

CS 450: Introduction to Networking

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Course Description

This is an introductory course on computer networks. The course covers some of the *key* protocols in each layer of the protocol stack in a top-down fashion: application layer (HTTP, DNS, SMTP), transport layer (TCP, UDP), network layer (IP), and link layer (802.3, 802.11). This is a hands-on, programming-heavy course. The course is structured with a series of programming assignments, a mid-term exam, and a final exam.

Textbook

Computer Networking: A Top-Down Approach by Kurose and Ross, 6th or 7th edition

Topics covered (tentative)

- TCP/IP layering model of the Internet
- HTTP, SMTP, P2P
- Domain Name Service (DNS), Video Streaming
- Socket API
- UDP, TCP
- Reliable data transfer and congestion control
- IP protocol
- Intra domain routing: OSPF, RIP
- Inter domain routing: BGP
- Architecture of routers
- Link layer: media access control

- Address learning, spanning tree protocol
- Wireless networks
- Cellular networks
- Network security: cryptography, TLS, IPsec, firewalls

Prerequisites

Prior programming experience in any language is a must. Prior experience with python is a plus. Because this is a programming-heavy course, please be prepared to write and debug a lot of code.

Grading

The course uses *relative* grading; Graduate and undergrad students are graded *separately*. The (tentative) weights of the different components are as follows:

- Programming assignments: 60%
 - **One** lowest score will be dropped.
 - Please see "*Use of AI tools*" for how score is determined.
- Mid-term exam: 15%
- Final exam: 15%
- Clicker Quizzes: 10%
 - **Two** lowest scores will be dropped.
- Bonus for *exceptional* participation: 2%

Programming assignments

There will be about **6–8** assignments that are spread out over the semester.

Lateness policy

- There is 25% penalty for submissions that are late but within 24 hours of the deadline
- There is 50% penalty for submissions that are late but within 24–48 hours of the deadline
- After 48 hours, you lose 100% of the grade
- If there is a legitimate reason for missing a deadline, please contact the instructor *well before* the deadline.

Use of AI tools

Students are encouraged to use generative AI tools such as *chatGPT* for exploring the topics and develop a deeper understanding of the content. You can certainly use these tools to help you complete the homework. However, please be forewarned that these tools are probabilistic and they can provide incorrect answers to problems. Students should be careful not to rely too heavily on these tools but rather to leverage them to improve their understanding of the subject matter. For example, students can ask the AI assistant to generate examples and counter-examples using code snippets, similar to how one would use <https://stackoverflow.com>. However, directly copying the code without understanding and prompting the chatbot for an exact answer to homework are not acceptable.

On the day of deadline for every homework, there will be an **in-class quiz**. The quiz will be designed in such a way to check whether students really understand their homework solutions. Students who heavily relied on AI chatbots without understanding their code will likely score poorly in the quiz.

Your total score for each homework will be determined based on your score in the in-class quiz and *autograder* score. If you score 70% or more, your total score will be same as your *autograder score*. If you score less than 70% but greater than or equal to 30%, your score will be $0.7 * \text{autograder score}$. If you score less than 30%, your score will be $0.5 * \text{autograder score}$.

Exams

There will be two exams: a midterm exam and finals. The exams will have a mix of short and long questions. Each exam will count for 15% of the grade.

Clicker Quizzes

In each class, there will be a *iClicker* quiz. Student should use the app for participating in these quizzes. The quiz will cover the topics previously discussed. There will be a handful of questions spread throughout the class.

Class participation

Class participation is *incredibly* important! There is a bonus 2% for exceptional participation based on the discretion of instructor and TA. Exceptional participation includes answering questions in Piazza, reporting errors in assignments, asking good questions in class, and contributing test-cases and scripts for the common good.

Academic Integrity

While active discussion with peers is encouraged, there is a **red** line: copying code, in any form, is plagiarism. If you don't know how your own code works, then there is a problem. Cite your sources in all your turn-ins to be safe. When in doubt, please consult with the instructor or the TA.