

**NEW YORK CITY COLLEGE OF TECHNOLOGY
THE CITY UNIVERSITY OF NEW YORK**

DEPARTMENT: Electrical and Telecommunications Engineering Technology

COURSE CODE: TCET 3142/TC 570

COURSE TITLE: Computer Systems and Network

COURSE DESCRIPTION: The skills needed to install, configure and troubleshoot a computer network are covered. A wide range of materials, starting with computer hardware, operating systems, wiring, protocols, and installation are discussed. Troubleshooting various networks, utilizing engineering analysis tools is covered. Discovering practical problems in interfacing computer networks in various configurations are covered in the laboratory.

PREREQUISITE: AAS Degree in ET, TC, CS, EM or equivalent

TEXTBOOK:

1. Network+ Guide to Networks, By: Tamara Dean (4th Edition) Delmar of Thompson Learning, ISBN: 0-619-21743-X
2. Lab Manual for Network+ Guide to Networks, By Michael Grice (4th Edition), ISBN-0619217448, Delmar of Thompson Learning

COURSE OBJECTIVES: Upon the completion of this course, the students should be able to:

1. Discuss Open System Interconnection (OSI) Reference Model. Understand the communication between two systems. Understand the concept of network protocols. (ABET criteria 2a, 2b, 2c, 2f, and 2i.)
2. Know the functions of the Network Operating Systems. Know how to select a Network Operating System. Understand the concept of Window Networks. (ABET criteria 2a, 2b, 2c, and 2d.)
3. Understand Network components and specifications. Understand the functions of Repeaters, Hubs, Bridges, Switches, and Routers. Understand the advantages of using VLANs. (ABET criteria 2a, 2b, 2c, and 2d.)
4. Understand the concept of WANs and its transmission methods. Understand PSTN, ISDN, DSL, Cable, and T-Carriers. Understand FDDI, X.25, and Frame Relay. (ABET criteria 2a, 2b, 2c, and 2d.)
5. Understand the addressing and name resolution in the network communication. Understand the IP addressing, Network classes, Host names and Domain Name System. Know how to configure and install TCP/IP in the network. (ABET criteria 2a, 2b, 2c, 2d.)
6. Know the concepts of network security and disaster recovery. Know the function of firewall. Discuss security considerations of a network. (ABET criteria 2a, 2b, 2c, 2d, 2f, and 2k.)

TOPICS: The topics include components of LANs, WANs communication systems, such as hardware, software, topology, architecture, protocols and standards governing computer networks; and specific types of networks, such as peer to peer and client/server.

CLASS HOURS: 2

LAB HOURS: 3

CREDITS: 3

PREPARED BY: Professor Jay E. Goykadosh, Fall 2006

Course coordinator: Professor Joe X. Wei
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Descriptive details for laboratory coursework:

Laboratory exercises include understanding elements of a network. Installing Window XP, installing Window 2003, Servers, Workstations and protocols, IP address, DHCP, Binding configuring MLTI-homed, RRAS, topologies, installing remote access and VPN. Using TCP/IP utilities, troubleshooting, preventing problems and creating a secure network.

GRADING POLICY

Class Participation	5%
Exam1	10%
Midterm	15%
Exam	10%
Labs Reports	25%
Lab Exam	10%
Final Exam	25%

<u>Letter Grade</u>	<u>Numerical Grade Ranges</u>	<u>Quality Points</u>
A	93-100	4.0
A-	90-92.9	3.7
B+	87-89.9	3.3
B	83.86.9	3.0
B-	80.82.9	2.7
C+	77-79.9	2.3
C	70-76.9	2.0
D	60-69.9	1.0
F	59.9 and below	0.0

Assessment

The following assessment techniques are correlated to the course objectives as follows. In addition, each assessment technique incorporates one or more of the following ABET Criterion 2 outcomes (2a, 2b, 2c, 2d, 2e, 2f, 2k, 2l, 2m, 2n, 2o, 2p, and 2q.).

COURSE OBJECTIVES Upon the completion of the course, the student should be able to	ASSESSMENT Evaluation methods and criteria Students will be assessed based on their ability to
1. Discuss Open System Interconnection (OSI) Reference Model. Understand the communication between two systems. Understand the concept of network protocols.	1. Analyze the function Network interface card in perspective to the OSI model Distinguish between IP, IPX and MAC address. Discuss the details for TCP/IP protocol
2. Know the functions of the Network Operating Systems. Know how to select a Network Operating System. Understand the concept of Window Networks.	2. Analyze Windows NOS (Network Operating System).
3. Understand Network components and specifications. Understand the functions of Repeaters, Hubs, Bridges, Switches, and Routers. Understand the advantages of using VLANs.	3. Distinguish between network Cables and connectors, Distinguish between NICs. Analyze the main features of network components, such as Repeaters, Hubs, Bridges, Switches, and Routers.
4. Understand the concept of WANs and its transmission methods. Understand PSTN, ISDN, DSL, Cable, and T-Carriers. Understand FDDI, X.25, and Frame Relay.	4. Analyze issues of PSTN, ISDN, DSL, Cable, and T-Carriers. Discuss the Serial Line Internet Protocol and Point-to-Point Protocol.
5. Understand the addressing and name resolution in the network communication. Understand the IP addressing, Network classes, Host names and Domain Name System. Know how to configure and install TCP/IP in the network.	5. Configure and install TCP/IP in the network.
6. Know the concepts of network security and disaster recovery. Know the function of firewall. Discuss security considerations of a network.	6. Install and update virus protection software. Install the firewall for network. Backup data for a network periodically.

Weekly course outline

WEEK	TOPIC	READING ASSIGNMENTS	HOMEWORK AND LAB PROJECTS
1	Introduction to Networks: a) Evolution of Telecommunication Networks and Computing Technology b) Network Protocol Architecture c) Open System Interconnection (OSI) Reference Model d) Internet Protocol Architecture Networking standards and the OSI Model a) ANSI, b) EIA, c) ISO, d) ITU f) Communication between two systems g) Frame Specification h) Addressing through the layers i) IEEE networking specifications Basic Networking Components	Chapter 1 Page 1-27 Chapter 2 Page 39-60	Review Questions 1 Through 20. Project 1-1 (Page 30). Project 1-2 (Page 32). Review Questions 1 Through 20. Project 2-1 (Page 62)
2-3	Transmission Basics and Networking Media a) Analog and digital Signaling b) Throughput and bandwidth c) Cables and connectors d) Infra red and RF transmission NOS - Windows 2003 Introduction to Network Operating Systems a) Services and features b) Installing and configuring c) Users, groups and rights d) Active Directory e) Selecting a Network Operating System f) Win 2003 - Based Networking g) Network Operating System and Servers h) Multiprocessing	Chapter 3 Page 75 – 132 Chapter 8 Page 415 - 464	Review Questions 1 Through 25 Review Questions 1 Through 25. Installing Windows Project 8-1 (Page 478). Project 8-2 (Page 478).
4	Network Protocols a) Introduction to protocols b) TCP/IP c) TCP/IP application layer protocols d) IPX / SPX core protocols e) Apple talk compared to the OSI model Exam 1	Chapter 4 Page 155-200	Review Questions 1 Through 25. Project 4-1, 4-2, 4-3, 4-4 (Page 214-219).
5	Networking Hardware a) Network Interface Cards (NIC's) b) Types of NIC's c) Installing NIC's d) Repeaters e) Hubs f) Bridges g) Switchers h) Routers i) VLANs Virtual LANs	Chapter 5 Page 221-262	Review Questions 1 Through 25. Project 5-1, 5-2, 5-3, 5-4, 5-5

WEEK	TOPIC	READING ASSIGNMENTS	HOMEWORK PROBLEMS
6	Network Architecture <ul style="list-style-type: none"> a) Simple LAN topologies b) Hybrid LAN topologies c) Backbone Networks d) Logical Topologies e) Switching f) Ethernet, Token Ring g) FDDI, ATM and Wireless 	Chapter 6 Page 285-319	Review Questions 1 Through 20 Projects 6-1, 6-2
7	WANs and Remote Connectivity: <ul style="list-style-type: none"> a) WANs Essentials b) WANs transmission methods c) PSTN d) ISDN e) DSL f) Cable i) T-Carriers i) X.25 and Frame Relay j) Remote Access k) VPN MIDTERM	Chapter 7 Page 341-390	Review Questions 1 Through 25 Project 7-1 (Page 407). Project 7-2 (Page 408). Project 7-4 (Page 410).
8-9	Networking with TCP/IP & the internet: <ul style="list-style-type: none"> a) Addressing and name resolution b) IP addressing and Network classes c) DNS and DHCP d) TCP/IP Subprotocols and Troubleshooting 	Chapter 11 Page 565-599	Review Questions 1 Through 20 Projects 11-1 Page 610 11-2 Page 612 11-3 Page 614
10	Troubleshooting network problems: <ul style="list-style-type: none"> a) Troubleshooting methodology b) Identify the symptoms b) Identify the scope of the problem c) Prevent Future Problems Troubleshooting Tools	Chapter 12 Page 617-651	Review Questions 1 Through 20. Project 11-3 (Page 596).
11	Network Integrity and Availability <ul style="list-style-type: none"> a) Viruses b) Fault Tolerance c) Data Backup Disaster Recovery	Chapter 13 Page 667-708	Review Questions 1 Through 20. Projects 13-1 Page 718 13-2 Page 719 13-3 Page 720
12	Network Security <ul style="list-style-type: none"> a) Security Risks b) Security Policy c) Physical Security d) Encryption and Authentication 	Chapter 14 Page 723-760	Review Questions 1 Through 25 Projects 14-1, 14-2, 14-3 Page 775-779
13	Implementing and Managing Networks Project and Network Management Software and Hardware Changes	Chapter 15 Page 783- 813	Review Questions 1 Through 20 Projects 15-1, 15-2, 15-3 Page 822-825
14	Networking With UNIX/Linux A closer look, Installation and Administration Network Base Networks Network NOS, Installation and Administration	Chapter 9 Page 485-510 Chapter 10 Page 527-544	Review Questions Projects will be done together
15	Final Examination		

TC570 Lab Outline

<u>Lab</u>	<u>Experiments</u>	<u>(Weekly)</u>
1.	UNDERSTANDING ELEMENTS OF A NETWORK.	1
2.	INSTALLING Window XP	2
3.	INSTALLING Window 2003	3
4.	SERVERS,WORKSTATIONS AND PROTOCOLS, IP ADDRESS, DHCP, BINDING	4
5.	HOW NETWORK HARDWARE IS USED, MLTI-HOMED, RRAS, BRIDGE	5
6.	HOW TOPOLOGIES, SWITCHING AND ETHERNET IS USED	6
7.	INSTALLING REMOTE ACCRESS AND VPN	7
8.	HOW TCP/IP IS USED IN THE REAL WORLD	8-9
9.	TROUBLESHOOTING AND PREVENTING PROBLEMS	10
10.	PREVENTING VIRUSES AND MAKING BACKUPS	11
11.	CREATING A SECURE NETWORK	12
12.	PROJECT MANAGEMENT	13
13.	WORKING WITH LINUX, NETWARE AND CISCO	14