



**Switched-On**  
SCHOOLHOUSE

# Course Catalog

Career and Technical Education Series:  
Network System Design

## Table of Contents

COURSE OVERVIEW .....	1
UNIT 1: INTRODUCTION TO NETWORK DESIGN .....	1
UNIT 2: NETWORKING MODELS AND LOCAL AREA NETWORKS .....	2
UNIT 3: INTERNET PROTOCOL (IP): ADDRESSING AND ROUTING .....	2
UNIT 4: WIDE AREA NETWORKS AND NETWORK SECURITY .....	2
UNIT 5: NETWORK MANAGEMENT AND NETWORK OPERATING SYSTEMS .....	2
UNIT 6: COURSE REVIEW, AND EXAM .....	2

## 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.

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

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

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

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

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

UNIT 6: COURSE REVIEW, AND EXAM				
NETWORK SYSTEM DESIGN	Assignment Titles			
	1.	Course Project Part 6: Network Administration*	3.	Exam
	2.	Review		

(\*) Indicates alternate assignment