

CSEN 317: Distributed Systems

Fall 2024

Department of Computer Science and Engineering
Santa Clara University

1. General Information

Instructor: Dr. Xiao Li

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Office Hour: Mon/Wed 6pm - 7pm (before lectures)

Office: Bergin 206

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2. Course Description

CSEN 317 is a graduate level course that put emphasizes on several crucial components in a distributed system. The course includes fundamental methodologies for distributed system architectures, inter-process communications, data consistency and replication, distributed transactions and concurrency control, distributed file systems, fault tolerant, distributed systems synchronization, and reliability. This course also introduces several emerging real-world distributed system applications, e.g. Blockchain, Edge Computing, Distributed Machine Learning for interested students to conduct further study and research.

3. Prerequisites

CSEN 233 (Computer Networks) and CSEN 283 (Operating Systems) or equivalent

4. Required Textbook

Book 1 (Primary): “Distributed Systems, Concepts and Design”, George Coulouris, Jean Dollimore, Tim Kindberg and Gordon Blair

Fifth Edition, published by Addison Wesley, May 2011

ISBN 0-13-214301-1, Book homepage: <https://www.cdk5.net/wp/>

Book 2: “DISTRIBUTED SYSTEMS”, Maarten van Steen Andrew S. Tanenbaum

Fourth edition Version 4.02

ISBN 978-90-815406-4-3, Book homepage: <https://www.distributed-systems.net/index.php/books/ds4/>

5. Course objectives

- 1) To learn advanced and cutting-edge state-of-the-art knowledge and implementation in operating systems and distributed systems.
- 2) To read and understand research publications in the technical area of operating systems and distributed systems, beyond that of the traditional textbook level.
- 3) To conduct group project and to equip for scholarly research in operating systems and distributed systems.
- 4) To explore the next generation of operating systems and distributed systems, models, tools, etc. and other advanced topics if time permits.

6. Expected Learning Outcome

- 1) Have the knowledge of operating systems and distributed systems (including processes and threads, virtual memory and paging, inter-process communication, network transparency, data consistency and replication, distributed transaction and concurrency control, fault tolerant, high availability and reliability, distributed systems synchronization, distributed file systems, message queues, event-based systems, etc.) by answering exam questions correctly.
- 2) Have the ability to build example thread programming and distributed system applications (using open-source cloud computing tools/systems) by implementing programming examples correctly.
- 3) Have the ability to read current research papers and implement example research group project.

7. Grading Policy

- 1) There are totally 5 homework, 2 exams and 1 optional individual project (talk with me for detail). Participation is also counted into grading. HW1-5 (10% each), Mid-term: 20%, Final 25%, Participation 5%.
- 2) All homes are due on Fridays' mid-night. Late submissions are allowed with penalties. within 24hrs: -20%, within 48hrs: -50%. No submission will be accepted after 48hrs of the due dates. No make-up exams or extra-credit assignments.
- 3) All works must be submitted online via Camino (Canvas), no paper submission, no email-submission.
- 4) The due dates of assignments may change according to course schedule. Announcements will be posted on Camino if there is any change.
- 5) Final letter grades will be curved according to the whole class's performance.
- 6) No cheating, no plagiarism is tolerated. Exams are close-book, close-notes exams.
- 7) In any case, if you need accommodation or having any trouble meeting the grading requirement, please let me know.

8. Generative AI Tool Rules

- 1) You can use generative AI tools (chat GPT, Co-pilot, etc.) to help you on assignment or problems you have in the course.
- 2) Be sure to quote/cite the parts in your work that are from generative AI tools.
- 3) You are responsible for the faults in your work even it is from AI tools.
- 4) The fact and amount of using AI tools will not affect your grade.
- 5) AI tools are useful but use wisely.

9. Resources for Help

In case you need any help on course works or anything related to your study, it is always the best to first send me an email. Emails are typically replied within 1 day.

- 1) If you want to have a face-to-face talk, you can come by my office during my office hours or anytime when you see my office door is open.
- 2) If you are interested in extending your knowledge beyond the lecture, extra reading materials can be found on course webpage.
- 3) If you would like to conduct further academic research, you are always welcomed to come and discuss with me about research ideas.

10. University Policies

10.1 Academic Integrity

The Academic Integrity pledge is an expression of the University's commitment to fostering an understanding of -- and commitment to -- a culture of integrity at Santa Clara University. The Academic Integrity pledge, which applies to all students, states:

I am committed to being a person of integrity. I pledge, as a member of the Santa Clara University community, to abide by and uphold the standards of academic integrity contained in the Student Conduct Code.

Students are expected to uphold the principles of this pledge for all work in this class. For more information about Santa Clara University's academic integrity pledge and resources about ensuring academic integrity in your work, see www.scu.edu/academic-integrity.

10.2 Office of Accessible Education (formerly Disabilities Resources)

If you have a documented disability for which accommodations may be required in this class, please contact the Office of Accessible Education (Benson 1, <http://www.scu.edu/oae>, 408-554-4109) as soon as possible to discuss your needs and register for accommodations with the University. If you have already arranged accommodations through OAE, please discuss them with me during my office hours within the first two weeks of class.

To ensure fairness and consistency, individual faculty members are required to receive verification from the Office of Accessible Education before providing accommodations. OAE will work with

students and faculty to arrange proctored exams for students whose accommodations include double time for exams and/or assistive technology. Students with approved accommodations of time-and-a-half should talk with me as soon as possible. The Office of Accessible Education must be contacted in advance (at least two-weeks notice recommended) to schedule proctored examinations or to arrange other accommodations.

10.3 Discrimination and Sexual Misconduct (Title IX)

Santa Clara University upholds a zero-tolerance policy for discrimination, harassment and sexual misconduct. If you (or someone you know) have experienced discrimination or harassment, including sexual assault, domestic/dating violence, or stalking, I encourage you to tell someone promptly. For more information, please consult the University's Gender-Based Discrimination and Sexual Misconduct Policy or contact the University's EEO and Title IX Coordinator, Belinda Guthrie, at 408-554-3043, bguthrie@scu.edu. Reports may be submitted online through the Office of Student Life <https://www.scu.edu/osl/report/> or anonymously through [EthicsPoint](#).

10.4 Accommodations for Pregnant and Parenting Students

In alignment with Title IX of the Education Amendments of 1972, and with the California Education Code, Section 66281.7, Santa Clara University provides reasonable accommodations to students who are pregnant, have recently experienced childbirth, and/or have medical needs related to childbirth. Pregnant and parenting students can often arrange accommodations by working directly with their instructors, supervisors, or departments. In addition, the Office of Accessible Education will provide reasonable accommodations for pregnancy-related impairments which impact a major life activity.

10.5 In-Class Recordings

The [Student Conduct Code](#) (p. 13) prohibits students from “making a video recording, audio recording, or streaming audio/video of private, non-public conversations and/or meetings, inclusive of the classroom setting, without the knowledge and consent of all recorded parties,” except in cases of approved disability accommodations. The Student Conduct Code also prohibits the “falsification or misuse, including non-authentic, altered, or fraudulent misuse, of University records, permits, documents, communication equipment, or identification cards and government-issued documents.” Dissemination or sharing of any classroom recording without the permission of the instructor would be considered “misuse” and, therefore, prohibited. Violations of these policies may result in disciplinary action by the University. At the instructor’s discretion, violations may also have an adverse effect on the student’s grade.

10.6 Classroom Engagement in Emergency Response Planning

Campus Safety Services invites faculty to read the following statement relating to fire alarms, earthquakes, building evacuations, and safety.

1. A fire alarm activation means leave the building immediately.

2. During an Earthquake, “Drop, Cover and Hold On.” Once the shaking stops look around to make sure it is safe to leave the building.
3. Look at the Fire Evacuation Maps posted in the building so that you can understand what your evacuation options are to exit the building (if you have a Fire Evacuation Map in the classroom, point to it).
4. Leave the building in an orderly fashion. Please take only your phone and car keys. All other items should be left behind.
5. If individuals need assistance to leave the building, please help them get to the assembly area if you do not know where your building assembly area is located move 300 feet away from the building in a safe direction.
6. Once outside, move to the assembly area, stay at the assembly area and wait until Campus Safety Services advises you to move to another location or releases you to return to your building.
7. Your cooperation is necessary to provide an orderly and safe exit for our guests, students, faculty and staff if an emergency were to occur.