

Course Description


This course provides an introduction to fundamental concepts in the design and implementation of computer communication networks, their protocols, and applications. Topics to be covered include layered network architectures, applications, network programming interfaces (e.g., sockets), transport, data link protocols, local area networks and network routing, wireless and mobile networks, and emerging software-defined networking. Examples will be drawn primarily from the Internet (e.g., TCP, UDP, and IP) protocol suite. This course is targeted primarily at undergraduate students.

Objectives:

By the end of this course, you will be able to:

- Understand the steps (protocols/algorithms) required when you request a web page till it is displayed on your phone or computer
- Examine and analyze the different tradeoffs included in protocol designs
- Design and Implement Network Applications
- Troubleshoot if you have any connection Issues

Textbooks


- **Required:** "[Computer Networking: A Top-Down Approach](https://www.pearson.com/en-us/subject-catalog/p/computer-networking/P200000003334/9780135928615)  (<https://www.pearson.com/en-us/subject-catalog/p/computer-networking/P200000003334/9780135928615>)", by Jim Kurose and Keith Ross, Pearson, 8th edition e-textbook

Regarding the Textbook: please note that via the U's Bookstores, you are directly enrolled in the e-Textbook Inclusive Access for \$37.00 per student for unlimited access (no semester-based subscription, students would own this digital textbook). See the textbook page for details and access. *You can opt out by January 26 (without being charged \$37.00)!*

- **Other Useful Recommended References:**

- "[Computer Networking: A Systems Approach](https://book.systemsapproach.org/)"  (<https://book.systemsapproach.org/>), by

Larry L. Peterson and Bruce S. Davie, 6th edition, 2019.

- **"Computer Networks"**  (<https://www.pearson.com/en-us/subject-catalog/p/computer-networks/P200000003188/9780136764052>), by Andrew S. Tanenbaum, Nick Feamster, David J. Wetherall, 6th Edition, 2020.
- *"Mastering Networks, An Internet Lab Manual"*, by Jorg Liebeherr and Magda El Zarki, Addison Wesley, 2010 (for students who want to learn more "hands-on" networking)

Prerequisites

A rudimentary understanding of computer architecture and operating systems, while not required, would be helpful. There will be 3 programming projects.

Semester Schedule (Tentative)

<https://canvas.umn.edu/courses/413026/pages/semester-schedule-tentative-2>)

Coursework and Evaluation

The grading system for this course is A-F (with +/-).

- Four homework assignments: (20%)
- Three *programming* projects: (35%)
- Two *take-home* exams: Exam 1 (10%), and Exam 2 (10%)
- Final Exam: (25%)

Letter Grade Scheme

[93 -- 100] A

[90 -- 93) A-

[85 -- 90) B+

[81 -- 85) B

[78 -- 81) B-

[73 -- 78) C+

[68 -- 73) C

[63 -- 68) C-

[58 -- 63) D+

[50 -- 58) D

[00 -- 50) F

NOTE: To pass the course, a student must have a passing grade (e.g., 60 out of 100) on at least one of the take-home exams AND the final exam. Otherwise, you will not pass the course.

Please see the schedule for the timing of assignments, projects, midterms, and the final exam. You are *encouraged* to discuss the course materials with other students, form study groups, and learn together. However, the homework assignments, individual programming assignments, take-home exams, and final exam must be completed **on your own** (see the section on "**Scholastic Conduct**" below).

Submission Policy

Homework assignments and program code and reports must be submitted online via the course canvas by the specified due date and time. Program codes and reports must also be submitted online.

If you have questions regarding the grading of your homework assignments, projects, or exams, you must come to see either one of the instructors or the TAs *within two weeks* after the date your homework assignments, projects, or exams have been returned to you. If you cannot see us within two weeks, you need to email us within two weeks and make an appointment.

Late Submission Policy

- *No late homework or project (unless with approval from instructors): one day late 10% deduction, thereafter each extra late day 15% deduction. No credit if more than one week late.*
- *Students are required to submit their homework assignments, projects, and take-home exams online via the Assignment Tab on the left. Projects must be submitted online (with the necessary documentation). We strongly discourage you from handing in your homework assignments or take-home exams in hard copy, unless under special circumstances and with permission from instructors. In this case, please make sure that you date them, make a copy, and retain the copy for your records. We are not responsible for lost homework assignments/take-home exams.*

Incomplete Policy

*Incomplete will in general **not** be given.* It will be considered only when a *provably* serious family or personal emergency arises, the proof is presented, and the student has already completed all but a small portion of the work. (According to the *CSE Bulletin* an incomplete should be given "only when a student has completed all but a small portion of the work of a course and has made prior arrangements with the instructor to make up the work".) The Department of Computer Science and Engineering requires students who request an "I" to fill out the "Agreement for Completion of Incomplete Work" form. Make-up exams will only be given to those students who have legitimate reasons such as conflict of finals and other provably serious family or personal emergencies. Students who need make-up exams are encouraged to notify the instructors as early as possible (preferably two weeks earlier) so that appropriate accommodations can be arranged.

COVID19

Please strictly follow the University's COVID policies and recommendations, including vaccination and mask requirements.

Scholastic Conduct

Scholastic conduct must be acceptable. Please refer to the University of Minnesota Board of Regents

Student Conduct Code ([https://regents.umn.edu/sites/regents.umn.edu/files/2022-](https://regents.umn.edu/sites/regents.umn.edu/files/2022-07/policy_student_conduct_code.pdf)

07/policy_student_conduct_code.pdf), SECTION IV, Subd.1. regarding what constitutes "*Scholastic Dishonesty*." Specifically, *you must do your homework assignments, individual projects, take-home exams, and final exam by yourself, on your own*. You may discuss the assignments with other students and use any reference material, provided that you do not *copy* any other person's work. In case of group projects, each group must complete its project independently, and each team member must contribute his/her fair share to the group project. For the *take-home* exams, you are *not allowed* to discuss them with other students, and you must complete them by yourself. The final exam will be in-class, open-book, and open-notes (e.g., you can look up definitions in the textbook, printed lecture notes, or online, and refresh yourself with specifics of some protocols or algorithms). *However, the exam must be done individually* (in particular, you are not allowed to email, IM, or chat with anyone to get help on your exam). For the written assignments, programming projects, and exams, if you find answers from the Internet, or get help from others (in the case of written assignments and programming projects only --- you are *not* allowed to get help from others when doing take-home exams and in-class exam), please cite your sources!

Important: If you have *not* done so yet, please make sure that you read and are familiar with the University of Minnesota Board of Regents **Student Conduct Code** (https://regents.umn.edu/sites/regents.umn.edu/files/2022-07/policy_student_conduct_code.pdf), FAQs for students about **student conduct** (<http://www.oscai.umn.edu/conduct/student/faq.html>), and *academic integrity* provided by Office for Student Conduct and Academic Integrity (OSCAI). Please also read the Dept. of CSE's *Departmental Guidelines for Academic Conduct for CSCI Students*, and if you are using a CSE account for course projects, etc., please also read the CSE Lab Acceptable Use Policy. You are *responsible* to know and must observe, these policies regarding scholastic conduct. Please note that per the university policy, the instructors/TAs are *required* to report such incidents when scholastic dishonesty is *suspected*, *not* when it is encountered and confirmed. That you did not know the policies regarding scholastic conduct cannot be a reason for lenient treatment.

Diversity and Collegiality

The diversity of your experience and ways of approaching our topic enrich this course. The perspectives and values of students, who may come from various ethnic, cultural, social class, and national backgrounds (among others) shape our discussions. The instructor strives to balance the exploration of these various perspectives with the need to meet our basic course goals within the semester. You are encouraged to continue discussions outside of class if we cannot devote class time to all the ideas raised by students.

In the unfortunate event that a student behaves in a disruptive manner to either the instructor or to other students, the disruptive student will be asked to leave. Students whose behavior suggests the need for counseling or other assistance may be referred to their college office or University Counseling and Consulting Services. Students whose behavior may violate the University Student Conduct Code may be referred to the Office of Student Judicial Affairs. Every attempt will be made to negotiate any conflict in the most direct and respectful manner.




Sexual Harassment

University policy prohibits sexual harassment as defined in the University Policy Statement, revised on Jan 1, 2018. Complaints about sexual harassment should be reported to the University Office of Equal Opportunity, 234 Morrill Hall, East Bank. <https://policy.umn.edu/hr/sexharassassault>.
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Accommodations for Students With Disabilities:

University policy is to provide, on a flexible and individualized basis, reasonable accommodations to students who have documented disability conditions (e.g., physical, learning, psychiatric, vision, hearing, or systemic) that may affect their ability to participate in course activities or to meet course requirements. Students with disabilities are encouraged to contact Disability Services and their instructors to discuss individual needs for accommodations. Disability Services, McNamara Alumni Center, Suite 180, 200 Oak Street, East Bank. Staff can be reached at <https://disability.umn.edu/> (<https://disability.umn.edu/>) or by calling (612) 626-1333 (voice or TTY).

Course Summary:

Date	Details	Due
Fri Jan 26, 2024	 <u>Background Survey</u> (https://canvas.umn.edu/courses/413026/assignments/3712372)	due by 11:59pm
Tue Feb 6, 2024	 <u>Homework 1.1: Short Answer Questions</u> (https://canvas.umn.edu/courses/413026/assignments/3699614)	due by 11:59pm
	 <u>Homework 1.2: Free-Response Questions</u> (https://canvas.umn.edu/courses/413026/assignments/3590901)	due by 11:59pm

Fri Feb 16, 2024



Extra Credit: WireShark Lab

(<https://canvas.umn.edu/courses/413026/assignments/3592089>)

due by 11:59pm

Fri Feb 23, 2024



Project 1: DNS

(<https://canvas.umn.edu/courses/413026/assignments/3759802>)

due by 11:59pm

Tue Feb 27, 2024



Homework 2.1: Short Answer

Questions

(<https://canvas.umn.edu/courses/413026/assignments/3723577>)

due by 11:59pm

Wed Feb 28, 2024



Homework 2.2: Free-

Response Questions

(<https://canvas.umn.edu/courses/413026/assignments/3590904>)

due by 11:59pm

Sun Mar 3, 2024



Homework 1.2: Self-Grading

Survey

(<https://canvas.umn.edu/courses/413026/assignments/3780809>)

due by 11:59pm



Take-Home Exam 1

(<https://canvas.umn.edu/courses/413026/assignments/3592094>)

due by 11:59pm

Tue Mar 19, 2024



Project 2 Phase 1: The Stop-

and-Wait Protocol

(<https://canvas.umn.edu/courses/413026/assignments/3590092>)

due by 11:59pm

Tue Mar 26, 2024



Homework 3.1: Short Answer

Questions

(<https://canvas.umn.edu/courses/413026/assignments/3723586>)

due by 11:59pm



Homework 3.2: Free-

Response Questions

(<https://canvas.umn.edu/courses/413026/assignments/3590905>)

due by 11:59pm

Sun Mar 31, 2024



Project 2 Phase 2: The Go-

Back-N Protocol

(<https://canvas.umn.edu/courses/413026/assignments/3590093>)

due by 11:59pm



Homework 4.1: Short Answer

Questions

(<https://canvas.umn.edu/courses/413026/assignments/3723591>)

due by 11:59pm



Homework 4.2: Free-

Tue Apr 9, 2024

Response Questions

due by 11:59pm

<https://canvas.umn.edu/courses/413026/assignments/3590907>



Project 3 Phase 1: Setup and Walkthrough

due by 11:59pm

<https://canvas.umn.edu/courses/413026/assignments/3590096>

Sun Apr 14, 2024



Take-Home Exam 2

due by 11:59pm

<https://canvas.umn.edu/courses/413026/assignments/3605255>

Fri Apr 19, 2024



Project 3 Phase 2: Topology Creation and Evaluations

due by 11:59pm

<https://canvas.umn.edu/courses/413026/assignments/3590097>

Mon Apr 29, 2024



Extra Credit: Sample Final Exam

due by 2:30pm

<https://canvas.umn.edu/courses/413026/assignments/3592104>

Fri May 3, 2024



Final Exam

8am to 10am

https://canvas.umn.edu/calendar?event_id=1348083&include_contexts=course_413026



Final Exam

<https://canvas.umn.edu/courses/413026/assignments/3590101>



Lecture 15 - Network Layer - Data Plane Part III ChimelN

<https://canvas.umn.edu/courses/413026/assignments/3794986>



Lecture 18 - Network Layer - Data Plane Part VI ChimelN

<https://canvas.umn.edu/courses/413026/assignments/3804367>
