Northeastern University

Graduate School of Engineering

TELE5330 Data Networking – Fall 2024

Course Syllabus

Rajiv Shridhar

E-Mail: rajiv@coe.neu.edu
Phone: (617) 324-6632 (office)

Office Hours: Wed 5 pm-6 pm, Sat 5PM+, or by appointment
Lecture Information: Wednesdays 6 pm - 9:30 pm (Knowles Hall 002B)
Teaching Assistants: TBA

Course Description

This course provides the basics of data networking protocols and architectures. Topics include overall protocol architecture of the internet; application protocols such as FTP, SMTP and HTTP, web caching, DNS, CDNs, and P2P applications; use of TCP and UDP socket programming to develop network applications in Python; transport protocols, including TCP, UDP, and TCP congestion control; IP protocol, addressing, IPv4 and v6, NATs, ICMP, and tunnels; routing algorithms – RIP, OSPF and BGP; data link protocols include CSMA/CA and CSMA/CD, encoding, framing, error control; switched LANs, ARP, Ethernet, and VLANs; wireless LANs and 802.11 protocols.

Prerequisites

Recommended knowledge of data structures and operating systems/computer architecture. We assume that the student is familiar with general computer organization, with basic microprocessor architectures, and UNIX system calls (though this last will be covered again if required).

Corequisites

All students enrolled in this course must also enroll in, and satisfactorily complete, the co-requisite TELE5331 Data Networking Laboratory course in order to be eligible to complete the TELE5330 course.

Prescribed Text

Kurose, J.F. and Ross, K.W., *Computer Networking – A Top-Down Approach Featuring the Internet*, (8th edition, Pearson, 2021 is the current version)

Other Recommended Texts

There are several textbooks, both in the library and online, that tackle the fundamentals of data networking. Most of them do a good job of illustrating the technology and concepts behind data networking functions. Interested students might also find it useful to consult Northeastern's site licensed video training service – Lynda.com (accessible from the myNEU portal) for online self-service tutorials on data networking, programming languages (Python, Java etc.), data structures, operating systems, and a host of other related topics. Some books that I have found useful myself and still occasionally refer to are listed below, though the editions have been updated in some cases.

- Bertsakas, D. and Gallager, R., *Data Networks, 2nd Edition*, Prentice Hall, 1992 (or later)
- Tanenbaum, A.S., *Computer Networks, 6th Edition*, Pearson, 2021 (or later)
- Stevens, W.R., *Unix Network Programming, 2nd Edition*, Prentice Hall, 1998
- Stevens, W. R., *Advanced Programming in the UNIX Environment*, Addison Wesley, 1992

Course Website

https://canvas.northeastern.edu/login/ (the course site is typically activated after the first lecture of the course)

Grading

Regular homework assignments, midterm and final exams, and a term paper will serve as the basis for grades assigned in this course. Homework will be due at the end of the lecture during the week for which it is due. The evaluation criteria are (tentatively):

Exams (midterm and finals)	45%
Homework Assignments	20%
Projects / Labs (TELE5331)	35%

Class Participation is important. Though a percentage of your grade is not directly attributed, it is taken into account as appropriate.

Note: Beginning Fall 2024, the program focuses on your attendance as a critical prerequisite for participation. Attendance will be taken at the beginning of each lecture and lab session. No more than two unexcused absences are allowed throughout the semester.

There are no individual make-ups for any of the grading elements.

NOTE: Reinforced by university guidance and Graduate School of Engineering policy, the average course grade is expected to be B. Therefore, grade distribution may be from A through C depending on performance of the student. The teaching team will enforce this policy.

Assignments

Homework assignments will be assigned regularly except during the weeks immediately before exams. The goal of assignments is to reinforce understanding of the in-class material through alternating written answer questions and practical assignments.

Projects / Labs

The goal of the projects and lab assignments is to provide students with the opportunity to put the in-class learning into practical implementation through simulation or reproduction of real-life scenarios. These labs are run through the co-requisite TELE 5331 lab course. Students must gain a satisfactory grade in the lab in order to pass it, and their actual project/lab scores are used in calculating the overall grade in the 5330 course as listed above. The 5330 course is a unique one in the university as it demonstrates the willingness and interest of a large volunteer group composed of past students of the course and MGEN program to help provide continued involvement in data networking education as a field.

Academic Integrity

A commitment to the principles of academic integrity is essential to the mission of Northeastern University. The promotion of independent and original scholarship ensures that students derive the most from their educational experience and their pursuit of knowledge. Academic dishonesty violates the most fundamental values of an intellectual community and undermines the achievements of the entire University.

As members of the academic community, students must become familiar with their rights and responsibilities. In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, examinations of whatever kind, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Students are responsible for learning the conventions of documentation and acknowledgment of sources in their fields. Northeastern University expects students to complete all examinations, tests, papers, creative projects, and assignments of any kind according to the highest ethical standards, as set forth either explicitly or implicitly in this Code or by the direction of instructors.

Go to https://www.northeastern.edu/osccr/academic-integrity-policy/ to access the academic integrity policy.

Student Accommodations

Northeastern University and the Disability Resource Center (DRC) are committed to providing disability services that enable students who qualify under Section 504 of the Rehabilitation Act and the Americans with Disabilities Act Amendments Act (ADAAA) to participate fully in the activities of the university. To receive accommodations through the DRC, students must provide appropriate documentation that demonstrates a current substantially limiting disability.

For more information, visit https://drc.sites.northeastern.edu/.

Diversity and Inclusion

Northeastern University is committed to equal opportunity, affirmative action, diversity and social justice while building a climate of inclusion on and beyond campus. In the classroom, members of the University community work to cultivate an inclusive environment that denounces discrimination through innovation, collaboration and an awareness of global perspectives on social justice.
Please visit https://www.northeastern.edu/oidi/ for complete information on Diversity and Inclusion.

Title IX

Title IX of the Education Amendments of 1972 protects individuals from sex or gender-based discrimination, including discrimination based on gender-identity, in educational programs and activities that receive federal financial assistance. Please visit https://www.northeastern.edu/titleix/ for a complete list of reporting options and resources both on- and off-campus.

Northeastern's Title IX Policy prohibits Prohibited Offenses, which are defined as sexual harassment, sexual assault, relationship or domestic violence, and stalking. The Title IX Policy applies to the entire community, including male, female, transgender students, faculty and staff. In case of an emergency, please call 911.

Student Responsibilities

- Studying all material covered in class, in assigned reading and through external assignments, whether formally or informally assigned.
- Reviewing, in advance, material to be covered in each lecture, and being prepared to participate in discussions about the material in class.
- Checking Canvas regularly and frequently (preferably morning and evening) to receive communication about the course, including assignments etc.
- Maintaining strict adherence to the Northeastern University rules and regulations for proper student conduct. Among others, cheating, fabrication, facilitating academic dishonesty, and plagiarism are considered violations that may result in immediate dismissal from the Graduate School of Engineering, or at minimum a discussion with OSCCR.
- A quick word about e-mail correspondence: I receive a lot of e-mail every day. Your correspondence is important to me. To ensure that I notice your e-mail quickly and also to reduce the chances of your e-mail being marked as spam and mistakenly deleted, please prefix 'TELE5330: ' to the subject line of your message.

Safety and Health

While we are back to the new normal after the pandemic, and will endeavor to maximize an in-person learning experience, there continue to be periodic concerns from new COVID-19 variants and other viruses.

- We abide by the safety protocols currently in place, including those governing testing, masking, eating, etc., while attending in-person lectures.
- If you feel unwell, please stay home. I will do my utmost to support your learning in cases where someone needs to attend remotely due to medical reasons.
- Please let me know if you are unable to come to a lecture. If you're missing the lecture because of an interview or other non-health related concern, please do let me know. If you're going to miss the

lecture because you're not feeling well, you don't need to give me (or anyone else other than medical staff at Northeastern) any details about the medical issue but let me know you are unable to attend.

- We'll discuss this more in class, and we can adjust our mode of teaching and learning as warranted.