SJSU SAN JOSÉ STATE UNIVERSITY

College of Science · Computer Science

Computer Networks

CS 158A

Fall 2026 Section 01 In Person 3 Unit(s) 08/19/2026 to 12/07/2026 Modified 08/17/2026

Welcome to CS 158A. This course covers the design and structure of computer networks, from the application layer down to the physical link, using the Internet as the running example throughout. The concepts here are the foundation for understanding how every networked system you build or debug actually works. They carry directly into not just future courses (like distributed systems, security, and cloud computing), but also into technical interviews and the rest of your work as an engineer.

Course Information

- **Instructor:** Dr. Preethi Natarajan
- **Email:** preethi.natarajan@sjsu.edu ()
- **Class Info**: MW 10:30AM - 11:45AM @ Boccardo Business Center 323
- **Preferred method of contact:** Canvas Inbox.

Course Description and Requisites

Introduction to computer networks, including network layered architectures, local and wide area networks, mobile wireless networks, Internet TCP/IP protocol suite, network resource management, network programming, network performance, network security, network applications.

Prerequisite(s): CS 146 and CS 47 (with a grade of "C-" or better). Computer Science or Software Engineering majors only, or instructor consent.

Letter Graded

Classroom Protocols

Communication with the Instructor
Please use the instructor's university email for course-related questions or concerns. Email is the best way to reach the instructor.

Course Materials and Intellectual Property
Course materials—including lecture slides, notes, presentations, exam questions, programming assignments, exercises, and homework solutions—are intended for students enrolled in this course. Please do not record, reproduce, upload, or share these materials without the instructor's permission. These guidelines help protect student privacy and maintain a fair and academically honest learning environment.

Unauthorized recording or distribution may be referred to the appropriate university office and may also violate university or state law. Students who require accommodations or assistive technology should contact the instructor so appropriate arrangements can be made.

Attendance and Arrival
Attendance is not mandatory and will not, by itself, affect your grade. However, regular attendance and participation are strongly encouraged. Please arrive on time and be ready to begin when class starts.

Respectful Classroom Environment
Please treat everyone in the classroom with respect. Questions, discussions, and different perspectives are welcome, but please keep conversations constructive and avoid behavior that disrupts others' learning.

Electronic Devices
Laptops, tablets, and smartphones should primarily be used for course-related activities. Please silence cell phones before class and minimize non-course-related device use.

Program Information

Diversity Statement - At SJSU, it is important to create a safe learning environment where we can explore, learn, and grow together. We strive to build a diverse, equitable, inclusive culture that values, encourages, and supports students from all backgrounds and experiences.

Course Learning Outcomes (CLOs)

Upon successful completion of this course, students will be able to:

1. Become familiar with network layered architecture and the structure of the Internet.
2. Understand the client/server model and key application-layer protocols, including HTTP, DNS, DHCP, and SMTP/IMAP.
3. Understand reliable data transfer and how TCP implements these concepts.
4. Know the principles of congestion control and routing (link-state, distance-vector, and inter-domain).
5. Understand link-layer operation, including switching, addressing, and medium access control.
6. Apply IP addressing and subnetting principles, and analyze live network traffic using Wireshark.
7. Gain exposure to network security fundamentals, including encryption, TLS, and firewalls.
8. Become familiar with wireless and mobile networking, including 802.11 WiFi and 5G cellular systems.

Course Materials

Textbook

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

Pearson, 2021.

- ISBN-10: 0136681557
- ISBN-13: 978-0136681557

Technology Requirements

Students will need access to a laptop with reliable internet connectivity throughout the course. The laptop should run macOS, Windows, or a version of UNIX/Linux and allow you to install the required software.

The course will use:

- Canvas for course materials, announcements, and assignments
- Python for socket programming assignments
- Wireshark for packet capture and analysis during lab sessions
- An Integrated Development Environment (IDE) for writing and running Python code

✓ Grading Information

Assessment Policy

Attainment of the learning objectives will be assessed via several components distributed across the semester. The following breakdown outlines the relative weight of each component toward the final course grade.

- **Quizzes** — 2-3 quizzes, weighted at **10%** of the final grade
- **Programming Assignments** — 3 assignments, weighted at **20%** of the final grade
- **Wireshark Labs** — 7 labs total, best 5 of 7 counted, weighted at **15%** of the final grade
- **Midterms** — 2 exams, weighted at **30%** of the final grade
- **Final Exam** — cumulative, weighted at **25%** of the final grade

Final grades may be curved (up) to raise grades if needed.

Your course grade will be determined by your final weighted average:
A plus = 97% or higher
A = 93% to 97%
A minus = 90% to 93%
B plus = 87% to 90%
B = 83% to 87%
B minus = 80% to 83%
C plus = 77% to 80%
C = 73% to 77%
C minus = 70% to 73%
D plus = 67% to 70%
D = 63% to 67%
D minus = 60% to 63%
F = 0% to 60%
Boundary cases count as the higher of the two grades.

The syllabus, details and dates of each of the above assessments will be posted in Canvas.

Make-up exams and quizzes will be granted only for extenuating circumstances. Contact the instructor as soon as possible during the semester if you have such a circumstance. Absence from examinations and quizzes without prior approval will result in a score of 0.

Wireshark labs are done in class immediately after the topic lecture, so the theory is still fresh when you apply it to a live packet capture. Attending the lecture and doing the lab right after is the most effective way to get the concept to stick, so plan to be there for both. Best 5 of 7 labs count toward the grade, which allows for a missed lab here and there. If extenuating circumstances keep you from reaching 5, reach out to the instructor to discuss options.

Programming assignments in this course are done in Python. The textbook's own socket programming and Wireshark exercises are Python-native, and since the goal is understanding network concepts rather than language mechanics, Python's socket library maps directly onto the concepts being taught, so the language stays out of the way.

No prior Python knowledge is required. Programming assignment #0 is ungraded and given as a handout early in the course. It walks through the Python basics needed for socket programming and gets your environment (Python, virtual environment, IDE) set up so you're ready for the graded assignments that follow.

Late Submissions Policy

Grades for late submissions are reduced by 10% per day they are late. For example, a homework is considered one day late if it submitted a couple minutes after the due date's 11:59 PM deadline. So, if an assignment is submitted four-and one-half days late, then the max score it can receive is 50%. There is no point submitting an assignment more than 9 days late as it already gets a zero then.

AI Use Policy

The concepts in this course, TCP/IP, routing, congestion control, the layered model, are the foundation for how every networked system you'll ever build or debug actually works, and mastering them requires direct engagement with the material. AI tools are permitted as a study aid: for self-quizzing, alternative explanations of protocols and concepts, and generation of additional practice problems. AI use is not permitted on any component of the assessed coursework tied to the learning objectives. To enforce this consistently, quizzes and midterms are closed-book and taken in class, and the Wireshark lab exit tickets are completed live during the lab session.

Programming assignments are not proctored, but AI use on them is discouraged. These assignments are the mechanism by which concepts are internalized: implementing rdt 3.0 by hand, tracing Dijkstra on a graph, debugging a socket that won't connect, subnetting until it clicks, is what builds the understanding required for quizzes, midterms, the final, and later professional application. Completing them with AI assistance produces a completed assignment without producing the corresponding learning, and that gap typically surfaces on the next quiz or midterm.

🏛 University Policies

Per University Policy S16-9 (PDF) (http://www.sjsu.edu/senate/docs/S16-9.pdf), relevant university policy concerning all courses, such as student responsibilities, academic integrity, accommodations, dropping and adding, consent for recording of class, etc. and available student services (e.g. learning assistance, counseling, and other resources) are listed on the Syllabus Information (https://www.sjsu.edu/curriculum/courses/syllabus-info.php) web page. Make sure to visit this page to review and be aware of these university policies and resources.

Course Schedule

Here's an overview of the course, organized by lecture. The schedule is tentative and may evolve as the course progresses; any changes will be communicated in advance.

Week	Class Dates	Tentative Topic(s)
1	Aug 19	Introduction, Syllabus
2	Aug 24	Protocol Layers & Service Models
2	Aug 26	App Layer Principles & HTTP
3	Aug 31	Email Protocols
3	Sep 2	P2P, CDNs & Socket Programming
4	Sep 7	No Class – Labor Day
4	Sep 9	DNS
5	Sep 14	Transport Services & UDP
5	Sep 16	Reliable Data Transfer Principles
6	Sep 21	Go-Back-N & Selective Repeat
6	Sep 23	TCP Connection & Flow Control
7	Sep 28	TCP Congestion Control & QUIC
7	Sep 30	Network Layer Overview & Router Architecture
8	Oct 5	IP Addressing, Subnetting & CIDR
8	Oct 7	NAT, DHCP & IPv6
9	Oct 12	DHCP & ICMP Deep Dive
9	Oct 14	Generalized Forwarding & SDN (OpenFlow)
10	Oct 19	Routing Algorithms: Link-State (Dijkstra)
10	Oct 21	Midterm #1
11	Oct 26	Distance-Vector Routing & OSPF
11	Oct 28	Inter-AS Routing: BGP
12	Nov 2	SDN Control Plane, ICMP & Network Management
12	Nov 4	Link Layer Services, Error Detection & MAC
13	Nov 9	No Class – Veterans Day
13	Nov 11	Ethernet & ARP & Switches
14	Nov 16	Data Center Networking & Full-Stack Synthesis
14	Nov 18	No Class – Veterans Day
15	Nov 23	Wireless Links & WiFi
15	Nov 25	Cellular Networks (4G/5G) & Mobility
16	Nov 30	Midterm #2
16	Dec 2	No Class – Thanksgiving Break
17	Dec 7	TLS + IPsec + Firewalls

Week	Class Dates	Tentative Topic(s)
Finals	Dec 11	Final Exam