CS455: **Data Communications** (Fall 2025)
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Course Description

Data communications are central to modern life—and this course covers ideas and techniques that are central to data communications! This is a practice-oriented course that helps students develop programming and design skills for using and extending data networks. The course is designed to have an evaluation baseline that all students are expected to meet in order to pass, but it also provides an extended pathway for advanced or ambitious students who wish to push further and go deeper.

Course Objectives

The main learning goals of this course are the following:

- Obtain a foundational understanding of how data is encoded and communicated on digital systems.
- Learn deep Systems Programming techniques and apply them to Data Communication.
- Develop practical skills for designing and debugging distributed systems.

Prerequisites

CS351. Contact instructor if you have problems registering.

Workload

Three credit hours.

Course format and grading

- Assignments: 30%
- Project: 30%
- Mid-term and Final exams: 40%

Syllabus

1. Introduction to data communications. 2. Data encoding. 3. Data communication. 4. Using the FABRIC federated testbed. 5. System design for data communication. 6. Scaling data communication: networks. 7. Programming techniques for data communication. 8. Debugging techniques for data communication. 9. Routing. 10. Traffic patterns. 11. Network monitoring. 12. Security. 13. Failure modeling. 14. In-network computing.

Course Resources

Students will be provided with access to computing resources for their assignments and projects. Tutorial materials will be provided to help students with self-study while developing new skills during this course.

Textbook and Resources

Computer Networking: A Top-Down Approach. Kurose and Ross. 8th Edition.