16:332:544 and 14:332:423 Communication networks II

Grading Policy:

Midterm exam (25%) Final exam (35%)

Network architecture paper (10%) Protocol project and report (25%)

Class participation & homework (5%)

Text book: Computer Networks, A top-down approach, 8th Edition, 2021, By James Kurose, Keith Ross -- available to all students through Pearson online access, for a minimal e-Access fee.

Course Outline: (some topics may not be covered in sequence or may be omitted; may include

some guest lectures). ***Due to constant improvements in technology, new topics will be introduced during the lecture. This syllabus is an outline and does not cover the sub-topics which will be discussed in the class.***

L1----- 1/19 Introduction

- What is a network?
- Different types of networks
- How to specify requirements
- Protocol layering and OSI architecture
- Network API's/sockets & software issues

Overview of Networking Fundamentals

- Network topologies
- Packet formats
- Resource Sharing
- Packet forwarding & routing
- Flow & congestion control
- Transport layer
- QoS, performance evaluation basics

L2----- 1/26 **Shared Media Protocols and LAN's**

MAC:

- 802.3 Ethernet,
- 802.11 Wireless LAN

80211x Port-based Network Access Control (PNAC)

Bridges and LAN switching:

- learning bridge
- multicast

L3----- **2/2 Switched Networks**

- Cell switching (ATM)

CLOUD COMPUTING

- Security Issues in Cloud computing
- QoS control

L4----- **2/09 Internet Protocol (IP) Basics**

- IP address
- ARP
- DHCP
- ICMP
- intra-domain routing (RIP, OSPF)

L5------**2/16 Internet Protocol (IP) Advanced**

- subnets
- classless inter-domain routing (CIDR)
- inter-domain routing (BGP)
- IPv6, IP QoS (diff serve, RSVP)
- **Network Architecture project – discussions**
- **Routing protocol prototyping project - discussions**

L6------**2/23 IP Multicast**

- DVMRP
- PIM
- Reliable Multicast

L7------**3/1 Network Hardware and Software**

- Wireless (802.11, 5G, PLAN)
- Switches (Ethernet, ATM/MPLS, OpenFlow)
- IP Routers
- Network software basics (OS, drivers, protocols, management)
- Socket programming intro

3/08 Mid-term exam

P1 **3/15 Project Discussions -- Spring Recess (NO CLASS)**

L8-----**3/22Quality of Service (QoS)**

- Traffic Shaping
- Flow Control
- Admission Control
- RSVP
- IP Diff Serve
- IP Int Serve and ATM QoS

L9------**3/29 Protocol Project tutorial & standards – Lab progress meeting**

(2-3 additional meetings to be scheduled as needed)

L10------**4/05 Transport layer protocols**

- UDP
- TCP
- RTP

L11-----**4/12 Mobility protocols**

- mobile IP
- ad-hoc routing, DTN
- alternative approaches from Cellular

L12------**4/19 Security protocols**

- DES
- RSA
- public key

- PGP
- IPsec

L13-------**4/26 Advanced Topics**

Advanced Topics -- Content delivery networks (CDN)

- Future Internet architecture

Course Projects:

1. Network Architecture project due on 4/29 (instructions to be given separately)
2. Routing protocol prototyping project due on 5/08 (instructions to be given separately)

---- Final Exam (between 5/2- to 5/8/ specific date TBA)