

ECE 544: Computer Networks II, Spring 2002 (Revised 3/14)

This course is intended to provide an in-depth and practical understanding of modern computer networks that constitute the Internet. The scope includes network architecture, component technologies (both hardware and protocols) and specific systems. Emphasis will be on network protocols and related software implementation.

Meeting Time: Fridays, 4:45-7:30PM, Hill 116

Course Instructors: Prof. D. Raychaudhuri (ray@winlab.rutgers.edu) and Dr. Max Ott (max.ott@acm.org).

Teaching Assistant: Sridharan Muthuswamy (msridhar@eden.rutgers.edu)

Text: Peterson & Davie, “Computer Networks: A Systems Approach”, Morgan Kaufman, 2nd ed. (Required text, which will be used for about 60-70% of the material covered)

Additional reading materials to be distributed or downloaded, including several Internet RFC’s (e.g. 793, 768 & 791) and papers on specific systems.

Course Information: comnw2 mailing list comnw2@winlab.rutgers.edu, website: www.winlab.rutgers.edu/comnet2

Grading Policy:

Class participation and homework	(10%)
Midterm exam	(20%)
Final exam	(30%)
Project paper	(10%)
Design specifications	(10%)
Software prototype & demo	(20%)

Course Outline: (some topics may be covered through reading assignments)

L1: 1/25-----

1. Introduction
 - a. What is a network?
 - b. Different types of networks
 - c. How to specify requirements
 - d. Service interfaces and QoS concepts
 - e. Protocol layering and OSI architecture
 - f. Network API’s/sockets & software issues

2. Overview of Networking Fundamentals

- a. Network topologies
- b. Packet formats
- c. Resource Sharing
- d. Packet forwarding & routing
- e. Flow & congestion control
- f. Transport layer
- g. QoS

L2: 2/1-----

3. Network Protocols

- i. MAC:
 - 1. Ethernet,
 - 2. Token Ring
 - 3. 802.11
- ii. Bridges and LAN switching:
 - 1. learning bridge
 - 2. spanning tree
 - 3. multicast

L3: 2/8-----

- iii. Cell switching (ATM):
 - 1. cell format, SAR
 - 2. VPI/VCI, signaling
 - 3. PNNI routing (basics only)
 - 4. QoS control

L4: 2/15-----

ATM network review & examples

L5: 2/22 -----

- IP basics:
- 1. IP address
 - 2. ARP
 - 3. DHCP
 - 4. ICMP
 - 5. intra-domain routing (RIP, OSPF)

L6: 3/1 -----

- IP advanced:
- 1. subnets
 - 2. inter-domain routing (BGP)

L7: 3/8 -----

- 1. QoS in networks (traffic shaping, scheduling, CAC, etc.)
- 2. IP QoS (diff serve, RSVP)

L8: 3/15 -----

- 1.IPv6 summary
- 2.IP multicast basics

3. Transport layer protocols

TCP

UDP

RTP

----Mid-term exam 3/29 (open book, 2 hr)

L9: 4/5 ----- (guest lecturer: Dr. K. Tepe)

Security protocols

Public key

DES

PGP

IP Sec

L10: 4/12 -----

Mobility protocols

mobile IP

mobile ATM

ad-hoc routing

L11: 4/19 ----- (guest lecturer: Dr. Max Ott)

Higher layer protocols (DNS, SNMP, HTTP, H.323)

Internet Software Architecture

System case study: Semantic Routing

L12: 4/26 ----- (guest lecturer: Dr. Pravin Bhagwat)

System-level case study:

Wireless local-area networks (802.11x)

Wireless personal area networks (Bluetooth, 802.15, etc.)

L12: 5/3 -----

System case study: Broadband WLAN (Hiperlan/WATMnet)

Course review and Q&A

----Final Exam