

# Intro to Computer Networking

EC 441 - Spring 2025

Electrical and Computer Engineering, Boston University

## General Information

**Time & Location:** Monday and Wednesday 2:30pm-4:15pm, LSE B03.

**Instructor:** Professor Jeff Carruthers (jbc@bu.edu)

## Syllabus

**Course Web Site:** [learn.bu.edu](http://learn.bu.edu)

### Recommended Textbook:

J. Kurose and K. Ross, Computer Networking: A Top-Down Approach (8<sup>th</sup> edition), Pearson, 2021.

ISBN 978-0-13-668155-7

### Prerequisites:

1. EC 381 (ECE Probability)
2. EC 401 (Signals and Systems)
3. Familiarity with programming (we will use python; you can learn what you need in real time)

## List of Topics

This course is an introduction to the foundations and design of computer networks, at an advanced-undergraduate level. We expect to cover the following topics:

**Networking Foundations:** Network elements and architectures, packet and circuit switching, performance measures (delay, throughput), TCP/IP protocol suites, layering.

**Applications:** Web (HTTP), the domain name system (DNS), E-mail (SMTP), Internet socket programming.

**Transport Protocols and Reliable Data Transfer:** Connectionless transport: UDP, Connection-oriented transport: reliable transfer, sliding window protocols (Stop & Wait, Go-Back-N, Selective Repeat), TCP, congestion control, time-out computation.

**Internetworking:** Internet protocol (IP), IP addressing, subnetting, forwarding, routing algorithms (Dijkstra, Bellman-Ford), distance-vector routing, link-state routing.

**Link Layer, LANs, and MAC Protocols:** Framing, error detection and correction, multiple access protocols, Aloha, CSMA, Ethernet (IEEE 802.3), Ethernet switches, address resolution protocol (ARP).

**Physical Layer:** Signals and Noise. Error Rates, Modulation, Propagation.

**Networking Tools:** Wireshark, Python sockets, ns-2, Mininet, OpenFlow, ping, traceroute, nslookup, ifconfig, iPerf.

**Special Topics:** Software-defined networking, network security, peer-to-peer networks, wireless LANs (IEEE 802.11).

## Course Components and Grading

- Participation: 10%
- Assignments: homeworks, labs, and projects (25%)
- Midterm One (20%)
- Midterm Two (20%)
- Final Exam (25%)

## Class and University Policies

1. **Attendance & Absences.** You are expected to regularly attend class and participate. You do not need to inform the instructor about occasional absences. Please also see the university Policy on Religious Observance.
2. **Assignment Completion & Late Work.** Each assignment will have a late work policy. If a single exam is missed, the remaining exams will be scaled to make up for the missing component.
3. **Collaboration and Academic Conduct** The collaboration policy for each assignment will be posted with the assignment. By signing your name(s), you attest that you have read and followed the rules of the assignment. All exams will have a printed list of rules which must be agreed to before beginning the exam. Here is the URL for Academic Conduct Code: <https://www.bu.edu/academics/policies/academic-conduct-code/>

4. **Accommodations for Students with Documented Disabilities:** If you are a student with a disability or believe you might have a disability that requires accommodations, requests for accommodations must be made in a timely fashion to Disability & Access Services, 25 Buick St, Suite 300, Boston, MA 02215; 617-353-3658 (Voice/TTY). Students seeking academic accommodations must submit appropriate medical documentation and comply with the established policies and procedures <http://www.bu.edu/disability/accommodations/>