Curriculum Catalog

Career and Technical Education Series

Introduction to Network Systems

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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 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.

Intro. to Network Systems	Unit 1: Networking Fundamentals			
	Assignments			
	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.	*
	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		
	9.	The TCP/IP Networking Model	17.	Glossary and Credits

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Intro. to Network Systems	Unit 2: Network Access Concepts	
	Assignments	
	1. Physical Layer: Transmission Media, Properties, and Components	8. Components of the Data-link Layer
	2. Project: The Physical Layer	9. Project: FAQ: A Data-Link Sublayer
	3. Fundamentals of Electrical Circuits: Signaling and Circuit Configuration	10. Data-link Layer Devices
	4. Network Security at the Physical Layer	11. Project: Video: Data-Link Hardware
	5. Project: Under Attack	12. Quiz 2: Data Link Layer Networking Concepts
	6. Quiz 1: Physical Layer Networking Concepts	13. *
	7. The Data-Link Layer	14. Unit 2 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	10. Transport Layer Protocols
	2. Project: Proposal: Classroom LAN	11. Project: Slide Show: Sending/Receiving a Communication
	3. Ethernet LANs	12. Quiz 2: Network, Transport, and Application Layers
	4. Wireless LANs	13. *
	5. Project: Video: Value of Hotspots	14. Unit 3 Test
	6. Quiz 1: LAN Components and Technologies	15. Course Project Part 3: Internet Connection*
	7. Network Addressing	16. Glossary and Credits
	8. Project: Table: IP Addresses	
	9. Network Routing and Protocols	

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

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

INS	Unit 6: Course Review, and Exam	
	Assignments	
	1. Course Project Part 6: Slide show: Introducing Your Network*	2. Review
		3. Exam

(*) Indicates alternative assignment

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