SJSU SAN JOSÉ STATE UNIVERSITY

College of Science · Computer Science

Computer Network Management

CS 158B

Fall 2026 Section 01 In Person 3 Unit(s) 08/19/2026 to 12/07/2026 Modified 08/15/2026

Contact Information

Instructor: Seshadri Paravastu
Email: seshadri.paravastu@sjsu.edu ()
Office hours: Tuesdays, 5:00–7:00 PM Pacific Time via Zoom, by appointment.
Appointment booking: Book a 10-minute appointment.

During the October 12–20 instructor travel period, office-hour availability may be adjusted and will be announced in Canvas.

Course Information

Course: CS 158B-01 — Computer Network Management
Class Number: 50046
Term: Fall 2026
Units: 3
Mode: In Person
Meetings: Tuesdays and Thursdays, 12:00–1:15 PM
Location: Duncan Hall 243
Course dates: August 19–December 7, 2026
First meeting: Thursday, August 20
Final examination: Tuesday, December 15, 2026, 10:45 AM–12:45 PM

Course Description:
Principles and technologies of network management: reference models; fault, configuration, accounting, performance, and security management; management information; communication protocols; integration; and assessment. The course also introduces network security and cyber defense, including cryptography, key distribution, authentication, network attacks, access control, monitoring, and representative systems.

Prerequisite(s): CS 158A or CMPE 148 with a grade of C- or better; allowed majors as specified in the catalog, or instructor consent.

Grading: Letter graded.

Course Description and Requisites

Principles and technologies of network management: reference models, functions (fault, configuration, performance, security and accounting management), management information, communication protocols, integration, and assessment. Network security and cyber defense: cryptography, key distribution, authentication protocols, network attacks, access control, and example systems.

Prerequisite(s): CS 158A or CMPE 148 (with a grade of "C-" or better); Allowed Majors: Computer Science, Software Engineering or Forensic Science: Digital Evidence; or instructor consent.

Letter Graded

Classroom Protocols

- Professional, respectful, and constructive behavior is expected in the classroom, Zoom, Canvas, and team activities.
- Phones must be silenced. Laptops and tablets may be used for class-related notes, tools, demonstrations, and exercises.
- Students may not record, redistribute, or publicly post course activities, slides, readings, or student presentations without permission or an approved accommodation.
- Students should arrive prepared to discuss the assigned material. Participation is evaluated through preparation and contribution, not attendance alone.
- Students who miss a student-presentation assignment must coordinate an alternate recorded brief or presentation with the instructor.

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 Goals

This course covers the essential concepts expected in prior CS 158B offerings while keeping the weekly workload focused and manageable. The class emphasizes understanding, interpretation, and practical use of management tools rather than large-scale programming.

Core coverage includes FCAPS, management architectures, SNMP, MIBs, polling and traps, syslog, flow and packet analysis, configuration management, performance monitoring, security monitoring, SDN, telemetry, cloud/IoT management, and automation.

Hands-on work uses small guided activities with Wireshark, Packet Tracer or GNS3, Net-SNMP, syslog, and dashboard or monitoring tools. No large software-development project is required.

Course Learning Outcomes (CLOs)

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

1. Explain network-management goals, architectures, and the FCAPS functional model.
2. Describe and use the SNMP ecosystem, including managers, agents, MIBs, OIDs, polling, traps, and SNMPv3 security.
3. Interpret CLI output, syslog messages, packet captures, counters, and common monitoring dashboards.
4. Select appropriate methods for fault, configuration, accounting, performance, and security management.
5. Use lightweight network-management tools to observe, document, and troubleshoot a small network.
6. Explain modern approaches including software-defined networking, model-driven management, streaming telemetry, intent-based networking, automation, and autonomic management.
7. Discuss management challenges in cloud, IoT, wireless, and distributed environments.
8. Evaluate operational and security tradeoffs and communicate a concise network-management recommendation.
9. Read, summarize, and present an IEEE technical article to a mixed technical audience.

Course Materials

Primary reference text:
James F. Kurose and Keith W. Ross, *Computer Networking: A Top-Down Approach*, 9th ed., Pearson, ISBN-13 978-0135415603.

Optional additional reference:
Andrew S. Tanenbaum, Nick Feamster, and David J. Wetherall, *Computer Networks*, 6th ed., Pearson, ISBN-13 978-0137523214.

instructor-provided technical notes, assigned standards excerpts, selected IEEE readings, and other materials posted in Canvas or available through the SJSU Library.

Required access: Canvas, Zoom, and SJSU Library access to IEEE Xplore.

Tools used in guided activities: Wireshark; Cisco Packet Tracer or GNS3; Net-SNMP; a syslog server; and an instructor-approved monitoring platform such as PRTG, Zabbix, LibreNMS, or equivalent.

Ubuntu 22.04 or later is recommended when a Linux environment is needed.

Course Requirements and Assignments

Weekly preparation normally includes:

- Complete one short assigned chapter/technical note and, on selected weeks, one IEEE reading or excerpt.

- Submit a concise reading brief of approximately 300–500 words, one annotated diagram, or a small tool-generated artifact.
- Participate in rotating student pair/team presentations.
- Complete brief in-class demonstrations, interpretation exercises, or guided labs.
- Submit short exit responses when assigned.

Weekly Reading Briefs and Presentations: approximately ten short briefs during the term; the lowest reading-brief score may be dropped.

Homework and Guided Labs: six to eight bounded assignments involving activities such as OIDs, SNMP walks, packet captures, syslog rules, monitoring comparisons, or simple dashboards.

Midterm I: Thursday, September 24, in class.
Midterm II: released Thursday, October 15 and due Tuesday, October 20 through Canvas.

Team Network-Management Project: teams of three to four students design and demonstrate a manageable monitoring solution for a small network or simulated environment. Deliverables include milestones, a final demonstration, a technical memo, configuration/screenshots, and an individual contribution reflection.

✓ Grading Information

Component	Weight
Participation, readiness checks, and class discussion	10%
Weekly reading briefs and student presentations	20%
Homework and guided labs	20%
Midterm Exam I	10%
Midterm Exam II	10%
Team network-management project	20%
Final examination / culminating activity	10%
Total	**100%**

🏛 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

Date	Format	Core topic	Reading / preparation	Homework / activity	Presentation / assessment
Thu 08/20	In person	Course introduction; why networks require management; management roles and lifecycle	K&R §5.7.1; Note 1 (intro: why network management, roles, lifecycle).	Map a familiar network and identify five management questions	Orientation; no formal presentation
Tue 08/25	In person	Networking refresher: layers, addressing, routing, devices, and services	K&R §§1.1-1.5; §§4.1, 4.3; §5.1 selected refresher sections.	Short topology and addressing worksheet	Student micro-brief: one real outage
Thu 08/27	In person	Network-management architectures; manager, agent, managed object, data model	K&R §5.7.1; Note 1 (manager, agent, managed object, data model; centralized vs. distributed).	Architecture diagram and terminology check	Pair presentation: centralized vs. distributed management
Tue 09/01	In person	FCAPS: fault and configuration management	Note 1 (FCAPS: fault and configuration); supplied incident record.	Classify events and propose configuration controls	Reading brief 1
Thu 09/03	In person	FCAPS: accounting, performance, and security management; KPIs and SLOs	K&R §1.4 background; Note 1 (FCAPS: accounting, performance, security; KPIs/SLOs).	Define five measurable indicators	Presentation group A
Tue 09/08	In person	SNMP concepts: versions, operations, messages, communities, security	K&R §§5.7.1-5.7.2; Note 2; selected RFC 3411/3416 excerpts; IEEE: SNMP and SNMPv2.	Identify GET/SET/TRAP use cases	Reading brief 2
Thu 09/10	In person	MIBs, OIDs, SMI, tables, and common interface/system objects	K&R §5.7.2; Note 3; selected RFC 3418/MIB-II material.	Guided OID/MIB exercise	Presentation group B
Tue 09/15	In person	SNMP hands-on: snmpget, snmpwalk, counters, and interpretation	K&R §5.7.2; Note 3; Net-SNMP quick-reference guide.	Lab 1: collect and explain counters	Tool demo

Date	Format	Core topic	Reading / preparation	Homework / activity	Presentation / assessment
Thu 09/17	In person	Polling, traps, informs, thresholds, and alert design	K&R §5.7.2; Note 2 (polling, traps, informs, thresholds); selected RFC 3416 excerpts.	Design an alert policy with noise controls	Reading brief 3
Tue 09/22	In person	Review and integration: FCAPS, SNMP, MIBs, events	K&R §§5.7.1-5.7.2; Notes 1-3 review guide.	Practice scenario	**Midterm I review**
Thu 09/24	In person	**Midterm I; introduction to syslog**	Midterm review materials; Note 4 introduction; selected RFC 5424 excerpt.	**Midterm I**	No presentation
Tue 09/29	In person	Syslog, event correlation, severity, time, and incident timelines	Note 4; selected RFC 5424 sections; supplied syslog examples.	Lab 2: build an incident timeline	Presentation group C
Thu 10/01	In person	Packet and traffic analysis for management; Wireshark filters and evidence	K&R §1.4 and selected Chs. 2-4 as packet context; Wireshark guide.	Lab 3: interpret a short capture	Reading brief 4
Tue 10/06	In person	Performance management: utilization, delay, loss, jitter, baselines, capacity	K&R §1.4, §§3.6-3.7, §4.2; Note 5; supplied performance dataset.	Analyze a small performance dataset	Presentation group D
Thu 10/08	In person	Configuration management; backups, drift, change control; NETCONF/RESTCONF overview	K&R §5.7.3; Note 6; RFC 6241/8040 excerpts; IEEE: SNMP/NETCONF Next Generation NMS.	Compare SNMP, NETCONF, and RESTCONF	Reading brief 5
Tue 10/13	Remote asynchronous	Instructor travel: dashboards, baselines, and performance interpretation	K&R §1.4 and §§3.6-3.7 review; Note 5; recorded module and supplied dashboard.	Remote monitoring activity	Canvas discussion
Thu 10/15	Remote asynchronous	Instructor travel: alerting, logs, and operational response	Note 4 review; RFC 5424 excerpt; recorded alerting/operational-response case.	**Midterm II released**	Reading brief 6
Tue 10/20	Remote asynchronous	Instructor travel: tool selection and integration	K&R §5.7 reference; monitoring-tool comparison guide; Notes 4-6 as needed.	**Midterm II due; project milestone 1**	Recorded team brief

Date	Format	Core topic	Reading / preparation	Homework / activity	Presentation / assessment
Thu 10/22	In person	Software-defined networking fundamentals and management implications	K&R §4.4 and §5.5; IEEE: Software-Defined Networking: A Comprehensive Survey.	Draw control/data-plane architecture	Presentation group E
Tue 10/27	In person	Network virtualization, cloud management, and observability	K&R §§5.5, 6.5-6.6 selected background; IEEE: Network Virtualization and SDN for Cloud Computing.	Cloud visibility comparison	Reading brief 7
Thu 10/29	In person	Streaming and in-band telemetry; telemetry overhead and value	K&R §§5.5/5.7 background; telemetry primer; RFC 7011 excerpt; IEEE: Knowledge-Defined Networking / INT.	Telemetry design exercise	Presentation group F
Tue 11/03	In person	Automation, autonomic management, feedback loops, and safe change	Automation/autonomic-management primer; IEEE: Network Autonomic Management tutorial.	Design a guarded automation loop	Reading brief 8
Thu 11/05	In person	Intent-based networking and policy validation	K&R §5.5 background; intent/policy primer; IEEE: A Survey on Intent-Based Networking.	Translate intent into checks and actions	Presentation group G
Tue 11/10	In person	Security management: management-plane protection, access control, key management	K&R §§5.7.2, 8.1-8.4, 8.6-8.9 selected sections; Note 7; RFC 3414/3415 excerpts.	Harden a management architecture	Reading brief 9
Thu 11/12	In person	Zero trust, segmentation, and secure administrative access	K&R §§8.7-8.9 background; Note 7; NIST SP 800-207 excerpt; IEEE: Zero Trust.	Zero-trust management access scenario	Presentation group H
Tue 11/17	In person	Anomaly detection, AI/ML, fault prediction, and limits of automation	K&R §8.9 conceptual bridge; ML/anomaly primer; IEEE: Fault Prediction survey; anomaly-detection paper as supplemental.	Interpret model outputs and false positives	Reading brief 10

Date	Format	Core topic	Reading / preparation	Homework / activity	Presentation / assessment
Thu 11/19	In person	IoT, edge, wireless, and distributed-management challenges	K&R §§7.1-7.6, especially §7.6.3; IEEE: IoT, SDN, and edge survey.	Management plan for heterogeneous devices	Project milestone 2
Tue 11/24	In person	Operational case workshop: outage, performance degradation, or security event	Integrated case packet; review K&R §1.4, §5.7, and §8.9; relevant notes/standards as references.	Team diagnosis and response briefing	Case presentation
Thu 11/26	**No class**	Thanksgiving holiday - campus closed	-	-	-
Tue 12/01	In person	Team project demonstrations I; peer feedback	Project materials; course references as needed.	**Final project demo and memo**	Team presentations
Thu 12/03	In person	Team project demonstrations II; course integration; final review	K&R §5.7 and selected review sections; final integration/review guide; IEEE/standards synthesis.	**Final project demo; individual reflection**	Team presentations
Tue 12/08	**No class**	Study/Conference Day - no classes or exams	-	-	-
Tue 12/15	**Final**	Cumulative final examination / culminating activity, 10:45 AM-12:45 PM	All assigned core material.	**Final examination**	Regular classroom unless reassigned