San José State University
College of Science / Department of Computer Science
CS157A, Introduction to Database Management Systems,
Section 2 & 3, Fall 2019

Course and Contact Information

Instructor:	Dr. Katarzyna Tarnowska
Office Location:	MacQuarrie Hall (MH) 215
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Office Hours:	Monday & Wednesday, 3PM – 4PM
Class Days/Time:	Monday & Wednesday, S2: 12PM – 1:15PM, S3: 1:30PM – 2:45PM
Classroom:	MacQuarrie Hall (MH) 225
Prerequisites:	CS 146 (Data Structures and Algorithms) with a grade of C- or better

Course Format

Faculty Web Page and MYSJSU Messaging

Course materials such as syllabus, handouts, notes, assignment instructions, etc. will be published on Canvas Learning Management System course login website at https://sjsu.instructure.com/courses/1321715 (S2)/ https://sjsu.instructure.com/courses/1321718 (S3). You are responsible for regularly checking with the Canvas system to learn of any updates.

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 and relation algebra.
- To teach students about design theory (such as normalization, etc.) and algorithms that help determine if a given database's tables are organized in a reasonable way.
- To teach students about real-world database system usage, architectures and components. Some example systems that might be considered are: Oracle, DB2, MySQL, Postgres, Access, and SQL Server.
- 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. Write relational algebra queries and predict given a database instance what such a query will return.
2. Design a database by creating Entity/Relationship Diagram for a given problem.
3. Being able to identify functional dependencies, check and perform a decomposition in a given normal form.
4. Use Data Definition Language to define database schemas.
5. 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.
6. Implement simple database application and write transactions using JDBC.

Required Texts/Readings

Textbook

Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer D. Widom, "Database Systems: The Complete Book", Prentice-Hall, 2nd Edition, 2009, ISBN-13: 978-0-13-606701-6
Or
Jeffrey D. Ullman, Jennifer D. Widom, "A First Course in Database Systems", Pearson, 3rd Edition, 2008

Other Readings

- Database Management Systems (3rd edition) by Ramakrishnan and Gehrke
- Fundamentals of Database Systems (6th edition) by Elmasri and Navathe
- An Introduction to Database Systems (8th edition) by Date

Other technology requirements / equipment / material

Oracle and MySQL
- Oracle Database at http://www.oracle.com/technetwork/community/students/database/index.html
Microsoft SQL Server
- Microsoft's program is currently available to all SJSU students allowing no-cost access to SQL Server
IBM DB2
- IBM Data Studio at https://www.ibm.com/developerworks/downloads/im/data/index.html
- DB2 Express C at https://www.ibm.com/us-en/marketplace/ibm-db2-direct-and-developer-editions
Diagram Design and Application Design
- Oracle Data Modeler
- Microsoft Visio
- Lucidchart
- SAP Power Designer – 30-day free trial version at https://www.sap.com/products/powerdesigner-data-modeling-tools.html

Course Requirements and Assignments

- Readings (designated Chapters/Sections) with understanding about the new topic are required. Lectures will summarize and clarify the reading content.
- University Policy S16-9: "Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week) for instruction, preparation/studying, or course related activities, including but not limited to

internships, labs, and clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus."

- There will be three lab sessions in class: Lab 1 - Data Modeling; Lab 2 – SQL Part 1; Lab 3 – SQL Part 2. Lab sessions require a student to bring their own laptop computer. Lab 1 requires installed software for the design. Lab 2 and Lab 3 will be completed using accounts on the Oracle APEX system assigned to each student individually beforehand. Lab instructions will be distributed in paper at the lab session. The lab reports are due on Canvas by the deadline assigned by the instructor.
- The project will be performed individually or in pairs on a topic assigned by the instructor. You will implement a simple database application. The project can be completed using the technology of your choice, but the scripts must be executable in the chosen environment. Detailed requirements will be presented in class and on Canvas.
- Midterm and Final exams will consist of test questions checking theory, but also practical problems to analyze and solve. Pop-up quizzes (in class, on Canvas) will check material from the previous module. You need to have access to Canvas (through phone or laptop) at each meeting.
- You can make up one lab (10 points) by attending Oracle Open World (September 16-19 2018) in San Francisco and writing a report (2-3 pages) about your discoveries from the event regarding Oracle Database. The report is due no later than a week after attending. The event is free for students: https://www.oracle.com/openworld/register.html -> Students Registrations. You will be excused from attending the class on these days once you provide proof of attendance.

Final Examination or Evaluation

The midterm and final examinations will be closed book and no notes. There will be no laptops or any personal digital devices allowed. There will be no make-up exams. If a student misses an exam without a legitimate excuse, a grade of zero will be recorded. If a student missed an exam with a legitimate excuse, then appropriate documentation must be provided beforehand.

Grading Information

Determination of Grades

The components of the final grade will be distributed as follows:
- Midterm   25%   25 points
- Final   30%   30 points
- Labs   30%   30 points
- Project   10%   10 points
- Pop-up quizzes 5%   5 points

Letter grades will be assigned according to the following policy:
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100– 99-----A+
93 – 98 ---- A
89 -- 92 ---- A-
87 -- 88---- 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-
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0 -- 59 ---- F
- No late work or make-ups accepted.

Classroom Protocol

- Attendance: students should attend all meetings of their classes (University Attendance and Participation Policy F15-12).
- Arrival: students are expected to arrive on time.
- Behavior: eating, personal loud discussions, cell phones are not allowed in the classroom.
- Policy on Academic Integrity
  "Your commitment, as a student, to learning is evidenced by your enrollment at San Jose State University. The University Academic Integrity Policy F15-7 requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. Visit the Student Conduct and Ethical Development website for more information."
  - Any cheating on an exam will result in a grade of F in the class.
  - For the project, no collaboration outside your own group is allowed.
  - If duplicate programs/assignments are found, both the provider and the copier will receive 0 points on the assignment/project. A second offense results in a grade of F in the class.
  - Any incident of academic dishonesty may be reported to the University for disciplinary action.

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 2019, Course Schedule

Course Schedule

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

Week	Date	Topics, Readings, Assignments, Deadlines
1	8/21	Introduction to course
2	8/26	Introduction to DBMS, Ch. 1
2	8/28	Relational Model, Ch. 2
3	9/2	Labor Day - Campus Closed
3	9/4	Data Modeling, Ch. 4.1-4.5
4	9/9	Modeling complex relationships, mapping to relational model, Ch. 4.5-4.10
4	9/11	Modeling complex relationships, mapping to relational model, Ch. 4.5-4.10
5	9/16	Modeling complex relationships, mapping to relational model, Ch. 4.5-4.10
5	9/18	Lab 1 – Data Modeling
6	9/23	The relational algebra, Ch. 5
6	9/25	The relational algebra, Ch. 5
7	9/30	The relational algebra, Ch. 5
7	10/2	SQL, Triggers, Ch. 6, 7
8	10/7	SQL, Triggers, Ch. 6, 7
8	10/9	Lab 2 - SQL
9	10/14	Midterm
9	10/16	Introduction to a real-world DBMS
10	10/21	Introduction to a real-world DBMS
10	10/23	Lab 3 – SQL, part 2
11	10/28	JDBC, Ch. 9
11	10/30	JDBC, Ch. 9
12	11/4	Functional Dependencies, Ch. 3.1-3.3
12	11/6	Functional Dependencies, Ch. 3.1-3.3
13	11/11	Veteran's Day (Observed) - Campus Closed
13	11/13	Functional Dependencies, Ch. 3.1-3.3

Week	Date	Topics, Readings, Assignments, Deadlines
14	11/18	Normal Forms and algorithms, Ch. 3.4-3.7
14	11/20	Normal Forms and algorithms, Ch. 3.4-3.7
15	11/25	Normal Forms and algorithms, Ch. 3.4-3.7
15	11/27	Non-Instructional Day
16	12/2	Data-mining and data warehousing, Ch. 10
16	12/4	Data-mining and data warehousing, Ch. 10
17	12/9	Data-mining and data warehousing, Ch. 10
17	S2: 12/16 S3: 12/13	MH 225, 9:45AM-12 MH 225, 12:15PM-14:30