

# HOSTOS COMMUNITY COLLEGE

## DEPARTMENT OF MATHEMATICS and COMPUTER SCIENCE

### COURSE: CST 220 Networking Fundamentals and Principles

**Credit Hours: 3.0**

**Equated Hours: 3.0**

**Class Hours: 3.0**

**Lab Hours: 2.0**

**Prerequisite: CST 140**

#### **Course Description:**

This is an intermediate-level course designed for students preparing for Network+ certification. This course provides comprehensive coverage of networking principles and practices, aligned with the objectives of the CompTIA Network+ N10-009 certification exam. Students will gain an in-depth understanding of network protocols, topologies, hardware, cloud technologies, network design, security, and troubleshooting. Throughout the course, students will explore high-level networking concepts through updated cloud, virtualization, and simulation projects. They will gain hands-on experience with hardware, software, operating systems, and device interactions. Scenario-based questions and discussion prompts will facilitate critical thinking and practical application of networking principles. Topics covered include Network Fundamentals such as understanding protocols, topologies, and basic networking concepts. Network Infrastructure focuses on the exploration of hardware components, network design, and implementation. Cloud and Virtualization covers updated projects focusing on cloud services and virtual environments. This course is ideal for individuals aiming to advance their networking skills and achieve CompTIA Network+ certification, providing them with the expertise to design, implement, and manage robust network systems. Through a blend of lectures, hands-on labs, and practice exams, students will be well-prepared to tackle the CompTIA Network+ certification at the end of the course.

#### **Required Textbook:**

*CompTIA Network+ Guide to Networks, 10th Edition by Jill West.*

*Access to the MindTap digital learning platform.*

#### **Grading Standards:**

Weekly Chapter Assignments & Labs	20%
Cengage Quizzes and other Quizzes	20%
Group Project /Discussion	20%
Board/Participation in Class	10%
Midterm & Final Exam	30%
Total	100%

**Instructional and Performance Objectives:**

1. Introduce students to networking basics by defining key terms and explaining fundamental principles.
2. Train students to document network infrastructure by creating detailed diagrams and documentation.
3. Ensure students understand IP addressing and subnetting by designing and implementing a mock IP scheme.
4. Teach students about network protocols by configuring and analyzing protocols like TCP/IP in a lab.
5. Instruct students on network cabling by setting up a network and testing cables for connectivity.
6. Educate students on wireless networking by having them configure and secure a wireless network.
7. Guide students on network architectures by designing and explaining a network setup for a given scenario.
8. Teach students the importance of network segmentation by implementing VLANs in a hands-on lab.
9. Instruct students on WAN technologies by configuring a simulated WAN connection using VPNs.
10. Teach students risk management by conducting a network risk assessment and recommending mitigation strategies.
11. Educate students on access control by configuring access control lists (ACLs) on network devices.
12. Instruct students on performance monitoring and recovery by developing a recovery plan in a lab setting.

**Discussion:** All students are encouraged to actively participate and engage on Brightspace.

Here's how you can earn points:

- Ask a Thoughtful Question:
  - Pose a question related to our current module or any topic discussed in class. Make it insightful and encourage your peers to share their perspectives.
- Answer a Peer's Question:
  - Once you've posted your question, take the opportunity to answer a question from one of your classmates. Share your knowledge and contribute to the collaborative learning environment we're fostering.

**Students learning outcomes:**

1. Students will be able to define key networking terms, explain fundamental principles, and accurately describe and differentiate between various network protocols and topologies.
2. Students will create detailed network diagrams and documentation for a given network setup, demonstrating their ability to accurately represent network infrastructure and design a network architecture for a given scenario, explaining their design choices.
3. Students will design and implement an IP addressing scheme for a mock network, correctly subnetting and assigning IP addresses, as well as configure and analyze network protocols such as TCP/IP.
4. Students will successfully set up a network using appropriate cabling techniques, including crimping and testing cables for connectivity.
5. Students will configure and secure a wireless network, demonstrating their ability to implement wireless networking solutions.
6. Through a hands-on lab, students will segment a network using VLANs, demonstrating their ability to implement and manage network segmentation.
7. Students will configure a simulated WAN connection using tools such as VPNs, showcasing their ability to implement and troubleshoot WAN solutions.
8. Students will conduct a risk assessment for a network, identifying potential risks and recommending mitigation strategies, configure access control lists (ACLs) on network devices to manage and enforce network access policies, and monitor network performance using appropriate tools, developing a recovery plan for a simulated network failure.

### **COURSE OUTLINE**

The schedule is subject to modification at the discretion of the instructor, and any alterations will be communicated either in class or through Brightspace. It is the students' responsibility to make any changes to this schedule as announced. It is strongly recommended that students check their HOSTOS email, Cengage, and Brightspace daily for crucial course-related emails and reach out to the instructor. PLEASE NOTE: Be aware that despite efforts to maintain the proposed schedule and keep students informed of changes, adjustments may occur with or without notice (including, but not limited to: test dates, times, course material coverage, and the nature and complexity of exams or assessments). Students are urged to monitor Brightspace and Cengage/MindTap regularly for course-related announcements and changes.

<b>Weeks</b>	<b>Topic</b>	<b>Modules (See Textbooks)</b>
<b>Week 1</b>	<b>Introduction to Networking</b>	Module 1
	Network Models	
	Client-Server Applications	
	Network Hardware	
	The Seven-Layer OSI Model	
	Safety Procedures and Policies	
	Troubleshooting Network Problems	
	Hands-On/ <b>LAB Projects-Labs are required for every Learning Unit and Chapter</b>	
	Capstone Projects	
<b>Week 2</b>	<b>Network Infrastructure and Documentation</b>	Module 2
	Components of Structured Cabling	
	Network Documentation	
	Change Management	
	Hands-On Projects	
	Capstone Projects	
<b>Week 3</b>	<b>Addressing</b>	Module 3
	Addressing Overview	
	IP addresses	
	Port and Sockets	
	Domain Names and DNS	
	Troubleshooting Address Problems	
	Hands-On Projects	
	Capstone Projects	
<b>Week 4</b>	<b>Protocols</b>	Module 4
	TCP/IP Core Protocols	
	Encryption Protocols	
	Remote Access Protocols	
	Remote Access Policies	
	Troubleshooting Network Issues	

	Hands-On Projects	
	Capstone Projects	
<b>Week 5</b>	<b>Cabling</b>	Module 5
	Transmission Basics	
	Copper Cable	
	Fiber-Optic Cable	
	Cable Troubleshooting Tools	
	Hands-On Projects	
	Capstone Projects	
<b>Week 6</b>	<b>Wireless Networking</b>	Module 6
	Characteristics of Wireless Transmissions	
	802.11 WLAN Standards	
	Implementing a Wi-Fi Network	
	Wi-Fi Network Security	
	Troubleshooting Wi-Fi Networks	
	Hands-On Projects	
	Capstone Projects	
<b>Week 7</b>	<b>Networking Architecture</b>	Module 7
	Physical Architecture	
	Virtual Architecture	
	Cloud Architecture	
	Network Availability	
	Hands-On Projects	
	Capstone Projects	
<b>Week 8</b>	<b>Segmentation</b>	Module 8
	Network Segmentation	
	Subnet Masks	
	Calculating Subnets	
	Virtual LANs (VLANs)	
	Hands-On Projects	
	Capstone Projects	

<b>Week 9</b>	<b>Wide Area Networking</b>	Module 9
	WAN Essentials	
	Routing Protocols	
	WAN Connectivity	
	Wireless WANs	
	Troubleshooting Connections	
	Hands-On Projects	
	Capstone Projects	
<b>Week 10</b>	<b>Risk Management</b>	Module 10
	Security Risks	
	Risk Assessment and Management	
	Physical Security	
	Device Hardening	
	Security Policies for Users	
	Hands-On Projects	
	Capstone Projects	
<b>Week 11</b>	<b>Security In Network Design</b>	Module 11
	Network Hardening by Design	
	Network Security Technologies	
	Authentication, Authorization, and Accounting (AAA)	
	Authentication Technologies	
	Hands-On Projects	
	Capstone Projects	
<b>Week 12</b>	<b>Performance And Recovery</b>	Module 12
	Collect Network Data	
	Manage Network Traffic	
	Plan Response and Recovery Strategies	
	Hands-On Projects	
	Capstone Projects	
<b>Week 13</b>	<b>Revision and Labs</b>	
<b>Week 14</b>	<b>Revision and Final preparation</b>	All chapters seen in class
	<b>Note:Labs are required for every Learning Unit and Chapter</b>	