San José State University
[Department of Computer Science](#)
Spring 2023
CS 257 – Database Systems Principles

Course and Contact Information

Instructor:	Ramin Moazeni, PhD
Class Hours:	TTh: 6:00PM - 7:15PM
Office Hours:	TTh: 12:30PM – 1:00PM over Zoom or after class
Email:	Ramin.Moazeni@sjsu.edu
Classroom:	MH 422
Prerequisites:	CS 157B or instructor consent

Catalog Description

Design management and performance issues on file organization and access methods, buffer management and storage management. Query processing and query optimization, transaction management, recovery, and concurrency control techniques. Reliability, protection and integrity techniques. Extensive programming project.

This course covers the essential concepts, principles, techniques, internals and mechanisms for the design, analysis, use, and implementation of computerized database systems.

The database and information management system technology examined in this course represents the state-of-the-art, including traditional approaches as well as recent research developments. By providing a balanced view of "theory" and "practice," the course should allow the student to understand, use, and build practical database and information management systems.

Learning Outcomes

By the end of this course, a student should be able to:

- Understanding of Storage management architecture and relevant performance issues
- Understanding of File and System structure, page structure, heap files, buffer manager
- Detailed understanding of DBMS critical subsystems such as query processing and optimization techniques,
- Understanding of concurrency control, transaction management and recovery.
- Detailed understanding to the different indexes support (Static Hashing, Extendible Hashing, Linear Hashing) and how they are leveraged by the query optimizer.
- Exposure to current advanced research topics related to Big Data paradigm for distributed processing.

Required Texts

(Required)	Raghu Ramakrishnan, Johannes Gehrke Database Management Systems 3rd Edition ISBN-13: 978-0072465631 ISBN-10: 0072465638
(Recommended)	Garcia-Molina, Ullman, Widom Database Systems: The Complete Book 2nd Edition ISBN-13: 978-0131873254 ISBN-10: 0131873253

Course Requirements and Assignments

SJSU classes are designed such that in order to be successful, it is expected that students will spend a minimum of forty-five hours for each unit of credit (normally three hours per unit per week), including preparing for class, participating in course activities, completing assignments, and so on. More details about student workload can be found in University Policy S12-3 at http://www.sjsu.edu/senate/docs/S12-3.pdf. Note that University policy F15-12 at http://www.sjsu.edu/senate/docs/F15-12.pdf states that "Attendance shall not be used as a criterion for grading."… "Students are expected to attend all meetings for the courses in which they are enrolled as they are responsible for material discussed therein, and active participation is frequently essential to ensure maximum benefit to all class members. In some cases, attendance is fundamental to course objectives; for example, students may be required to interact with others in the class. Attendance is the responsibility of the student."… "Participation may be used as a criterion for grading when the parameters and their evaluation are clearly defined in the course syllabus and the percentage of the overall grade is stated."

Assignments

There will be a number of written and programming assignments throughout the course. Assignment specification and their corresponding due dates will be posted on Canvas.

The submissions are due at midnight on the due date. The assignments are to be submitted on time. A penalty of 10% per day is applied to late submissions. No assignments will be accepted after a week past its due date.

Course Project:

A programming group project of your choice related to the course. Detailed guidelines including milestones for the project will be posted on Canvas in the second week of the semester.

Absolutely NO late submission for the course project.

Exams

- Absolutely NO items may be shared during the exams, including books, notes, and calculators.
- Absolutely NO usage of cell phones during exams. Cell Phones must in off or silent mode and not within your reach.

Makeup exams will only be granted in case of documented medical emergency with an advanced notice to the instructor.

No students are allowed to miss either exam. Failure to take an exam during its scheduled time will result in a grade of zero on that exam.

Grading Policy

Your individual class grade will be weighted as follows:

Assignments	20%
Course Project	20%
Exams (Midterm and Final)	60% (each exam 30%)
Total	100%

The final "letter" grade will be determined by a curve based on class average at the end of the semester.

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 web page at http://www.sjsu.edu/gup/syllabusinfo/

CS 257, Database Systems Principles, Course Schedule

Course Schedule (Tentative)

Week	Date	Lecture Topic	Readings
1	01/26	Course introduction	
2	01/31	Relational Algebra	Chapter 4
	02/02	Storage and RAID	Chapter 9
3	02/07	File and System Structure	Chapter 9
	02/09	Buffer Management	
4	02/14	Indexing and Hashing	Chapter 8, 10
	02/16	Indexing and Hashing	
5	02/21	Indexing and Hashing	
	02/23	Query Evaluation	Chapter 12
6	02/28	Query Evaluation	Chapter 14
	03/02	Query Optimization	Chapter 15
7	03/07	Query Optimization	
	03/09	Query Optimization	
8	03/14	Midterm review	
	03/16	**Midterm Exam**	
9	03/21	External Sorting	Chapter 13
	03/23	External Sorting	
10	03/28	**No Class – Spring Recess**	
	03/30	**No Class – Spring Recess**	
11	04/04	Transactions	Chapter 16
	04/06	Transactions	
12	04/11	Concurrency Control	Chapter 17
	04/13	Concurrency Control	Chapter 17
13	04/18	Database Design	Chapter 19
	04/20	Database Design	Chapter 19
14	04/25	Crash Recovery	Chapter 18
	04/27	Crash Recovery	Chapter 18
15	05/02	Security	Chapter 21
	05/04	Distributed Databases	Chapter 22
16	05/09	Distributed Databases	Chapter 22
	05/11	Final Exam review	
17			
	05/18	**Final Exam**	