College of Science · Computer Science

Database Management Systems IICS 157B

- Spring 2026
- Section 01
- In Person
- 3 Unit(s)
- 01/22/2026 to 05/11/2026
- Modified 01/21/2026

Contact Information

Instructor: Frank Luo

Office: DH 282

Phone Number: (408) 718-8216

Email: zhiqiang.luo@sjsu.edu

Office Hours: MW 3:00-4:15pm in DH282

Class Meets:Sec1 MW 4:30-5:45pm in MH424

Course Information

Course Description

The catalog description is: Object-oriented data model, definition language, query language. Object relational database systems. Database trends like active, temporal, multimedia, deductive databases. Web database topics, namely, architectures, introduction to interface languages. Team projects. This class continues where CS157A left off. To begin data storage will be considered. This includes a discussion of how disks works, a discussion of algorithms for disk scheduling and sorting, and a discussion of how RAID systems work. Then indexes, B+-trees, record structures, multi-dimensional indexes, etc will be discussed. The focus will then switch to how query evaluation is implemented. Next we will cover database recovery algorithms. This will be followed with some lectures on transaction processing and concurrency control techniques and then a discussion on combining data from different databases. The semester will conclude with a discussion of data mining and databases and the internet. This course provides an in-depth exploration of **DBMS internals** using **SQLite** as a reference implementation. Topics include storage hierarchy, indexing, query execution, transaction management, OLAP, and data mining. Students will perform hands-on exercises tracing SQL queries through the DBMS to connect theory with practical implementation.

Course Description and Requisites

Survey course. Object-oriented data model, definition language, query language. Object relational database systems. Database trends like active, temporal, multimedia, deductive databases. Web database topics, namely, architectures, introduction to interface languages. Team projects.

Prerequisite: CS 157A (with a grade of "C-" or better); Computer Science, Applied and Computational Math, Forensic Science: Digital Evidence, or Software Engineering Majors only; or instructor consent.

Letter Graded

Classroom Protocols

Classroom Protocol

I will start lecturing close to the official start time for this class modulo getting tangled up in any audio/visual presentation tools I am using. Once I start lecturing, please refrain from talking to each other, answering your cell phone, etc. If something I am

talking about is unclear to you, feel free to ask a question about it. Typically, on practice tests days, you will get to work in groups, and in so doing, turn your desks facing each other, etc. Please return your desks back to the way they were at the end of class. This class has an online class discussion board which can be used to post questions relating to the homework and tests. Please keep discussions on this board civil. This board will be moderated. Class and discussion board participation, although not a component of your grade, will be considered if you ask me to write you a letter of recommendation.

Exams

The midterm will be during class time on: Mar 27.

The final will be: Monday, May 18 3:15-5:15 PM.

All exams are closed book, closed notes and in this classroom. You will be allowed only the test and your pen or pencil on your desk during these exams. The final will cover material from the whole semester although there will be an emphasis on material after the last midterm. No make ups will be given. The final exam may be scaled to replace a midterm grade if it was missed under provably legitimate circumstances. These exams will test whether or not you have mastered the material both presented in class or assigned as homework during the quarter. My exams usually consist of a series of essay style questions. I try to avoid making tricky problems. The week before each exam I will give out a list of problems representative of the level of difficulty of problems the student will be expected to answer on the exam. Any disputes concerning grades on exams should be directed to me, Frank Luo.

Regrades

If you believe an error was made in the grading of your program or exam, you may request **in person** a regrade from me, Frank Luo, during my office hours. **I do not accept e-mail requests for regrades.** A request for a regrade must be made no more than a week after the homework or a midterm is returned. If you cannot find me before the end of the semester and you would like to request a regrade of your final, you may see me **in person** at the start of the immediately following semester.

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)

Course Learning Outcomes (CLOs)

Upon completing this course, students will be able to:

1. Describe DBMS architecture, storage hierarchy, and buffer management.
2. Analyze I/O costs and their impact on query execution.
3. Explain RAID, disk failures, and reliability mechanisms.
4. Understand record storage, slotted pages, and record modification.
5. Implement and trace secondary indexes and their updates.
6. Analyze B-Tree and hash-based indexing structures.
7. Trace query execution in SQLite and estimate cost.
8. Explain transaction management, logging, concurrency control, and recovery.
9. Apply MVCC and locking for serializability.
10. Perform data integration, OLAP, and data mining operations.

Grading Information

Assessment & Grading

Component	Description	Weight
Weekly Quizzes	Multiple choice / true-false / numeric (best 10 of 11)	10%
Midterm Exam	Written + SQLite tracing (Lectures 1–13)	20%
Final Exam	Comprehensive, includes SQLite-based applied questions	30%
Project	Semester-long SQLite-based DBMS project/Homework	30%
In-Class Exercises	Coding labs, page tracing, discussions	10%

Grading Scale

Grade	Percentage
A+	97–100%
A	93–96%
A-	90–92%
B+	87–89%
B	83–86%
B-	80–82%
C+	77–79%
C	73–76%
C-	70–72%
D+	67–69%
D	63–66%
D-	60–62%
F	Below 60%

University Policies

Per University Policy 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 web page. Make sure to visit this page to review and be aware of these university policies and resources.

Course Schedule

Weekly Schedule

Here's **tentative time table for when we'll do things this quarter**:

Week	Topic / Lecture
1	Lecture 1: **DBMS Architecture & Storage Hierarchy**
2	Lecture 2: IO Model, Disk Access, Disk Failures & Raid
3	Lecture 3: Records, Blocks, Record Addresses, Pinning, and Record Modification
4	Lecture 4: Indexes, Secondary Indexes, B-trees, And Hashing
5	Lecture 5: Query Execution & Query Algorithms
6	Lecture 6: Index-based Query Algorithms & Cost-based Planning
7	Lecture 7: System Failures Transactions
8	Lecture 8: Redo Undo Serializability
9	Review Lectures 1–8, **Midterm Exam**
10	Spring Break – No Class
11	Lecture 9: Concurrency Control Locking Timestamp
12	Lecture 10: Parallel & Distributed Databases
13	Lecture 11: Information Integration & Olap
14	Lecture 11 continue , Lecture 12: Data Mining
15	Lecture 12: Data Mining
16	Final Review (All Lectures) **Final Exam** (Monday, May 18, 3:15–5:15 PM)