
Introduction to Database Management Systems

Section 04

CS 157A

Fall 2023 3 Unit(s) 08/21/2023 to 12/06/2023 Modified 08/23/2023

Contact Information

Instructor: Nidhi Zare

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Office Hours: Monday and Wednesday 11 AM - 12 PM, through Zoom

Class Days and Time: Monday and Wednesday 4:30 PM - 5:45 PM

Classroom: MH 225

Course Format: In-person

Course Description and Requisites

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(s): CS 146 (with a grade of "C-" or better); Computer Science, Applied and Computational Math, Forensic Science: Digital Evidence, Software Engineering, or Data Science majors only; or instructor consent.

Letter Graded

* Classroom Protocols

- This course is an in-person class.
- There will be **no lecture recordings** for later review/study. Recording a lecture is prohibited. Students are prohibited from recording class activities (including class lectures, office hours, advising sessions, etc.), distributing class recordings, or posting class recordings. Materials created by the instructor for the course (syllabi, lectures lecture notes, presentations, etc.) are copyrighted by the instructor. This university policy (S12-7) is in place to protect the privacy of students in the course, as well as to maintain academic integrity through reducing instances of cheating. Students who record, distribute, or post these materials will be referred to the Student Conduct and Ethical Development office. Unauthorized recording may violate university and state law. It is the responsibility of students who require special accommodations or assistive technology due to a disability to notify the instructor.
- Attendance is not mandatory but crucial to doing well on pop quizzes, assignments and examinations. Missing a pop quiz counts as 0 for that particular quiz.

- Course materials such as handouts, notes, assignment instructions, etc. can be found on Canvas Learning Management System available at <https://sjsu.instructure.com>. Students are responsible for regularly checking with its messaging system (or other communication system as indicated by the instructor) to learn of any updates.
- Plagiarism/Cheating will not be tolerated and will be reported to the Department and the University. (Obtaining homework solutions from someone or giving/showing your Homework solutions to someone is also treated as plagiarism/cheating.)

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

- Database Fundamentals and Users: Introduce the purpose of databases, user roles, and system applications.
- Relational Concepts: Cover the relational model and algebra, foundational for data organization and manipulation.
- Design Optimization: Teach design theory, including normalization, and algorithms to ensure efficient table structures.
- Real-World Systems: Explore database architectures, components, and prominent systems like Oracle, MySQL, and SQL Server.
- SQL: Educate on Standard SQL, enabling effective data querying and manipulation.
- Programming Interfaces and Project: Provide insights into programmatic interaction, integrity constraints, triggers, views, indexes, transactions, distributed data, and guide an application project using a prominent database system.

Course Learning Outcomes (CLOs)

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

- Utilize theoretical and practical knowledge to create database applications through DBMS and the SQL programming language.
- Proficiently employ Entity Relationship Diagrams to represent conceptual schemas.
- Recognize functional dependencies and apply normalization algorithms.
- Implement Data Definition Language to outline database schemas.
- Construct procedures for data retrieval using the Data Manipulation Language, encompassing schema management, indexing, normalization, views, triggers, and constraints.
- Formulate SQL commands for tasks such as database and table creation, as well as the insertion, updating, deletion, and retrieval of data within a standard database management system.
- Develop data retrieval processes using Relational Algebra principles.

Course Materials

Textbook

This course does not have a required textbook. The lecture notes contain all the required materials.

References

- Hector G Molina, Jeffrey D Ullman and Jennifer Widom, Database Systems – The complete Book, 2nd edition, Pearson Education
- Database System Concepts (6th edition) by Silberschatz, Korth, and Sudarsha

- The references at the end of each lecture note

Course Requirements and Assignments

Homework Assignments

The assignments are to be submitted on time. No late assignments will be accepted after the due date.

Quizzes

Unannounced pop quizzes may be given anytime during the class. The purpose is to encourage you to learn, study, and review the concepts and materials presented/discussed in the lecture. These will generally be problems covered in today's or previous lecture.

Exams

- The exams are based on lectures, homework/lab assignments, and reading materials covered before the exam's date.
- Exams are CLOSED book and NO items may be shared during the exams, including books, notes, and calculators.
- Absolutely NO usage of cell phones during exams. Cell Phones must be in off or silent mode and not within your reach.

Makeup exams will only be granted in case of a documented medical emergency with advanced notice to the instructor. If a student misses an exam without a legitimate excuse, a grade of zero will be recorded.

Grading Information

Your individual grade will be weighted as follows:

- Quiz 15%
 - Homework 20%
 - Midterm exam 20%
 - Final project 20%
 - Final Exam 25%
- Total 100%

Digit number grades will be assigned according to the following policy:

97 - 100 A+
93 - 96 A
90 - 92 A-
87 - 89 B+
83 - 86 B
80 - 82 B-
77 - 79 C+
73 - 76 C
70 - 72 C-
67 - 69 D+
63 - 66 D
60 - 62 D-
0 - 59 F

University Policies

Per [University Policy S16-9 \(PDF\)](http://www.sjsu.edu/senate/docs/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 \(https://www.sjsu.edu/curriculum/courses/syllabus-info.php\)](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

Tentative Course Schedule (This schedule is subject to change with fair notice.)

Week	Date	Topics, Readings, Assignments, Deadlines
1	08/21	Motivation, Orientation/Syllabus, Course Introduction Prerequisites Check (Student Assignment)
1	08/23	Introduction to database systems
2	08/28	Relational Databases Concepts
2	08/30	Intro to SQL Programming (Homework Assignment 1)
3	09/04	Holiday: Labor Day
3	09/06	MySQL DBMS basics, create database and tables Connecting to MySQL using JDBC
4	09/11	SQL Programming Final Project Announcement and Team formation (Homework Assignment 1 Submission)
4	09/13	SQL Programming (Homework Assignment 2)
5	09/18	Overview of Data Modeling, Entity- Relational Modeling
5	09/20	Relational Model Concepts, Relation as a Mathematical Model, ER, ER to Relational Model
6	09/25	Functional Dependencies
6	09/27	Normal Forms and normalization Project doubts and discussion (Homework Assignment 2 Submission)
7	10/02	Normal Forms and normalization Midterm Syllabus Review
7	10/04	Mid Term Exam

Week	Date	Topics, Readings, Assignments, Deadlines
8	10/09	Mid Term Solutions Project doubts and discussion (Project Design Document Submission)
8	10/11	Relational Algebra (Homework Assignment 3)
9	10/16	Transaction Management, Overview Serializability, Recoverability, Concurrency Control, Locking
9	10/18	Transaction Management, Overview Serializability, Recoverability, Concurrency Control, Locking
10	10/23	Views and Indexes (Homework Assignment 3 Submission)
10	10/25	Views and Indexes
11	10/30	Query processing and Optimization (Homework Assignment 4)
11	11/01	Data Storage
12	11/06	Constraints and Triggers
12	11/08	Data Formats - RDF, JSON
13	11/13	Querying - XML, JQuery, SPARQL
13	11/15	Introduction to data warehousing
14	11/20	OLAP , Dynamic DB (Homework Assignment 4 Submission)
14	11/22	Holiday: Thanksgiving
15	11/27	Final Project Presentation
15	11/29	Final Project Presentation (Final Project Code Submission)
16	12/04	Final Exam Review

Week	Date	Topics, Readings, Assignments, Deadlines
	12/14	Final Exam 2:45 - 5:00 PM (Final Project Report Submission)