



Database Systems: Storage and Retrieval using SQL ISE 382 (4 Units)

Spring 2025

Time: 10:00 – 11:50 am Monday and Wednesday

Location: DMC 260

Instructor: Nitin Kalé, Professor, Information Technology Program (ITP) and Epstein Department of Industrial and Systems Engineering (ISE)

Contact Info: kale@usc.edu

Office Hours: TBD (on Brightspace)

Course Producers:

- Alex Wang, awang756@usc.edu
- Xinrui Li, xli71479@usc.edu

CP Peer Mentoring Hours: TBD

IT Help: Viterbi IT

Hours of Service: Monday – Friday, 8:30 a.m. – 5:00 p.m.

Contact Info: DRB 205

(213) 740-0517 engrhelp@usc.edu

Course Description

Data-oriented thinking. Data models for industry applications. Modeling, designing, implementing and querying robust databases.

Learning Objectives

- Think in terms of data
- Model, design, implement databases
- Normalize and denormalize databases for optimal performance
- Retrieve and verify information from databases
- Describe the structure and role of data warehouses for analytics
- Prepare data for analytics

Course Notes

Grading Type: Letter grade

Lecture slides, assignments, readings, announcements, and other class information will be posted on Brightspace - <https://brightspace.usc.edu/>

Outside of class time, course discussion will take place on Piazza (link is posted on Bs)

Technological Proficiency and Hardware/Software Required

Platforms, packages, and tools that will be used for the class will be provided to students free of charge. The following software will be used in the class. Students should have access to a computer and bring their laptop to class.

Required Readings and Supplementary Materials

No required textbook. Lecture notes and readings will be posted on Bs.

Description and Assessment of Assignments

Assignment details and deadlines will be posted on D2L.

Assignment	% of grade
Homework	30
Exam 1	30
Exam 2	30
Final Project	10
TOTAL	100

Homework will be assessed on timeliness, completeness, thoroughness, and conclusions drawn. Each component of the assessment will have points associated with it. This will vary for each assignment and will be listed in the homework instructions. Grader will provide feedback for each component of the assessment through Bs.

Homework instructions will be posted on Bs with a due date, objective, expectations, data files, resources, and deliverables. In most cases, the deliverable will be answers in a Word document along with source code and any other output files.

Assignment Submission Policy

Students are responsible for completing individual assignments by stated deadlines. Assignments must be turned into Bs. Assignments turned in late will have 25% of the total points deducted from the graded score for each late day. You will have 3 “grace days” for the semester. i.e., no late penalty on HW for a cumulative 3 days. No grace days are available for Final Project.

Grading Timeline

Assignments Grading will typically be completed 7 days after the deadline for submission. Any variations will be announced in class or on Bs. All grading discrepancies must be resolved within a week of grade release. For grade disputes, contact your grader first. If resolution is not reached, contact the instructor.

Grading Scale

Course final grades will be determined using the following scale:

Letter grade	Corresponding numerical point range
A	95-100
A-	90-95
B+	87-90
B	83-87
B-	80-83
C+	77-80
C	73-77
C-	70-73
D+	67-70
D	63-67
D-	60-63
F	60 and below

Academic Integrity

The University of Southern California is foremost a learning community committed to fostering successful scholars and researchers dedicated to the pursuit of knowledge and the transmission of ideas. Academic misconduct is in contrast to the university's mission to educate students through a broad array of first-rank academic, professional, and extracurricular programs and includes any act of dishonesty in the submission of academic work (either in draft or final form).

This course will follow the expectations for academic integrity as stated in the [USC Student Handbook](#). All students are expected to submit assignments that are original work and prepared specifically for the course/section in this academic term. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s). Students suspected of engaging in academic misconduct will be reported to the Office of Academic Integrity.

Other violations of academic misconduct include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.

Academic dishonesty has a far-reaching impact and is considered a serious offense against the university. Violations will result in a grade penalty, such as a failing grade on the assignment or in the course, and disciplinary action from the university itself, such as suspension or even expulsion.

For more information about academic integrity see the [student handbook](#) or the [Office of Academic Integrity's website](#), and university policies on [Research and Scholarship Misconduct](#).

Please ask your instructor if you are unsure what constitutes unauthorized assistance on an exam or assignment or what information requires citation and/or attribution.

Policy for the use of AI Generators

In this course, I permit the use artificial intelligence (AI)-powered programs to help you with assignments that indicate the permitted use of AI. You should also be aware that AI text generation tools may present incorrect information, biased responses, and incomplete analyses; thus, they are not prepared to produce answers that meets the standards of this course. To adhere to our university values, you must cite any AI-generated material (e.g., text, images, etc.) included or referenced in your work and provide the prompts used to generate the content. Using an AI tool to generate content without proper attribution will be treated as plagiarism and reported to the Office of Academic Integrity. Please review the instructions in each assignment for more details on how and when to use AI Generators for your submissions.

Course Content Distribution and Synchronous Session Recordings Policies

USC has policies that prohibit recording and distribution of any synchronous and asynchronous course content outside of the learning environment.

Recording a university class without the express permission of the instructor and announcement to the class, or unless conducted pursuant to an Office of Student Accessibility Services (OSAS) accommodation. Recording can inhibit free discussion in the future, and thus infringe on the academic freedom of other students as well as the instructor. ([Living our Unifying Values: The USC Student Handbook](#), page 13).

Distribution or use of notes, recordings, exams, or other intellectual property, based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study. This includes but is not limited to providing materials for distribution by services publishing course materials. This restriction on unauthorized use also applies to all information, which had been distributed to students or in any way had been displayed for use in relation to the class, whether obtained in class, via email, on the internet, or via any other media. Distributing course material without the instructor's permission will be presumed to be an intentional act to facilitate or enable academic dishonesty and is strictly prohibited. ([Living our Unifying Values: The USC Student Handbook](#), page 13).

Course Schedule	
	Topics/Daily Activities (refer to Brightspace for assignments and deadlines)
Week 1	Introduction <ul style="list-style-type: none"> • Brief history of databases and their role in information systems • Different types of databases and their organizational context • Survey of DBMS • Data-oriented thinking
Week 2	Data Models <ul style="list-style-type: none"> • Overview of Data Models • Business Rules • Relational data model
Week 3	Entity relationship modeling <ul style="list-style-type: none"> • Entities • Attributes • Relationships • Constraints
Week 4	Normalization & Denormalization <ul style="list-style-type: none"> • Data Anomalies • Normal Forms • Normalization • Performance and denormalization
Week 5	Structured Query Language (SQL) <ul style="list-style-type: none"> • Data Definition Language (DDL) • Data Manipulation Language (DML)
Week 6	Data Storage <ul style="list-style-type: none"> • CRUD • Extract, transform, load
Week 7	Data cleansing and harmonization
Week 8	Data Retrieval – SQL 2 <ul style="list-style-type: none"> • Aggregation <p>Exam 1</p>
Week 9	Data Retrieval – SQL 3 <ul style="list-style-type: none"> • Joins
Week 10	Data Retrieval – SQL 4 <ul style="list-style-type: none"> • Subqueries
Week 11	Data Retrieval – SQL 5 <ul style="list-style-type: none"> • Correlated subqueries
Week 12	Data Security, Privacy, Access-control <ul style="list-style-type: none"> • Disaster preparedness • Backup and Recovery strategies • Securing databases • SQL Injection
Week 13	JSON schema

Week 14	Data warehouses <ul style="list-style-type: none">• Big Data• Business Intelligence• Data Mining• Artificial Intelligence
Week 15	PANDAS/data frames Exam 2
Week 16	Final Project due

Statement on University Academic and Support Systems

Students and Disability Accommodations:

USC welcomes students with disabilities into all of the University's educational programs. [The Office of Student Accessibility Services](#) (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

Student Financial Aid and Satisfactory Academic Progress:

To be eligible for certain kinds of financial aid, students are required to maintain Satisfactory Academic Progress (SAP) toward their degree objectives. Visit the [Financial Aid Office webpage](#) for [undergraduate-](#) and [graduate-level](#) SAP eligibility requirements and the appeals process.

Support Systems:

[Counseling and Mental Health](#) - (213) 740-9355 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

[988 Suicide and Crisis Lifeline](#) - 988 for both calls and text messages – 24/7 on call

The 988 Suicide and Crisis Lifeline (formerly known as the National Suicide Prevention Lifeline) provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States. The Lifeline consists of a national network of over 200 local crisis centers, combining custom local care and resources with national standards and best practices. The new, shorter phone number makes it easier for people to remember and access mental health crisis services (though the previous 1 (800) 273-8255 number will continue to function indefinitely) and represents a continued commitment to those in crisis.

[Relationship and Sexual Violence Prevention Services \(RSVP\)](#) - (213) 740-9355(WELL) – 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender- and power-based harm (including sexual assault, intimate partner violence, and stalking).

[Office for Equity, Equal Opportunity, and Title IX \(EEO-TIX\)](#) - (213) 740-5086

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

[Reporting Incidents of Bias or Harassment](#) - (213) 740-2500

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

[The Office of Student Accessibility Services \(OSAS\)](#) - (213) 740-0776

OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

[USC Campus Support and Intervention](#) - (213) 740-0411

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

[Diversity, Equity and Inclusion](#) - (213) 740-2101

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

[USC Emergency](#) - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

[USC Department of Public Safety](#) - UPC: (213) 740-6000, HSC: (323) 442-1200 – 24/7 on call

Non-emergency assistance or information.

[Office of the Ombuds](#) - (213) 821-9556 (UPC) / (323-442-0382 (HSC)

A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

[Occupational Therapy Faculty Practice](#) - (323) 442-2850 or otfp@med.usc.edu

Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.