

ECE 158B: Data Networks II, Spring 2021

University of California San Diego

Instructor:

Prof. Xinyu Zhang,

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Office hours: Tue. Thu. 5pm-6pm on Zoom (ID: [97543516999](https://ucsd.zoom.us/j/97543516999)), or by appointment

TA:

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Office hours: 11am-12:30pm on Monday, 1pm-2:30pm Wednesday on Zoom (<https://ucsd.zoom.us/j/96092967791>), or by appointment

Course info:

Location: Zoom <https://ucsd.zoom.us/j/98029827237>

Internal Website (assignments, lecture notes, and reference materials) on Canvas: <https://canvas.ucsd.edu/courses/26683>

Prerequisite:

- ECE 158A or equivalent computer networking course
- Experience with high level programming language (e.g., Python and Java)

Textbook:

- “Computer Networking: A Top-Down Approach”, by James Kurose and Keith Ross
- Online tutorials and papers (to be included in lecture notes)

Course description:

ECE 158B is a second course in data networking following ECE 158A, and will be focused on software implementation of network systems and applications. The objective is to consolidate the knowledge you learned in ECE158A (or other similar computer network courses) through hands-on measurement and implementation of network protocols (link layer, IP layer, and transport layer), and to further experiment with state-of-the-art network architectures and applications. The course lectures will cover the following topics: network programming over TCP/UDP sockets; application-layer protocols (DNS, HTTP, P2P); multimedia protocols (video streaming, VoIP, video telephony, virtual reality); data center networking and cloud computing; software-defined networking; network security.

There will be 6 programming assignments involving general network programming (mainly in Python), and measurement/simulation tools such as Wireshark and Mininet. A few hands-on tutorials will be interleaved with the lectures to help you familiarize with the programming tools. In addition, there will be 2 group projects, each spanning 3 to 4 weeks.

Lecture schedule and course content:

Below is a tentative list of topics to be covered in the course. Detailed course schedule and reading assignments will be updated on the course website. The content may change according to our progress.

- Lecture 1-4: Review of Internet architecture and core protocols (link, IP and transport layer); socket programming; Wireshark hands-on
- Lecture 5-7: Application layer protocols: DNS, P2P, HTTP (Web), CDN
- Lecture 8-11: Multimedia applications: VoIP, video streaming, video telephony, virtual reality
- Lecture 12-14: ns-3 hands-on; Data center networking and cloud computing; Mininet hands-on
- Lecture 15-17: Software-defined networking
- Lecture 18-20: Network security, message authentication, TCP/IP security, firewalls and IDS

Grading:

- Homework assignment: 30%
- Group project: 30%
- Class participation: 5%
- Final exam: 35%

Exams:

There will be an open-book final exam, scheduled at 8m-11am, 06/08/2021.

Class participation:

Many of the topics covered in this course are constantly evolving. Many challenges remain open. So feel free to raise questions or comments during class. You are strongly encouraged to present your opinions and lead the discussion by yourself. Class participation will be graded based on how active you are throughout the course.