PAMANTASAN NG LUNGSOD NG PASIG
2nd Semester, Academic Year 2024-2025

COLLEGEOF COMPUTER STUDIES

COURSE TITLE: IT105 Networking I

COURSE DESCRIPTION:

This course provides students with a foundational understanding of computer networking concepts, protocols, and technologies. The course introduces the basic principles of data communication, network topologies, network hardware, and the OSI and TCP/IP models. Emphasis is placed on local area networks (LANs), IP addressing and subnetting, Ethernet standards, and the configuration of basic networking devices such as switches and routers. Students will gain hands-on experience through laboratory exercises focused on setting up, configuring, and troubleshooting small networks.

COURSE CREDITS: 3 UNITS

PRE-REQUISITE/S: none

CONTACT HOURS: 5 HOURS/WEEK

INSTRUCTOR: RANDY R. OTERO

COURSE LEARNING OUTCOMES: At the end of the semester, the students are able to:

PO1: Explain fundamental concepts of computer networking, including data transmission, protocols, and network models (OSI and TCP/IP).
PO2: Identify and describe common networking devices (e.g., routers, switches, hubs, modems) and media (e.g., UTP cables, fiber optics).
PO3: Differentiate various network types and topologies, such as LAN, WAN, MAN, star, mesh, and bus configurations.
PO4: Apply IP addressing and subnetting techniques to configure and troubleshoot network connections.
PO5: Demonstrate basic configuration and operation of networking devices, including setting up a simple LAN using switches and routers.
PO6: Use network tools (e.g., ping, tracert, ipconfig, packet tracer) for basic diagnostics and troubleshooting.
PO7: Recognize basic network security concepts and describe strategies for securing a simple network.
PO8: Work collaboratively in a team environment to plan, design, and implement small-scale network projects.
PO9: Communicate technical information effectively, both orally and in writing, related to network design, setup, and troubleshooting.

Course Learning Outcome

Cognitive

1. Explain the fundamental concepts and components of computer networks, including protocols, topologies, and communication models (OSI/TCP-IP).
2. Describe the functions of various networking devices such as routers, switches, hubs, and modems.
3. Analyze different types of IP addressing, subnetting, and network classes.
4. Compare types of networks (LAN, WAN, MAN, PAN) and their appropriate applications.
5. Evaluate basic network designs and identify potential performance or security issues.

Affective

1. Demonstrate a positive attitude toward collaborative work and problem-solving in networking tasks.
2. Show responsibility and ethical behavior in handling network configurations and data.
3. Appreciate the importance of network security and privacy in both academic and real-world settings.
4. Follow safety protocols and respect equipment and tools used in network laboratories.
5. Display eagerness and curiosity in exploring current trends and emerging technologies in networking.

Psychomotor

1. Set up and configure basic wired and wireless local area networks (LANs).
2. Perform IP addressing and subnetting for small networks.
3. Use network tools (e.g., cable testers, command-line utilities, simulators) to troubleshoot network issues.
4. Crimp and test Ethernet cables (e.g., straight-through and crossover).
5. Install and configure network devices such as switches, routers, and wireless access points.

Learning Plan

Time Frame	Intended Learning Outcomes	Course Contents	Teaching and Learning Activities	Evidence of Learning/Output (Summative/Formative Assessment/Performance Assessment	Learning Resources
1	1 Understand the structures and policies of the course. 2 Review of Hardware Concepts as they relate to networking technology	• Orientation • Review of Hardware and Software	• Individual Expectation Discussion	Recitation Lecture Presentation Discussion	https://netacad.com

	3 Review of Software Concepts as they relate to networking in general				
Time Frame	Intended Learning Outcomes	Course Contents	Teaching and Learning Activities	Evidence of Learning/Output • (Summative/Formative Assessment/Performance Assessment	Learning Resources
2	1 Explain how networks affects our lives 2 Explain how host and network devices are used. 3 Explain network representations and how they are used in network topologies 4 Compare the characteristics of common types of networks. 5 Explain how LANs and WANs interconnect to the internet 6 Identify some basic security threats and solution for all networks	1 Network Affect our lives 2 Network Components 3 Network Representations and Technologies 4 Common types of Networks 5 Internet Connections 6 Network Trends and Security	Discussion	Recitation Hands-on Exercises	https://netacad.com
3	1 Explain how to access a Cisco IOS device for configuration purposes. 2 Configure a Cisco IOS device using CLI 3 Use IOS commands to save running configuration 4. Explain how devices communicate across network media ‘ 5. Configure a host device with an IP Address 6 Verify connective between two end devices	1 Cisco IOS Access 2 Basic device configuration 3 Save configuration 4 Ports and Addresses 5 Configure IP Addressing 6 Verify Connectivity	Handouts/Readings • Demonstration • Discussion	Quiz Hands-on	https://netacad.com
4	1 Explain why protocols are necessary in network communications 2 Explain the role of Standard Organizations in establishing protocols for network interoperability 3. Explain how the TCP and the OSI model are used to facilitate 4. Explain how data encapsulation allows. data to be transported across the network. 5. Explain how local hosts access local resources on a network	1 Protocols 2 Standard Organizations 3 Reference Models 4 Data Encapsulation 5 Data Access	Lecture Presentation • Discussion	Recitation Hands on Exercises	https://netacad.com

5	1 Describe the purpose and functions of the physical layer in the network. 2 Describe characteristics of the physical layer 3 Identify the basic characteristics of copper cabling 4 Explain how UTP cable is used in Ethernet Networks 5 Describe fiber optic cabling and its main advantages over other media 6 Connect devices using wired and wireless media	1 Purpose of the physical layer 2 Physical layer characteristics 3 Copper cabling 4 UTP cabling 5 Fiber Optic cabling 6 Wireless media	Lecture Presentation Demonstration of Network Cabling Discussion		https://netacad.com

Week Number	• Intended Learning Outcomes	Topic	Teaching and Learning Activities	Assessment Tasks	
6	1 Calculate numbers between decimal binary systems. 2 Calculate numbers between decimal and hexadecimal numbers 3 Describe the purpose and function of the data link layer in preparing communication for transmission on specific media. 4 Compare the characteristics of media access control methods on WAN and LAN topologies. 5 Describe the characteristics and functions of the data link frame. 6 Explain how the Ethernet sublayers are related to the frame fields. 7 Explain how a switch builds its MAC address table and forwards frames.	1 Binary Number System 2 Hexadecimal Number System 3 Purpose of the Data Link Layer 4. Topologies 5 Data link Frame 6 Ethernet Frame 7. MAC address table	Lecture presentation Discussion	Exercises Quiz	https://netacad.com
7&8	1 Explain how the network layer uses IP protocols for reliable communications. 2 Explain the role of the major header fields in the IPv4 and IPV6 packets. 3 Explain how network devices use routing tables to direct packets to a destination network. 4 Explain the function of fields in the routing table of a router.	1 Network Layer characteristics 2 IPV4 and IPV6 Packets 3 How a hosts routes 4 Router routing tables 5. MAC and IP 6. ARP 7 Neighbor Discovery	Demo Presentation Discussion	Hands-on exercises Quiz	https://netacad.com

	5 Compare the roles of the MAC address and the IP address. 6 Describe the purpose of ARP. 7 Describe the operation of IPv6 neighbor discovery. 8 Configure initial settings on an IOS Cisco router. 9 Configure two active interfaces on a Cisco IOS router. 10 Configure devices to use the default gateway.	8 Configure Initial Router Settings 9 Configure Interfaces 10 Configure the Default Gateway			
9	MIDTERM EXAM				
10&11	1 Describe the structure of an IPv4 address including the network portion, the host portion, and the subnet mask. 2 Compare the characteristics and uses of the unicast, broadcast and multicast IPv4 addresses. 3 Explain public, private, and reserved IPv4 addresses. 4 Explain how subnetting segments a network to enable better communication. 5 Calculate IPv4 subnets for a /24 prefix. 6 Explain how to create a flexible addressing scheme using variable length subnet masking (VLSM).	1 IPV4 Address Structure 2 IPV4 Unicast, Broadcast, and Multicast 3. Types of IPV4 Addresses 4. Network Segmentation 5. Subnet an IPV4 Network 6. Variable Length Subnet Masking	Reading/Listening/Laboratory Exercises	Exercises Quiz	https://netacad.com
12&13	1 Explain the need for IPv6 addressing. 2 Compare types of IPv6 network addresses. 3 Explain how to Configure static global unicast and link-local IPv6 network addresses. 4 Explain how to configure global unicast addresses dynamically. Configure link-local addresses dynamically. 5 Identify IPv6 addresses. 6 Implement a subnetted IPv6 addressing scheme.	1 IPV6 Address Representation 2 IPV6 Address Types 3. GUA and LLA Static Configuration 4 Dynamic Addressing for IPV6 GUAs and LLAs 5 IPV6 Multicast Addressing 6 Subnet an IPV6 Network	Reading/Listening/Laboratory Exercises	Exercises Quiz	https://netacad.com
14&15	1 Explain how ICMP is used to test network connectivity. 2 Use ping and traceroute utilities to test network connectivity. 3 Explain the purpose of the transport layer in managing the transportation of data in end-to-end communication. 4 Explain characteristics of TCP and UDP 5 Explain how TCP and UDP use port numbers. 6 Explain how TCP session establishment and termination processes facilitate reliable communication.	1 ICMP Messages 2 PING and Traceroute Testing 3 Transportation of Data 4 TCP and UDP Overview 5 Port Numbers 6 TCP communication process 7. UDP communication	Discussion	Hands-on-Exercises	https://netacad.com
16	1 Explain how the functions of the application layer, presentation layer, and session layer work together to provide network services to end user applications. 2 Explain how end user applications operate in a peer-to peer network.	Reference/Suggested Readings: • NETACAD, CISCO – Network Fundamentals • CISCO Packet Tracer Network Simulator • Cisco Systems Incorporation –	Reading/Listening/Laboratory Exercises	Hands-on Exercises	https://netacad.com

	3 Explain how web and email protocols operate. 4 Explain how DNS and DHCP operate. 5 Explain how file transfer protocols operate.	Network Fundamentals, 2020 • Cisco IOS Configuration Fundamentals Command Reference			
17	1 Explain why basic security measure are necessary on network devices. 2 Identify security vulnerabilities. 3 Configure network devices with device hardening features to mitigate security threats.	1 Security Threats and Vulnerabilities 2. Network Attacks 3. Network Attack Mitigation 4. Device Security	Reading/Listening/Laboratory Exercises	Exercises Quiz	https://netacad.com
18	FINAL EXAM				

Reference/Suggested Readings:

• NETACAD, CISCO – Network Fundamentals (www.netacad.com)
• CISCO Packet Tracer Network Simulator
• Cisco Systems Incorporation – Network Fundamentals, 2020 • Cisco IOS Configuration Fundamentals Command Reference

Course Requirements:

- Complete assigned readings
- Attend online and face-to-face classes regularly and participate in class discussion
- Complete activities/seatwork/assignments and papers on time
- Complete laboratory exercises during laboratory sessions
- Complete and submit a “real-world” project. Mode of Classes:
- Face-to-face Classroom Requirements - Attend class meetings on time. Classroom Policies: In order to make classroom a comfortable and encouraging learning environment, everyone is expected to abide by the following policies: •
- Treat other students and the professor with courtesy and respect •
- Listen when other are speaking • Do your best to be on-time for class •
- Do not disrupt the classroom. •
- See faculty schedule for consultation hours.
- Student may also schedule consultation by appointment.

GRADING SYSTEM

Criteria	Percentage
Class Standing	60%

Quizzes Participation Recitation/Seat works/Assignment/Activity	30% 5% 25%
Major Examination (Midterm/Final Exam)	40%
Total	100%

Submitted by:

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APPROVED BY:

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