



Switched-On
SCHOOLHOUSE

Course Catalog

Career and Technical Education Series:
Introduction to Network Systems

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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 is fully dependent on its parts working properly.

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.

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

UNIT 2: NETWORK ACCESS CONCEPTS	
INTRODUCTION TO NETWORK SYSTEMS	Assignment Titles
	1. Physical Layer: Transmission Media, Properties, and Components
	2. Project: The Physical Layer
	3. Fundamentals of Electrical Circuits: Signaling and Circuit Configuration
	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. Project: Special Project*
	14. Unit 2 Test
	15. Course Project Part 2: Physical Standards*
16. Glossary and Credits	

UNIT 3: LOCAL AREA NETWORKS	
INTRODUCTION TO NETWORK SYSTEMS	Assignment Titles
	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: IP 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. Project: Special Project*
	14. Unit 3 Test
	15. Course Project Part 3: Internet Connection*
16. Glossary and Credits	

UNIT 4: WIDE AREA NETWORKS AND SECURING THE NETWORK	
INTRODUCTION TO NETWORK SYSTEMS	Assignment Titles
	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. Project: Special Project*
	14. Unit 4 Test
	15. Course Project Part 4: Security*
16. Glossary and Credits	

UNIT 5: MANAGING THE NETWORK	
INTRODUCTION TO NETWORK SYSTEMS	Assignment Titles
	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. Project: Special Project*
	14. Unit 5 Test
	15. Course Project Part 5: Servers and Operating System*
16. Glossary and Credits	

UNIT 6: COURSE REVIEW, AND EXAM	
INTRODUCTION TO NETWORK SYSTEMS	Assignment Titles
	1. Course Project Part 6: Slide show: Introducing Your Network*
	2. Review
	3. Exam

(*) Indicates alternate assignment