Spring 2024

CS 656-106: Internet and Higher-Layer Protocols

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Syllabus CS 656, Spring 2024
NJIT

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Kurose and Ross, "Computer Networking: A Top-Down Approach", 8th Edition, ISBN-13:978-0-13-668155-7

Some course materials could be found in:

Student Resources - Pearson Education: http://wps.pearsoned.com/ecs_kurose_compnetw_6/216/55463/14198700.cw/

The objective of this course is to provide a unified view of data and computer communications, emphasizing on the application and design of TCP/IP networking. In this course, students gain the knowledge and skills required to analyze and develop solutions to solve TCP/IP networking problems of modern data communications, services and related tools and technologies. Within this scope, the aspect of broadband high speed access technologies, LAN, WLAN, WAN, DNS, Cellular, VoIP, Video streaming over IP, Cable Telephony and related evolving technologies and protocols are covered. Upon successful completion of the course, students will have gained a deep understanding of the broad concepts and principles of designing and implementing modern TCP/IP supported computer data networking applications.

Home Works:
HW will include the following Programming assignments, in addition to the selected problems given at the end of the each Chapter:

Assignments:

1. TCP/UDP Socket Programming (Java/Python))
2. Implementing a Reliable Transport Protocol (Chapter 3)
3. Implementing a Distributed, Asynchronous Distance Vector Routing Algorithm (Chapter 4)
4. ICMP design/programming for Ping/traceroute
5. DNS Simulation
6. Term papers: TCP/IP related topics

Text book Chapters:

1. Data Networking: Computer Networks and the Internet; Performance Analysis
2. The Application layer: Principles of Networking and socket programming
3. The Transport Layer: Principles of reliable data transfer and Connection oriented TCP; Congestion control
4. The Network Layer: Virtual Circuit and Datagram networks; Routing Algorithms; IP addressing
5. Advanced wireless and mobile data networks: Architecture, protocol and performance analysis; TCP/IP over wireless
6. Multimedia Networking: UDP streaming and HTTP streaming; RTP/SIP
7. Network Management: Protocols and TCP/IP based fault and performance monitoring

Weekly topics

Class	Lecture	Topics	Assignment
1	1 (Chap 1)	Computer Networks, the Internet, core, edge, IETF	HW
2	2 (Notes)	Introduction of Networking and TCP/IP	HW
3	3 (Chap 2)	App layer: Web, HTTP/TCP, FTP, SMTP, DNS, P2P	HW
4	4 (Chap 2)	App Layer: Socket programming with TCP/UDP	HW
5	5 (Chap 3)	Transport Layer: TCP/IP Implementation and Reliable data transfer	HW
6	6 (Chap 3)	Transport layer: TCP Flow /Congestion control; Review	HW
7	7 (Notes)	Transport layer performance issues; Review	HW
8		**Mid term**	
9	8 (Chap 4)	Network Layer: Data Plane - Routing/IP addressing	HW

9	9 (Chap 5)	Network Layer: Data Plane – Subnet design	HW
10	10 (Chap 5)	Network Layer: Control Plane; Routing Algorithm	HW
11	11 (Chapter 6)	Link-layer	HW
12	12 (Chapter 7)	Wireless and mobile networks; TCP/IP over wireless	HW
13	13 (Chap 8)	Security	No HW
		Final Exam	

Grading policy:
Homework assignment 10%
Quiz (each class) 10%
Term paper 10%
Class attendance 5%
Midterm 30%
Final 35%

Homework:
From lecture notes and textbook. No late homework.