Syllabus

COEN 233 Computer Networks
Department of Computer Engineering
Santa Clara University

Dr. Ming-Hwa Wang   Winter Quarter 2015
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Course website: http://www.cse.scu.edu/~mwang2/network/
Office Hours: Saturday 5:00-5:30pm

Course Description

Fundamentals of computer networks: protocols, algorithms, and performance. Data Communication: circuit and packet switching, latency and bandwidth, throughput/delay analysis. Application Layer: client/server model, socket programming, Web, e-mail, FTP. Transport Layer: TCP and UDP, flow control, congestion control, sliding window techniques. Network Layer: IP and routing. Data Link Layer: shared channels, media access control protocols, error detection and correction. Mobile and wireless networks. Multimedia Networking. Network security.

Prerequisites

Probability (AMATH 108), Introduction to Embedded systems (COEN 20) or equivalent, optional: Abstract data Types and Data Structures (COEN 12).

Required Textbooks

1. "Computer Networks, 5th Edition", by Andrew S. Tanenbaum, ISBN: 978-0132126953, Prentice Hall 2010
2. "Software Defined Networks: A Comprehensive Approach", by Paul Goransson, Chuck Black, ISBN: 978-0124166752, Morgan Kaufmann 2014

Recommended Textbooks

1. "Computer Networks, An Open Source Approach", by Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, McGraw-Hill, 2011
2. "Computer Networks, A System Approach, 5th Edition", by Larry L. Peterson and Bruce S. Davie, Morgan Kaufmann Publishers, 2011
3. "Computer Networking: A Top-Down Approach, 5th Edition", by James Kurose, Keith Ross, Addison-Wesley, 2009
4. "Computer Networks, Principles, Technologies, and Protocols for Network Design", Natalia Olifer, Victor Olifer, Wiley 2006
5. "Communication Networks, Fundamental Concepts and Key Architectures, 2nd Edition", by Alberto Leon-Garcai, Indra Widjaja, McGraw-Hill, 2004

6. "The Essential Guide to RF and Wireless, 2nd Edition", by Carl J. Weisman, Prentice Hall, 1999

References

1. "Computer Networks, A Top-Down Approach", by Behrouz A. Forouzan, Firouz Mosharraf, McGraw-Hill, 2011
2. "Building Wireless Sensor Networks", by Robert Faludi, O'reilly, 2010
3. "RFID Systems, Research Trends and Challenges", by Miodrag Bolic, David Simplot-Ryl, Ivan Stojmenovic, ISBN: 978-0470746028, Wiley, 2010
4. "Optical Networks, A Practical Perspective, 3rd Edition", by Rajiv Ramaswami, Kumar Sivarajan, Galen Sasaki, Morgan Kaufmann, 2009
5. "802.11 Wireless Networks, the Definitive Guide, 2nd Edition", by Matthew S. Gast, O'Reilly 2005
6. "Mastering Networks, An Internet Lab Manual", by Jorg Liebeherr, Magda El Zarki, Addison-Wesley, 2004
7. "Network Systems Design using Network Processors", by Douglas E. Comer, Prentice Hall, 2004
8. "Design Network Security, 2nd Edition", by Marike Kaeo, Cisco Press, 2003
9. "Converged Network Architectures, Delivering Voice and Data over IP, ATM, and Frame Relay", by Oliver C. Ibe, John Wiley & Sons, 2002
10. "OFDM Wireless LANs" A Theoretical and Practical Guide", by Juha Heiskala, John Terry, Sams Publishing, 2002
11. "Fixed Broadband Wireless Access, Networks and Services", by Oliver C. Ibe, John Wiley & Sons, 2002
12. "TCP/IP Illustrated 3 Volume Set", by W. Richard Stevens, etc. Addison Wesley, 2002
13. "Digital Communications, 4th Edition", by John G. Proakis, McGraw-Hill, 2001
14. "Internet Routing Architectures, 2nd Edition", by Sam Halabi, Cisco Press, 2001
15. "Interconnections, 2nd Edition: Bridges, Routers, Switches, and Internetworking Protocols", by Radia Perlman, Addison-Wesley, 1999
16. "Routing in the Internet, 2nd Edition", by Christian Huitema, Prentice Hall 1999
17. "Unix Network Programming, Volume 1: Network APIs – Sockets and XTI and Volume 2: Interprocess Communications", by Richard Stevens, Prentice Hall, 1997 & 1998

Course Objectives

1. To learn advanced and cutting edge state-of-the-art knowledge and implementation in computer network.
2. To explore queuing theory or other performance techniques.

3. To read and understand research publications in the technical area of computer network, beyond that of the traditional textbook level.
4. To conduct group project and to equip for scholarly research in computer network.
5. To explore network security and other advanced topics if time permits.

Expected Learning Outcomes

1. Demonstrate the knowledge of physical layer, data link layer, medium access control sublayer, network layer, transport layer, and their implementation.
2. Demonstrate the knowledge of network programming and implement example client-server program.
3. Demonstrate the knowledge of network protocols and implement example protocol.
4. Demonstrate the knowledge of queuing theory or other performance techniques.
5. Demonstrate the ability to read/understand current research papers and implement example research group project in computer networks.

Grading Policy

Course grade is determined based on the total score (maximum 1100 points + up to 200 optional bonus points for extra work) from:

1. Mid-term and final exams of 200 points each (close book with one A4 note, no sitting together, no wireless connection.) Makeup exams (must have a very good reason) are much difficult than normal exams.
2. Two programming assignments of 200 points each (late penalty: 40 points/day.) Makeups are more difficult too. You can call Design Center at 408/554-4909 for setup account or IT support, and ssh linux.scudc.scu.edu to work remotely.
3. A group (2-3 people in a team) programming term project of 300 points (late penalty: 60 points/day.) No makeup is allowed.
4. Bonus assignments will be assigned at each week with 20 points each. Due before next lecture begin by email to me (in plain text or PDF) with title "coen233 bN" (where N can be 2, 3,…, 10) and cc to the grader. The solution for bonus assignments will be posted on my protected web page. Please read solutions of bonus assignments before asking questions. No late work accepted for bonus assignments. 75-80% of exam questions are similar to bonus assignments.
5. Class average targeted at **A-**.

Table 1: Grade-score table

1000	950	900	850	800	750	700	650	0
-	-	-	-	-	-	-	-	-
1300	999	949	899	849	799	749	699	649
A	A-	B+	B	B-	C+	C	C-	F

Course Schedule (Saturday 1:10pm-5:00pm)

Table 2: Course Schedule

#	week	Readings	Remarks
1	1/10	introduction	submit due 1/17
2	1/17	physical layer	
3	1/24	physical layer	program #1 due 1/18
4	1/31	data link layer	
5	2/7	data link layer	program #2 due 2/1 mid-term exam 2/7
6	2/14	mac sublayer	problem due 2/14 group & topic due 2/15
7	2/21	mac sublayer	paper presentation 2/21 last day to withdraw 2/20
8	2/28	network layer	proposal due 2/28
9	3/7	network layer	
10	3/14	transport layer	final exam 3/14
11	3/21	review/evaluation	project defense 3/21

Reminder

- No cheating, and no register complaint without talking to me first.
- No incomplete. No sit-in or audit the class except formally registered.
- Read files under /home/mwang2/tips for help.
- Handouts, assignments, and solutions will be posted on the web. You should check the class web site at least once a week (and don't forget to refresh the webpage to get the latest versions). You are responsible for printing and bring the handout to the class if you prefer printed pages.
- Office hours: Saturday 5:00pm-5:30pm.

Honor Code

All students taking course in the school of engineering agree, individually and collectively, they will neither give nor receive unpermitted aid in examinations or other course work that is to be used by the instructor as a basis of grading.

Disability Accommodation Policy:

To request academic accommodations for a disability, students must contact Disability Resources located in The Drahmann Center in Benson, room 214, (408) 554-4111; TTY (408) 554-5445. Students must provide

documentation of a disability to Disability Resources prior to receiving accommodations.