference Model
9. The TCP/IP Networking Model
10. Project: Slide Show: Networking Layers
11. Data Encapsulation
12. Project: Slide Show: Data Encapsulation
13. Quiz 2: OSI and TCP/IP Networking Models
14. Special Project*
15. Test
16. Course Project Part 1: Uses of a Small Business Network*
17. Glossary and Credits

Intro. to Network Systems

Unit 2: Network Access Concepts

Assignments

1. Physical Layer
2. Project: The Physical Layer
3. Fundamentals of Electrical Circuits
4. Network Security at the Physical Layer
5. Project: Under Attack
6. Quiz 1: Physical Layer Networking Concepts
7. The Data-Link Layer
8. Components of the Data-link Layer
9. Project: FAQ: A Data-Link Sublayer
10. Data-link Layer Devices
11. Project: Video: Data-Link Hardware
12. Quiz 2: Data Link Layer Networking Concepts
13. Special Project*
14. Test
15. Course Project Part 2: Physical Standards*
16. Glossary and Credits

Intro. to Network Systems

Unit 3: Local Area Networks

Assignments

1. LAN Fundamentals
2. Project: Proposal: Classroom LAN
3. Ethernet LANs
4. Wireless LANs
5. Project: Video: Value of Hotspots
6. Quiz 1: LAN Components and Technologies
7. Network Addressing
8. Project: Table: IPV6 Addresses
9. Network Routing and Protocols
10. Transport Layer Protocols
11. Project: Slide Show: Sending/Receiving a Communication
12. Quiz 2: Network, Transport, and Application Layers
13. Special Project*
14. Test
15. Course Project Part 3: Internet Connection*
16. Glossary and Credits

Intro. to Network Systems

Unit 4: Wide Area Networks and Securing the Network

Assignments

1. WAN Fundamentals
2. Project: FAQ: WAN Connections
3. WAN Technologies and Protocols
4. WAN Transmission Media
5. Project: Slideshow: Fiber Optics
6. Quiz 1: Wide Area Networks
7. Authentication and Access Controls
8. Project: FAQ: Public Key Infrastructure (PKI)
9. Network Threats and Mitigation
10. Project: Policy: Password Policy
11. Physical and Hardware Security
12. Quiz 2: Network Security
13. Special Project*
14. Test
15. Course Project Part 4: Security*
16. Glossary and Credits

Intro. to Network Systems

Unit 5: Managing the Network

Assignments

1. Managing and Monitoring the Network
2. Project: Slide Show: Management
3. Network Troubleshooting
4. Project: FAQ: Utilities
5. Software and Hardware Troubleshooting Tools
6. Quiz 1: Network Management and Troubleshooting
7. The Server in a Network
8. Project: Diagram: Web Email Service
9. Networking with Windows
10. The Linux Operating System
11. Project: Report: Network Wish List
12. Quiz 2: Network Operating Systems
13. Special Project*
14. Test
15. Course Project Part 5: Servers and Operating System*
16. Glossary and Credits

Unit 6: Course Review, and Exam

Assignments

1. Course Project Part 6: Slideshow: Introducing Your Network*
2. Review
3. Exam

(*) Indicates alternative assignment