

COE 344: Computer Networks

Instructor: Dr. Uthman Baroudi

Lecture: S.T: 8:30-9:45 AM

Location: Bldg. 24-106

Office hours: S.S.M.T.: 11-11:50 am (if it is Not suitable for you, please do not hesitate to call or e-mail me to set an appointment)

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Catalogue Description:

This course will be taught using the top-down approach. Topics covered include introduction to computer networks, OSI model, WAN and LAN design issues. Application layer design issues and protocols are discussed. Then, Transport layer design issues, protocols as well as congestion control mechanisms are presented. Socket programming is explained. An in-depth analysis is presented of the Network layer design issues, and internetworking. MAC layer design issues and protocols are presented.

Course Objectives:

- 1) To provide students with a theoretical and practical base in computer networks issues,
- 2) Student will be able pursue his study in advanced networking courses,
- 3) Prepare students for easy transfer from academia into practical life (i.e. summer training, Coop, etc.)

Prerequisite: COE 341

Learning Outcomes:

At the end of the course a student will:

1. Ability to apply knowledge of mathematics, probability, and statistics to model and analyze some networking protocols.
2. Ability to design, implement, and analyze simple computer networks.
3. Ability to identify, formulate, and solve network engineering problems.
4. Knowledge of contemporary issues in computer networks.
5. Ability to use techniques, skills, and modern networking tools necessary for engineering practice.

Textbook:

- Computer Networking: A Top-Down Approach featuring the Internet by J. F. Kurose and K. W. Ross, Prentice Hall Publishing Company, 2002

References:

- Peterson L. & Davie, B. *Computer Networks: A Systems Approach*, Morgan Kaufmann Publishers, Inc., 1996
- Tanenbaum, Andrew S. , *Computer Networks 3rd ed.*, Prentice Hall Publishing Company

Grading:

- Homework 5%
- Other assignments 5%
- Quizzes 15% (**Every Tuesday**)
- Laboratory 15%
- Exam-I (**Tuesday October 23rd, 2007**) 15%
- Exam-II (**Tuesday December 11th, 2007**) 15%
- Final Exam (**January 22nd, 2008**) 30%
- **A +> 90, F < 50**

General policy

1. Minimize disruptions -- turn off mobile phone and pager during lectures
2. *Check your exam schedule carefully. NO MAKE-UP EXAM will be given.*
3. Minimum penalty for cheating is 0 for the homework/project/exam where it occurs.
4. Exceeding **6 absences** without official excuse means DN grade automatically
5. No WP grade will be given for poorly performing students
6. *You are responsible for all the materials covered in the class. So, it is your responsibility to find out what has been covered in those unattended classes.*
7. You have to abide with the Lab rules and regulations

Proposed Outline (Subject to Change)

Week		Topic	Lab Experiments
1	Introduction (Chapter 1)	What is the Internet, What is a protocol? Network Edge, Network Core, and Network Access & Physical Media Delay and Loss in Packet-Switched Networks Protocol Layers and Their Service Models Internet Backbones, NAPs and ISPs Brief History of Computer Networking and the Internet	<u>Introduction</u> : Lab setting, Network devices, etc.
2	Application Layer (Chapter 2)	Principles of Application Layer Protocols The World Wide Web: HTTP File Transfer: FTP	<u>Lab1</u> : Networking Tools - OS and LAN implementation
3		Electronic Mail in the Internet The Internet's Directory Service: DNS	<u>Lab2</u> : Application Layer - Web, FTP, and TFTP Services
4		P2P File Sharing	<u>Lab3</u> : Application Layer - DNS, SMTP, and POP3
Eid al-Fitr Break (October 14, 2006)			
Major I (Tuesday October 23rd, 2007)			
5	Transport Layer (Chapter 3)	Transport-Layer Services and Principles Multiplexing and Demultiplexing Applications	<u>Lab4</u> : Application and Transport Layers - Socket Programming
6		Connectionless Transport: UDP Principles of Reliable of Data Transfer: TCP case study Principles of Congestion Control	<u>Lab5</u> : Transport Protocol Analysis - TCP
7		Principles of Congestion Control	<u>Lab6</u> : Transport & Network Protocol Analysis - UDP, IP
8	Network Layer (Chapter 4)	Introduction and Network Service Models What is Inside a Router? IP: the Internet Protocol	<u>Lab7</u> : IP Address Assignment: Static and Dynamic using DHCP
9		Routing Algorithms Hierarchical Routing	<u>Lab8</u> : IP Address Subnetting, CIDR, and VLSM
10		Routing in the Internet	<u>Lab9</u> : IP Address Assignment in LANs and Inter-networked LANs
10	Link Layer & LANs (Chapter 5)	Link Layer: Introduction & Services Multiple Access Protocols and LANs Major Exam II (Tuesday December 11th, 2007)	
11		LAN Addresses and ARP Ethernet Hubs, Bridges and Switches	<u>Lab10</u> : Dynamic Routing Protocols: RIP, and RIPv2
12		PPP: the Point-to-Point Protocol Link Virtualization: ATM	Lab11: Network Protocol Analysis - IEEE 802.3, ARP, and ICMP
13	Wireless & Mobile Net (Chapter 6)	Wireless Links & Network Characteristics, CDMA	Lab12: Wireless LAN
14		Wireless LANs: IEEE 802.11 WPAN & Bluetooth	
15		Mobile networking (introduction)	Final Lab Exam
Final Exam (January 22nd, 2007)			

Course Learning Outcomes	Outcome Indicators and Details	Assessment Methods and Metrics	ABET 2000 Criteria	Outcome (Minimum Weight)
1. Ability to apply knowledge of mathematics, probability, and statistics to model and analyze some networking protocols.	<ul style="list-style-type: none"> • Packet and circuit switching modeling, analysis, and comparison. • Modeling of some MAC protocols. 	<ul style="list-style-type: none"> • Assignments • Quizzes • Exams 	A(M)	18%
2. Ability to design, implement, and analyze simple computer networks.	<ul style="list-style-type: none"> • Experiments on LAN design and implementation. • Protocol analysis. • Use of networking tools. 	<ul style="list-style-type: none"> • Lab assignments • Lab work 	B(L)	6%
3. Ability to identify, formulate, and solve network engineering problems.	<ul style="list-style-type: none"> • Identify and solve reliable data transfer problems over IP Networks. • Identify and solve network addressing problems. • Identify, compare, and contrast different routing protocols. 	<ul style="list-style-type: none"> • Assignments • Quizzes • Exams • Lab work 	E(H)	35%
4. Knowledge of contemporary issues in computer networks.	<ul style="list-style-type: none"> • Contemporary networking technologies. 	<ul style="list-style-type: none"> • Assignments 	J(L)	5%
5. Ability to use techniques, skills, and modern networking tools necessary for engineering practice.	<ul style="list-style-type: none"> • Setup networking services. • Setup and basic configuration of networking devices. • Networking tools. • Traffic analyzers. • Troubleshooting network problems. • Different operating systems. 	<ul style="list-style-type: none"> • Lab work. 	K(L)	9%