

San Jose State University
College of Science
Department of Computer Science
CS157A, Introduction to Database Management Systems, Sections 4,5, and 8, Fall 2021

Course and Contact Information

- Instructor: Dr. Suneuy Kim
- Office Location: MacQuarrie Hall 217 (MH217)
- Telephone: 408-924-5122
- E-mail: suneuy.kim@sjsu.edu (Preferred mode of contact is via email.)
 - When you send me an e-mail to ask a question, use [Q] in a subject line to get a reply from me within a reasonable response time. Here is an example subject line to ask a question.

[Q] lecture note
- Office Hours: M,T,W,R 12:00 PM - 12:30 PM at Zoom: <https://sjsu.zoom.us/j/88385851426>
- Class Days/Time/Classroom
 - Section 5, MW 9:00AM - 10:15AM
 - Register in advance for this meeting - <https://sjsu.zoom.us/meeting/register/tZYqd-GqrDwvHtKMhXltY14GxnPN61Rd6liA>
 - Section 4, MW 10:45AM - 12:00PM
 - Register in advance for this meeting - <https://sjsu.zoom.us/meeting/register/tZEtCuiqrD8iEtzZ7f-AWFhd7d2AoOOwIe9g>
 - Section 8, TR 9:00AM - 10:15AM
 - Register in advance for this meeting - <https://sjsu.zoom.us/meeting/register/tZ0tdOGqrzkvEtKsUmzPyyEbfGYYzChVV14>
- Course Prerequisites: CS146
- [Course Web Site](http://www.cs.sjsu.edu/~kim/cs157a) at <http://www.cs.sjsu.edu/~kim/cs157a>
Announcements and course materials will appear here. It is updated frequently. You are strongly encouraged to check out this course web page regularly.

Course Description

Relational data model. Relational algebra. Standard SQL. Design theory. Conceptual data modeling. Integrity constraints and triggers. Views and indexes. Transactions. Distributed data management. Interactive and programmatic interfaces to database systems. Application programming project using a prominent database system. Prerequisite: CS 146 (with a grade of “C-” or better); Computer Science, Applied and Computational Math, or Software Engineering majors only; or instructor consent.

Course Goal

To provide an introduction to database management systems, with an emphasis on how to effectively organize, manipulate, and maintain databases in relational systems.

Course Objectives

- To ensure the understanding of the fundamentals of relational database systems, including data models, database design, and database manipulations
- To teach how to express relational logic using relational algebra

- To teach the data definition, manipulation, and querying aspects of SQL (Structured Query Language)
- To introduce constraints and triggers as an integrity control mechanism in database systems.
- To introduce the concept of database transactions and their ACID (Atomicity, Consistency, Isolation, and Durability) properties
- To teach how database systems can be accessed from applications through a database application programming interface (API)
- To acquaint students with distributed data management

Student Learning Outcomes

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

- Explain basic database concepts, including the structure and operations of the relational data model
- Identify key components of database management systems and their functions at a high level
- Conduct normalization to decompose relations into 3NF or BCNF when that removes anomalies
- Use SQL as a data definition language (DDL) to create and alter databases, tables, views and indexes
- Use SQL as a data manipulation language (DML) for querying and modifying databases
- Define and use constraints and triggers in SQL
- Describe the concept of transactions
- Build a simple database application in a high-level programming language (e.g., Java and Python) that interacts with a relational database system at the back-end (e.g., Oracle, MySQL, SQL Server, Postgres, and Access)
- Describe one of well-known data distribution technologies such as replication and partitioning (a.k.a. sharding), etc.

BS in Computer Science Program Outcomes Supported

These are the BSCS Program Outcomes supported by this course:

- An ability to apply knowledge of computing and mathematics to solve problems
- An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
- An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
- An ability to use current techniques, skills, and tools necessary for computing practice

Course Topics

Topics	Chapters
Introduction to Database Systems Concepts	1
Relational Databases	2
Relational Algebra	2, 5
Relational Design Theory	3
High-Level Database Models	4
SQL	6
Transactions	6
Constraints and Triggers	7
Views and Indexes	8
JDBC	N/A
Distributed Data Management	N/A

Required Texts/Readings

- Textbook
Database Systems: The Complete Book (2nd edition) by Garcia-Molina, Ullman, and Widom
- [Textbook web site](http://infolab.stanford.edu/~ullman/dscb.html): <http://infolab.stanford.edu/~ullman/dscb.html>

Course Requirements and Assignments

- Assignments: Individual assignments aligned with the course topics will be given throughout the semester. Randomly selected questions will be graded per assignment.
- Project
 - A team project will be given in the middle of October.
 - The project involves database design and modeling, creation, data population, query, and database application programming using JDBC.
 - Your project will be submitted through the project submission link on the course web site.
- Late Policy
 - Any assignment or project turned in past the deadline will get a penalty: For each late day, a 20% of the maximum obtainable score of the work will be taken out of what you earned. (a late day is one 24 hour period beyond the due date). For example, suppose the maximum score of an assignment is 100 and you earned 80 points. If the submission is late by two days, the final score of the assignment would be $80 - 2 * 20 = 40$.
 - Any submission turned in more than 48 hours past the deadline will result in a grade of zero for that assignment.
- Software
 - [MySQL \(Community Server\)](http://dev.mysql.com/downloads/mysql/) (<http://dev.mysql.com/downloads/mysql/>)
 - [MongoDB](http://www.mongodb.com) (<http://www.mongodb.com>)
 - Docker
 - Git

Evaluation (Exams)

- There will be **one** midterm exam and one comprehensive final exam. The exams are scheduled as below. The date of midterm exam is subject to change with fair notice, but the final exam date is firm and cannot be changed.
 - Midterm: in class, Date: DBA
 - Final Exam: Date and Time: See the semester schedule below
- Makeup Exam Policy
Absolutely no make-up exams will be offered under any circumstances. For those who couldn't take the exam or worked hard but had a bad day on the exam day ending up with a low score, I offer the following opportunity to possibly replace your worst midterm score with the final score. If your final exam (percentage) grade is higher than your worst midterm (percentage) grade, then I will replace the worst midterm grade with your final exam grade. For example, if you have a 60% on your worst midterm and you receive an 80% on the final exam, I will replace the 60% by 80% in the computation of your course grade.

Grading Information

You will receive the final grade based on the weighted average score on your performance. The grading weights are as follows.

- Assignment: 20%
- Midterm : 30%
- Final Exam: 35%
- Project: 15%

I first try scores of 90, 80, and 70 to cut off letter grades of A-, B-, and C-, respectively. If overall class performance is too low to use these cut offs, I set a cut off of C- to a lower score than the class total average but a higher score than 60 (this number may change), and divide the students' group above the cut off of C- into A+, A, A-, B+, B, B-, C+, C, C-. The rest of students will be given by a grade of D+, D, D-, F or WU depending on their class performance.

Technology Requirements

Students are required to have an electronic device (laptop, desktop or tablet) with a camera and built in microphone. SJSU has a free [equipment loan](https://www.sjsu.edu/learnanywhere/equipment/index.php) (https://www.sjsu.edu/learnanywhere/equipment/index.php) program available for students.

Students are responsible for ensuring that they have access to reliable Wi-Fi during tests. If students are unable to have reliable Wi-Fi, they must inform the instructor, as soon as possible or at the latest one week before the test date. See [Learn Anywhere](https://www.sjsu.edu/learnanywhere/equipment/index.php) website (https://www.sjsu.edu/learnanywhere/equipment/index.php) for current Wi-Fi options on campus.

Recording Zoom Classes

This course or portions of this course (i.e., lectures, discussions, student presentations) will be recorded for instructional or educational purposes. The recordings will only be shared with students enrolled in the class through the course web site. If you would prefer to remain anonymous during these recordings, then please speak with the instructor about possible accommodations (e.g., temporarily turning off identifying information from the Zoom session, including student name and picture, prior to recording). Students are not allowed to record the instructor's Zoom classes.

Online Exams

Proctoring Software and Exams

Exams will be proctored in this course through Respondus Monitor and LockDown Browser. Please note it is the instructor's discretion to determine the method of proctoring. If cheating is suspected the proctored videos may be used for further inspection and may become part of the student's disciplinary record. Note that the proctoring software does not determine whether academic misconduct occurred, but does determine whether something irregular occurred that may require further investigation. Students are encouraged to contact the instructor if unexpected interruptions (from a parent or roommate, for example) occur during an exam.

Testing Environment: Setup

- No earbuds, headphones, or headsets
- The environment is free of other people besides the student taking the test.
- No other browser or windows besides Canvas opened.
- A workplace that is clear of clutter (i.e., reference materials, notes, textbooks, cellphone, tablets, smart watches, monitors, keyboards, gaming consoles, etc.)
- Well-lit environment. Can see the students' eyes and their whole face. Avoid having backlight from a window or other light source opposite the camera.

Students must:

- Remain in the testing environment throughout the duration of the test.
- Keep full face in full view of the webcam

Technical difficulties

Internet connection issues: Canvas autosaves responses a few times per minute as long as there is an internet connection. If your internet connection is lost, Canvas will warn you but allow you to continue working on your exam. A brief loss of internet connection is unlikely to cause you to lose your work. However, a longer loss of connectivity or weak/unstable connection may jeopardize your exam.

Other technical difficulties: Immediately email the instructor a current copy of the state of your exam and explain the problem you are facing. Your instructor may not be able to respond immediately or provide technical support. However, the copy of your exam and email will provide a record of the situation.

Contact the SJSU technical support for Canvas:

Technical Support for Canvas Email: ecampus@sjsu.edu Phone: (408) 924--2337
<https://www.sjsu.edu/ecampus/support/>

Policy on Academic Integrity

- Any cheating on an exam will result in a grade of F in the class.
- If duplicate programs are found, both the provider and the copier will receive 0 point on the assignment. A second offense results in a grade of F in the class.
- Any incident of academic dishonesty will be reported to University for disciplinary action.

Attendance

[University policy F15-12](http://www.sjsu.edu/senate/docs/F15-12.pdf) at <http://www.sjsu.edu/senate/docs/F15-12.pdf> states that "Students should attend all meetings of their classes, not only because they are responsible for material discussed therein, but because active participation is frequently essential to insure maximum benefit for all members of the class. Attendance per se shall not be used as a criterion for grading."

Consent for Public Sharing of Instructor Material

Course material cannot be shared publicly without his/her approval. You may not publicly share or upload instructor generated material for this course such as exam questions, lecture notes, or homework solutions without instructor consent.

University Policies

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on [Office of Graduate and Undergraduate Programs' Syllabus Information](http://www.sjsu.edu/gup/syllabusinfo/) web page at <http://www.sjsu.edu/gup/syllabusinfo/>

CS157A Introduction to Database Management Systems, Fall 2021 Semester Schedule

Subject to change with fair notice.

Weeks	Topics
1	Introduction to Database Systems Concepts
1	Relational Databases and Relational Algebra
2	Relational Algebra
2	Relational Algebra
3	Relational Algebra
3	Relational Algebra
4	SQL Programming

4	SQL Programming
5	SQL Programming
5	SQL Programming
6	SQL Programming
6	SQL Programming
7	Constraints and Triggers
7	Constraints and Triggers
8	Constraints and Triggers
8	Midterm
9	Views and Indexes
9	Views and Indexes
10	Views and Indexes
10	JDBC
11	JDBC
11	Relational Design Theory
12	Relational Design Theory
12	Relational Design Theory
13	Transactions
13	Transactions
14	Transactions
14	Distributed Data Management
15	Distributed Data Management
Final Exam	Section 5 (MW 9:00AM - 10:15AM): Thursday, December 9, 7:15-9:30 AM Section 4 (MW 10:45AM - 12:00PM): Wednesday, December 8, 9:45 AM-12:00 PM Section 8 (TR 9:00AM - 10:15AM): Friday, December 10, 7:15-9:30 AM