

UNIVERSITY OF DELAWARE
DEPARTMENT OF COMPUTER & INFORMATION SCIENCES
CISC 650 / CPEG 651 / ELEG 651: COMPUTER NETWORKS II

Fall Semester, 2017
Mon, Wed, 8:40 - 9:55 am
117 Gore Hall

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Office Hours: Wednesdays
10:30 am - 12:30 pm, and by appt.

Textbook:

Computer Networking: A Top-Down Approach Featuring the Internet by James F. Kurose and Keith W. Ross. Boston, MA: Addison-Wesley, 2017. Seventh 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:

- An undergraduate level course in computer architecture and operating systems.
- Good programming skills in the C or C++ languages.
- Knowledge of basic probability theory and statistics.

Students cannot get credit for this course and any of the following courses: CISC 250, CPEG 419, CISC 450. Also, credit cannot be received for more than one of CISC 650, CPEG 651, and ELEG 651.

Contents:

1. Introduction: Network architectures and protocols; protocol layering; the Internet and OSI Reference Models; the role of standardization in network protocols. 2.5 weeks.

2. The Application Layer (Selected topics): Basic services; qualities of service; network programming; Domain Name System (DNS), HTTP. 1.5 weeks.
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. 4 weeks.
4. The Network Layer: Service models; Software Defined Networking (SDN); data plane: the IPv4 and IPv6 protocols; control plane: routing algorithms. 2.5 weeks.
5. The Data Link Layer and Local Area Networks: Data link functions; error detection and correction; multiple access protocols; TDMA and FDMA; CSMA, CSMA/CD and ALOHA protocols; Ethernet; hubs, bridges, and switches. 2 weeks.

Special Dates:

The first day of class is Wednesday August 30 and the last day of class is Wednesday December 6.

There will be no classes on Labor Day (September 4) and during the Fall Thanksgiving Break (November 20).

Mid-Term Exam will be held approximately in the last two weeks of October. The exact date will be announced later.

Final Exam date will also be announced later.

Additional Reading:

1. *Computer Networks* by Andrew S. Tanenbaum. Upper Saddle River, NJ: Prentice Hall, 2010. Fifth Edition.
2. *Computer Networks: A Systems Approach* by Larry L. Peterson and Bruce S. Davie. San Francisco, CA: Morgan Kaufmann Publishers, 2011. Fifth Edition.
3. *Computer Networks: A Top-Down Approach* by Behrouz A. Forouzan and Firouz Mosharraf. New York, NY: McGraw-Hill, 2012.
4. *TCP/IP Sockets in C: A Practical Guide for Programmers* by Michael J. Donahoo and Kenneth L. Calvert. San Francisco, CA: Morgan Kaufmann Publishers, 2009. Second Edition.
5. **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>