

UNIVERSITY OF DELAWARE
DEPARTMENT OF COMPUTER & INFORMATION SCIENCES
CISC 650-010: COMPUTER NETWORKS

Fall Semester, 2009
Tue and Thu, 9:30 - 10:45 am
Smith 102A

Professor: Adarsh Sethi
Office: 422 Smith Hall
Phone: 831-1945
Email: *sethi@cis.udel.edu*
Office Hours: Wed 10 - 11 am,
Thu 11 am - 12 pm, and by appt.

This course is cross-listed with ELEG 651: Computer Networking Communications.

Textbook:

Computer Networking: A Top-Down Approach Featuring the Internet by James F. Kurose and Keith W. Ross. Boston, MA: Addison-Wesley, 2009. Fifth Edition.

The text will be supplemented by selected readings from other books or from the literature.

Goals:

CISC 650 is one of the core courses for CIS Graduate students. The aim of this course is to provide the student with a deep understanding of the principles, structure, and operation of computer networks. The student completing this course should have a strong knowledge of the protocols and mechanisms used in the Internet, and of the design and operation of both wide-area and local-area computer/communication networks. Mathematical models of protocol structures and their effects on network behavior are studied. The course will also involve implementation of simple protocols using application-level network programming. As compared to the similar course taught at the undergraduate level (CISC 450), this course will provide deeper coverage of the topics at a faster pace and will also use mathematical formulations whenever appropriate.

Required Background:

Pre-requisites:

- CISC 360 (Computer Architecture) is an essential pre-requisite.
- CISC 361 or CISC 663 (Operating Systems) is also an essential pre-requisite.
- Knowledge of basic probability theory is required.
- Good programming skills in the C or C++ languages are required.

Students cannot get credit for both CISC 450 and CISC 650.

Contents:

1. Introduction: Network architectures and protocols; protocol layering; the Internet and OSI Reference Models; the role of standardization in network protocols. 6 lectures (Sept. 1, 3, 8, 10, 15, 17).
2. The Application Layer (Selected topics): Basic services; qualities of service; network programming; Domain Name System (DNS). 3 lectures (Sept. 22, 24, 29).
3. The Transport Layer: Basic principles; reliable data transfer; pipelined protocols; connection management; flow control in the Transport Layer; the TCP and UDP protocols; congestion control. 9 lectures (Oct. 1, 6, 8, 13, 15, 20, 22, 27, Nov. 3).
4. The Network Layer: Service models; routing algorithms; routing in the Internet; the IP and IPv6 protocols; mobile IP. 6 lectures (Nov. 5, 10, 12, 17, 19, 24).
5. The Data Link Layer and Local Area Networks: Data link functions; error detection and correction; multiple access protocols; TDMA, FDMA, and FDMA; CSMA, CSMA/CD and ALOHA protocols; token protocols; Ethernet; hubs, bridges, and switches; 802.11 Wireless LANs. 3 lectures (Dec. 1, 3, 8).
6. Additional topics to be covered, if time permits: Quality of Service, Security.

Note: The Mid-Term Exam will be held on Thursday October 29 (date subject to change). There will be no class on Thursday November 26 (Thanksgiving Holiday). The Final Exam will be held at the time and date scheduled for our class by the University (to be announced).

Additional Reading:

1. *Computer Networks* by Andrew S. Tanenbaum. Upper Saddle River, NJ: Prentice Hall, 2003. Fourth Edition.
2. *Networks for Computer Scientists and Engineers* by Youlu Zheng and Shakil Akhtar. New York, NY: Oxford University Press, 2002.
3. *Computer Networks: A Systems Approach* by Larry L. Peterson and Bruce S. Davie. San Francisco, CA: Morgan Kaufmann Publishers, 2003. Third Edition.
4. *Communication Networks: Fundamental Concepts and Key Architectures* by Alberto Leon-Garcia and Indra Widjaja. Boston, MA: McGraw-Hill, 2000.
5. *The Pocket Guide to TCP/IP Sockets, C Version* by Michael J. Donahoo and Kenneth L. Calvert. San Francisco, CA: Morgan Kaufmann Publishers, 2001.
6. **Internet Engineering Task Force:** This is the body responsible for developing the architecture of and protocols for the Internet. Its work is mostly done within Working Groups, and is initially published as Internet Drafts. All standards as well as some informational documents are published as RFCs (Request For Comments). All of these are accessible through IETF's web page: <http://www.ietf.org>