**Hunter College**
**Department of Computer Science**
**Computer Science 415: Data Communications and Networking**
**Fall 2020**

Instructor: Stan Wine Email address: stanley.wine@baruch.cuny.edu
Section: 01 code: 35505. Mode of instruction: synchronous online. Meeting times: Tuesday and Thursdays, 3:45 to 5:00 P.M. Classroom: Zoom/HN C107
Office hours: By appointment, over the web, preferably immediately before class.
Office location: Baruch College, Vertical Campus, 55 Lexington Avenue, cube 12-210C (look for door marked Zicklin School of Business Faculty Offices 12-210).
Phone: (646) 312-3413
Class website: http://www.cuny.edu

**Course description:**
Computer networking is one of the most dynamic areas in computer science. It is also one of the few areas of computer science in which the history of the field is relevant to an understanding of the present state of the industry. Before studying the underlying principles and technology of communications systems and computer networks, we will examine the history of the field and the social and political issues to which it gives rise. To stay abreast of the ever-changing developments in the industry, we will discuss articles from newspapers such as The New York Times. Students are expected to come to class prepared to discuss current developments.

Upon completion of the course, you should understand and be able to describe all of the major functions of a computer network and to have an appreciation for the current issues and forces driving the industry. Our goal in this course is to cover breadth, not depth, emphasizing concepts and principles. The technologies we study will become obsolete, but the principles will remain. Each of the topics is quite complex, and separate courses could be offered on a number of the major topics we will cover.

**Course content:**
This course is a comprehensive overview of the field, and will prepare you for further study in this exciting area. Topics include: History and current state of the regulatory and competitive environment; convergence, consolidation and industry dynamics guided and unguided transmission; the Public Switched Telephone Network (PSTN); components; interfaces; protocols; error detection; communications facilities and network services; standards; architectures; LANs; WANs; voice communications; the local loop; DSL; trunks and multiplexing; Pulse Code Modulation (PCM); circuit and packet switching; the Physical, Data Link, Network, Transport and Application layers. The TCP/IP model protocol.

This course satisfies departmental learning goal 1D by developing in-depth knowledge of the field of data communications and networking. Goal 3B is addressed by exposing students to ethical, political and social concerns that arise from the use of computer networks. This course also satisfies goal 4 by giving students the background necessary for continued study of the field of computer networking.

**Syllabus:**

Any changes to the syllabus will be announced via Blackboard Announcement and email and will be posted on Blackboard.

**Required text:**
Tanenbaum, Andrew, *Computer Networks*, 5th Ed., Prentice-Hall, 2011, ISBN: 0132126958.
Book store link: http://hunter.textbookx.com/institutional/index.php?action=browse#books/2336025/
http://authors.phptr.com/tanenbaumcn5/ has links to many information sources. One copy of the text is on reserve in the library.

**Website:** http://www.cuny.edu
Slides, handouts, newspaper articles, supplemental sources and suggested study topics for exams are posted on Blackboard. Recording of Zoom sessions will be posted on Blackboard.

**Announcements of Class Cancelations**
Some students posing as instructors have made announcements to classmates via email or through signs affixed to classroom doors. These announcements have indicated that a class in which an exam has been scheduled has been canceled.

If I cancel a class, you will be notified via Hunter email (I will never use Gmail or any other account that a student could create in my name) and by posting an announcement on the Blackboard site.

**A word to the wise:**
This course introduces a plethora of acronyms and jargon. It is important that you become familiar with these terms and their usage. I strongly recommend that you take extensive notes.
This course covers a vast amount of material. It is imperative that you do the assigned reading before class.

**Grading:** The course grade will be derived from the exam scores as follows:

| | |
|---|---|
| Exams (First Exam at 25%, Midterm at 30%, Final at 30%) | 85% |
| In-class quizzes | 15% |

Exams are delivered over Blackboard and start at the scheduled class start time.

Quizzes will be held in class and may or may not be announced in advance; students who miss the quiz will not have an opportunity to make it up and will receive a score of zero.

**Blackboard:** I make extensive use of Blackboard; all course materials and information can be found there, with the exception of the text. See
https://help.blackboard.com/Learn/Administrator/Hosting/Release_Notes/Browser_Support
for information on supported browsers.

**Labs:** The labs are intended to foster a deeper understanding of the course material. Lab assignments make use of the industry-standard Wireshark network protocol analyzer (see the Assignments section of Blackboard).

Lab work must be carried out on personal machines; the required software (Wireshark and other software) is not installed in the Linux lab.

Lab assignments are due at the class meeting following the one in which the relevant chapter is covered and are submitted through Blackboard. Due dates are listed in the Assignments column of the schedule below; see Course Materials/Labs on Blackboard for additional information.

The Computer Science Department requires that all 300 and 400 level courses have either a 1000-word written report or a five to ten-minute oral presentation. In this course, the labs will satisfy that requirement.

**Exams:** Exams will be derived from both the reading assignments and from material covered in the lectures and labs. Some of the lecture material will not be found in the text. Therefore, it is critical that you attend class regularly, take good notes and keep up with the pace of the reading assignments.

**There will be no "extra-credit" assignments and make-up tests will not be given.** Students will have an opportunity to check their graded exams but the instructor will retain all exams.

Exams will consist of a mix of multiple choice, fill-in-the-blank, matching, short answer, longer answer and problems to be worked. In some sections, you may be able to choose from among a set of questions. Exams are not cumulative. See Course Documents /Exams for exam study guides.

**Academic integrity:**
Hunter College regards acts of academic dishonesty (e.g., plagiarism, cheating on examinations, obtaining unfair advantage, and falsification of records and official documents) as serious offenses against the values of intellectual honesty. The college is committed to enforcing the CUNY Policy on Academic Integrity and will pursue cases of academic dishonesty according to the Hunter College Academic Integrity Procedures.

**Students with disabilities:**
In compliance with the American Disability Act of 1990 (ADA) and with Section 504 of the Rehabilitation Act of 1973, Hunter College is committed to ensuring educational parity and accommodations for all students with documented disabilities and/or medical conditions. It is recommended that all students with documented disabilities (Emotional, Medical, Physical and/ or Learning) consult the Office of AccessABILITY located in Room El124 to secure necessary academic accommodations. For further information and assistance please call (212) 772-4857/TTY (212) 650-3230).

**Hunter College Policy on Sexual Misconduct:**
In compliance with the CUNY Policy on Sexual Misconduct, Hunter College reaffirms the prohibition of any sexual misconduct, which includes sexual violence, sexual harassment, and gender-based harassment retaliation against students, employees, or visitors, as well as certain intimate relationships. Students who have experienced any form of sexual violence on or off campus (including CUNY-sponsored trips and events) are entitled to the rights outlined in the Bill of Rights for Hunter College.

a. Sexual Violence: Students are strongly encouraged to immediately report the incident by calling 911, contacting NYPD Special Victims Division Hotline (646-610-7272) or their local police precinct, or contacting the College's Public Safety Office (212-772-4444).

b. All Other Forms of Sexual Misconduct: Students are also encouraged to contact the College' s Title IX Campus Coordinator, Dean John Rose (jtrose@hunter.cuny.edu or 212-650-3262) or Colleen Barry (colleen.barry@hunter.cuny.edu or 212-772-4534) and seek complimentary services through the Counseling and Wellness Services Office, Hunter East 1123.
CUNY Policy on Sexual Misconduct Link: http://www.cuny.edu/about/administration/offices/la/Policy-on-SexualMisconduct-12-1-14-with-links.pdf

**Attendance:**
You are expected to be present and punctual for each class meeting. If I call you name to ask you a question, and you do not respond promptly, my assumption is that you are absent. If you are called on and ask me to repeat a question, I will assume you were not paying attention and will not repeat the question.

**Academic calendar:**
https://ww2.hunter.cuny.edu/students/academic-planning/academic-calendar/

**Schedule:** If required, the course content and schedule may be changed at the instructor's discretion. The dates for holidays, withdrawal, and final exams were taken from the academic calendar and should be checked by the student against the official academic calendar. All other dates are approximate.

| Week | Date | Topic | Assignments |
|---|---|---|---|
| 1 | 8/28 - 9/1 | Chapter 1: Introduction | Read Chapter 1 (all except 1.4.4-1.4.6 and 1.5.2-1.5.4). Read Net Effects: The Past, Present, and Future Impact of Our Networks |

| Week | Date | Topic | Assignments |
|---|---|---|---|
| 2 | 9/4 –<br>**9/8** | Chapter 1, continued<br>**Quiz 1**<br>Chapter 2: The Physical Layer | <br>Covers Chapter 1.<br>Read Chapter 2 (all except 2.5.5 and 2.7.3). |
| 3 | 9/11 – 9/15 | Chapter 2: continued | |
| 4 | **9/18**<br>9/22 – 2/25 | **No Classes Scheduled**<br>Chapter 2: continued | |
| 5 | **9/29**<br>**10/2–**<br><br>10/6 | **Classes Follow a Monday Schedule**<br>**Quiz 2**<br><br>Chapter 3: The Data Link Layer | <br>Covers Chapter 2.<br>**Lab 1 due.**<br>Read Chapter 3 all except 3.2.1, 3.4 and 3.5 but including Fig. 3-24 and surrounding paragraphs on PPP. |
| 6 | **10/9** –<br>10/13 | **Exam 1**<br>Review Exam 1. Chapter 3, continued | Covers Chapters 1 and 2. |
| 7 | 10/16 -10/20 | Chapter 4: The Medium Access Control Sublayer | Read Chapter 4 all except 4.1.1, 4.2.1, 4.2.3 - 4.2.4, 4.2.5, 4.4 – 4.4.5, 4.5.2 - 4.5.5, 4.6 – 4.7.4 |
| 8 | **10/23** –<br>10/27 | Chapter 5: The Network Layer | **Lab 2 due.**<br>Read Chapter 5 all except: 5.2.1 - 5.2.2; Fig. 5-13; 5.2.7 - 5.2.11; 5.3 – 5.4; 5.6.8 – 5.6.9.<br>View *Bundled, Buried and Behind Closed Doors* (10:05) |
| 9 | 10/30 –<br>11/3 | Chapter 5, continued | |
| 10 | 11/6-<br>**11/10** | Chapter 5, continued<br>**Midterm** | <br>**Subnet Addressing, ARP and NAT Practice Exercises due (see Course Materials/Review Exercises folder).**<br>Covers Chapters 3 – 5; **Labs 5 - 8 due.** |
| 11 | 11/13 –<br>11/17 | Chapter 6: The Transport Layer | Chapter 6: all, with exception of 6.1.4 and 6.2.2 – 6.2.4; 6.2.6; 6.3.3; 6.5.7; 6.5.11 - 6.7.2.<br>**See Sockets Interface handout.** |
| 12 | 11/20 - 11/24 | Chapter 7: The Application Layer<br>DNS and Web | Read Chapter 7: all except 7.4 (all) and 7.5.4. |
| 13 | **11/25**<br>**11/27**<br><br>- 12/1 | Classes Follow Friday Schedule<br>College closed.<br>Chapter 7, continued. Email and CDNs.<br>**Wireshark demo** | <br><br><br>**Install Wireshark on a laptop** and bring to class for demo. The demo will use Understanding TCP Sequence and Acknowledgment Numbers. |
| 14 | 12/4 –<br><br><br>**12/8**<br>**12/10– 12/11** | Quality of Service<br><br><br>**Last class** | Sections 5.3.4, 5.4, 5.4.1 – 5.4.3, 5.4.6, 6.4.3, 6.5.10, 7.4.3 - 7.4.5 (MOOC video lectures 9-1 through 9-6).<br>**Labs 9, 10, 11 and 12 due.**<br>**Reading Days** |

| Week | Date | Topic | Assignments |
|---|---|---|---|
| | **12/15** | **Final Exam**<br>1:45 P.M. to 3:45 P.M.<br>https://ww2.hunter.cuny.edu/students/wp-content/uploads/sites/5/2020/08/Fall-2020-Final-Exam-Schedule-8.6.20.pdf | Covers Chapters 6 and 7 and Quality of Service |

**Supplementary references:**
These books are on reserve in the library and can be optionally used to explore topics in more detail:

Bates, Bud, *Voice and Data Communications Handbook*, 4th Ed., McGraw-Hill, TK5105 .B395 2001
Beyda, William, Data Communications, 3rd Ed., Prentice Hall, TK5105 .B485 2000
Comer, Douglas, *Computer Networks and Internets*, 4th Ed., Prentice-Hall, TK5105.5 .C5897 2004
Comer, Douglas E., Computer Networks and Internets, 5th Ed., Prentice-Hall, TK5105.5 .C5897 2009
Comer, Douglas E., Computer Networks and Internets, 6th Ed., Prentice-Hall, TK5105.5 .C5897 2015
Comer, Douglas, *The Internet Book*, Prentice-Hall, 3rd Ed., TK5105.875.I57 C65 2000
Comer, Douglas, *The Internet Book*, Prentice-Hall, 4th Ed., TK5105.875.I57 C65 2007
Comer, Douglas, *Computer Networking with TCP/IP,* 5th Edition, Pearson Prentice-Hall, 2006
Comer, Douglas, *Internetworking with TCP/IP,* 6th Edition, Pearson Prentice-Hall, 2014 TK5105.585 .C66 2014
Dean, Tamara, *Guide to Telecommunications Technology*, Thomson Course Technology, TK5101 D43 2003
Dodd, A., *The Essential Guide to Telecommunications*, 3rd Ed., Prentice-Hall, TK 5105 D54 2002
Forouzan B., *Data Communications and Networking*, 3rd Ed., McGraw-Hill, TK 5105 F6617 2004
Forouzan B., *Data Communications and Networking*, 4th Ed., McGraw-Hill, TK 5105 F6617 2007
Kurose and Ross, *Computer Networking*, 3rd Ed., Pearson Addison-Wesley, TK5105.875.157 K88 2005
Kurose, J. and Ross, K. W., Computer Networking: A Top-Down Approach Featuring the Internet, 5th Ed., Addison-Wesley, TK5105.875 I57 K88 2010
Kurose, J. and Ross, K. W., Computer Networking: A Top-Down Approach Featuring the Internet, 6th Ed., Addison-Wesley, TK5105.875 I57 K88 2013
Peterson and Davie, Computer Networks: A Systems Approach, 5th Ed., Morgan Kaufmann, TK5105.5.P479 2011
Peterson and Davie, Computer Networks: A Systems Approach, 6th Ed., Morgan Kaufmann,
Shay, William, *Understanding Data Communications and Networks*, 3rd Ed., Brooks/Cole Publishing, TK5105 S49 2004
Stallings, William, *Data and Computer Communications*, 7th Ed., Prentice-Hall, TK5105 S73 2003
Stallings, William, *Data and Computer Communications*, 9th Ed., Prentice-Hall, TK5105 S73 2011
Stallings, William, *Data and Computer Communications*, 10th Ed., Prentice-Hall, TK5105.S73 2014
Tanenbaum, Andrew, *Computer Networks*, 5th Ed., Prentice-Hall, TK 5105.5 T36 2011