



ENLIGHTIUM ACADEMY

Ignitia™ Career and Technical Education
Electives

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.

INTRODUCTION TO NETWORK SYSTEMS	
UNIT 1: NETWORKING FUNDAMENTALS	
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	

**INTRODUCTION TO NETWORK SYSTEMS
UNIT 2: NETWORK ACCESS CONCEPTS**

Assignment Titles

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|---|---|
| 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. Project: Special Project |
| 7. The Data-Link Layer | 14. Unit 2 Test |
| | 15. Course Project Part 2: Physical Standards |
| | 16. Glossary and Credits |

**INTRODUCTION TO NETWORK SYSTEMS
UNIT 3: LOCAL AREA NETWORKS**

Assignment Titles

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| 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. Project: Special Project |
| 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 | |

**INTRODUCTION TO NETWORK SYSTEMS
UNIT 4: WIDE AREA NETWORKS AND SECURING THE NETWORK**

Assignment Titles

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| 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. Project: Special Project |
| 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 |

**INTRODUCTION TO NETWORK SYSTEMS
UNIT 5: MANAGING THE NETWORK**

Assignment Titles

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| 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. Project: Special Project |
| 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 | |

**INTRODUCTION TO NETWORK SYSTEMS
UNIT 6: COURSE REVIEW, AND EXAM**

Assignment Titles

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| 1. Course Project Part 6: Slide show: Introducing Your Network | 2. Review |
| | 3. Exam |