San José State University
College of Science / Department of Computer Science
CS157A, Introduction to Database Management Systems,
Section 2, 3, 7 Fall 2020

Course and Contact Information

Instructor:	Dr. Katarzyna Tarnowska
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Email:	katarzyna.tarnowska@sjsu.edu
Office Hours:	Online by appointment
Class Days/Time:	S2: ThTh/10:30-11:45AM; S3: TuTh/12:00-1:15PM; S7: MoWe/4:30-5:45PM
Classroom:	Online (Canvas LMS/Zoom)
Prerequisites:	CS 146 (Data Structures and Algorithms) with a grade of C- or better.

Course Format

This edition of the CS157A course will be entirely online, using Canvas as an LMS platform and Zoom. Therefore, you will need access to a computer and the Internet. The exams must be taken on Windows/macOS platform with access to a web camera. The primary mode will be asynchronous with designated synchronous meetings via Zoom during the class time.

Faculty Web Page and MYSJSU Messaging

All course materials such as syllabus, handouts, notes, assignment instructions, discussions, URLs, etc. will be published on the Canvas Learning Management System course login website at https://sjsu.instructure.com/.

Course Description

Current, classical database systems. Entity-relationship and enhanced entity models. Relational model, algebra, calculus. Current, emerging SQL standard. Embedded, Dynamic SQL. Application perspective on transactions and security. Interactive and programmatic interfaces to database systems. Application programming project using commercial 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 Goals

- To introduce students to the purpose of database systems and databases, as well as common users of such systems.
- To teach students about the relational model.
- To teach students about design theory (such as normalization, etc.).
- To teach students about real-world database system usage, architectures and components, using MySQL as an example.
- To teach students about SQL, the standard language for interacting with a database.
- To teach students how to interact with a database system from a programming language such as Java, C, PHP, Perl, etc.

Course Learning Outcomes (CLO)

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

1. Design a database by creating Entity/Relationship Diagram for a given problem.
2. Use Data Definition Language to define database schemas.
3. Construct data retrieval procedures using the Data Manipulation Language (schema, index, normalization, view, trigger, constraints). Write SQL commands to create databases, create tables, insert/update/delete/retrieve rows in a common database management system.
4. Implement simple database application and write transactions using JDBC.

Required Texts/Readings

Textbook

zyBook https://learn.zybooks.com/zybook/SJSUCS157ATarnowskaFall2020. You need to subscribe in the first week of instructions. Assigned zyBook readings, activities, and labs will be linked via Canvas LMS.

Other Readings

Materials uploaded by the instructor on Canvas under the current week.

Other technology requirements / equipment / material

- MySQL Database 8.0 & MySQL Workbench https://dev.mysql.com/
- Lucidchart lucidchart.com (access available through SJSU SSO) – diagramming (analysis & design)

Course Requirements and Assignments

- Proof of prerequisites (i.e. transcript) has to be provided in the first week of instructions via Canvas upload.
- Short lectures, messages, and instructions will be pre-recorded by the instructor and uploaded on Canvas.
- Participation (10% of total grade) – assigned participation activities from zyBook readings and posting on discussion forum will be graded in scale 0-100 points. An average from all assignments will be counted for the final total score in this category. These activities are due on Tuesdays and Thursdays at 1:15 PM.
- Assignments (10% of total grade) – assignments posted on Canvas from the current week are due on the following Mondays at 4:30 PM. Assignments of the week are graded in scale 0-100, and an average from all will be taken for the final score in this category (0-100 points).
- Labs (10% of the total grade)– programming assignments in SQL from zyLabs from the current week are due on the following Mondays at 4:30 PM. An average of all labs will be taken to calculate the final score in this category (0-100 points).
- Quizzes (10% of the total grade) – Canvas quizzes on material related to the current or previous week with a due date. An average of all quizzes score will be used to determine the total score in this category (0-100).
- Exams (30% of the total grade) – there will be two exams during class-time: Midterm (15%), covering Chapters 1-3, and Final (15%), covering chapters 4-6. The exams will be closed book online, requiring access to PC, Internet, Canvas, Windows/macOS, and web camera.
- Projects (30% of the total grade) – semester project will be completed in teams of 3 members, involve design and implementation of a simple database application, with deliverables split into milestones:
    - Analysis: topic choice & description: due 9/15
    - Design: conceptual database model & documentation: due 10/1
    - Design: table database model & documentation: due 10/27
    - Implementation: database with Java- or web-based connectivity with SQL queries: due 11/17
    - Implementation: Stored procedures, Java- or web-based GUI, final code and report: due 12/3
    - Presentations (~15 min./team) – delivered in teams via Zoom on final registrar time

The project's goal is to design and implement a simple database system on one of the topics of choice. The project will utilize the E/R design method and client-server architecture. The required technology is MySQL and web- or Java-based connectivity and a user interface. Projects will be completed in teams and require the contribution of each team member in each milestone. The collaboration tools include Zoom/Slack/Canvas for communication and GitHub for code version control. The final project grade will be adjusted based on the percentage of contribution, as assessed by other team members, and GitHub contribution statistics.

Final Examination or Evaluation

The final evaluation will consist of a group presentation of projects' results delivered via Zoom video conferencing system, and final project deliverables including design, implementation (source code & code repository), documentation, and presentation slides.

Grading Information

- Late work will not be accepted and will be graded with 0 points.
- Plagiarism/cheating will not be accepted and will be graded with 0 points and reporting.
- There will be no extra credit opportunities available.

Determination of Grades

The components of the final grade will be distributed as follows:
- Midterm   15%   150 points
- Final   15%   150 points
- Participation 10%   100 points
- Assignments   10%   100 points
- Labs   10%   100 points
- Project   30%   300 points
- Quizzes   10%   100 points

Letter grades will be assigned according to the following policy:
>   1000– 990-----A+
>   930 – 989 ---- A
>   890 -- 929 ---- A-
>   870 -- 889---- B+
>   830 -- 869 ---- B
>   800 -- 829 ---- B-
>   770 -- 799 ---- C+
>   730 -- 769 ---- C
>   700 -- 729 ---- C-
>   670 -- 699 ---- D+
>   630 -- 669 ---- D
>   600 -- 629 ---- D-
>   0 -- 599 ---- F

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/.

CS157A / Introduction to Database Management Systems, Fall 2020, Course Schedule

Course Schedule

The schedule is subject to change with fair notice available to registered students through Canvas.

Week	Date	Topics (Readings), Exams, Project Milestones, Meetings, Holidays
0	8/19-20	San Jose fires. Campus closed.
1	8/24-25	Introduction to course (Zoom meeting). Database Basics (1.1); Database Systems (1.2)
1	8/26-27	Query languages (1.3); Database design and programming (1.4); MySQL (1.5)
2	8/31	The relational model (2.1); Tables, columns, and rows (2.2); Null values (2.3)
2	9/2-3	Primary and foreign keys (2.4); Referential integrity (2.5)
3	9/7-8	Labor Day
3	9/9-10	Inner and outer joins (2.6); View tables (2.7);
4	9/14-15	Normal form (2.8); Project analysis/description due
4	9/16-17	Database design: Entities, relationships, and attributes (3.1); Discovery (3.2)
5	9/21-22	Database design: Cardinality (3.3); Independent and dependent entities (3.4)
5	9/23-24	Database design: Supertype and subtype entities (3.5); Implementing entities (3.6)
6	9/28-29	Database design: Implementing relationships (3.7); Implementing attributes (3.8)
6	9/30	Database design: Normalization (3.9); Projects conceptual model due
7	10/5-6	Exam Ch 1-3 (online: Canvas with LockdownBrowser and ResponsusMonitor)
7	10/7-8	SQL: Introduction to SQL (4.1); Creating and dropping databases (4.2);
8	10/12-13	SQL: Creating and dropping tables (4.3); Primary and foreign key constraints (4.4);
8	10/14-15	SQL: Column constraints (4.5); Inserting, updating, and deleting rows (4.6);
9	10/19-20	SQL: Selecting rows (4.7-4.8);
9	10/21-22	SQL: Functions (4.9); Subqueries (4.10);
10	10/26-27	MySQL Workbench: Import/Export (10.1); Projects table model due
10	10/28-29	Programming databases: Programming languages (5.1); Embedded SQL (5.2)
11	11/2-3	Programming: Procedural SQL (5.3); Application programming interfaces (5.4)
11	11/4-5	Programming: Database programming with Python (5.5.); Database programming for the web (5.6)
12	11/9-10	MySQL Workbench: Stored procedures and functions (10.2)

Week	Date	Topics (Readings), **Exams**, **Project Milestones**, Meetings, **Holidays**
12	11/11-12	Veteran's Day
13	11/16-17	NoSQL: Big data (6.1); Key-value databases (6.2); Project table schema implemented in MySQL with sample data inputted, Java/web connectivity due
13	11/18-19	NoSQL: Wide column databases (6.3); Document databases (6.4)
14	11/23-24	NoSQL: Graph databases (6.5); MongoDB (6.6)
14	11/25-26	Thanksgiving
15	11/30	Project work
15	12/2-3	Project work, Projects Final Implementation (stored procedures, simple Java/web GUI) + final report due
16	12/7-8	Exam Ch. 4-6 (online: Canvas with LockdownBrowser and RespondusMonitor)
16	S2: 12/15 S3: 12/10 S7: 12/9	Final projects presentations (15-min per team) (Zoom meeting) S2: Tuesday, December 15, 09:45-12:00 S3: Thursday, December 10, 09:45-12:00 S7: Wednesday, December 9, 14:45-17:00