

San José State University
Computer Science Department
CS157A: Introduction to Database Management Systems
Sections 5 and 6, Fall 2015

Course and Contact Information

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|-------------------------|---|
| Instructor: | Ron Gutman |
| Office Location: | DH 282 |
| Email: | ronald.gutman@sjsu.edu |
| Office Hours: | Tuesday 12noon-1:15pm, Thursday 12noon-1:15pm and by appointment or email |
| Class Days/Time: | Section 5: Tuesday, Thursday 10:30am-11:45am Section 6: Tuesday, Thursday 1:30pm-2:45pm |
| Classroom: | Section 5: MH 225 Section 6: DH 450 |
| Final Exam: | Section 5: Wed, December 16, 2015, 9:45am – 12pm Section 6: Thursday, December 10, 2015, 12:15pm – 2:30pm |
| Prerequisites: | CS 146 (with a grade of "C-" or better) or instructor consent. |

Faculty Web Page

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on the Canvas learning management system course website. You are responsible for regularly checking with the messaging system through Canvas to learn of any updates..

Course Description

Current, classical database systems. Entity-relationship and enhanced entity models. Relational model, algebra. 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.

Learning Outcomes and Course Goals

Course Objectives:

1. To introduce students to the purpose of Database systems and databases, as well as common users of such systems.
2. To teach students about the relational model and relation algebra.
3. 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.
4. 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.

5. To teach students about SQL, the standard language for interacting with a database.
6. To teach students how to interact with a database system from a programming language such as Java, C, PHP, Perl, etc.
7. To make students aware of the variety of non-relational database format and systems in current use and the reasons.

Student Learning Outcomes:

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

1. Write relational algebra queries and predict given a database instance what such a query will return.
2. Write SQL commands to create databases, create tables, insert/update/delete/retrieve rows in a common database management system. Use a database management system's bulk loader to populate a database.
3. Write simple transactions using JDBC and ODBC, or similar programmer interfaces in other languages.
4. Know the algorithms for testing if a decomposition is in BCNF normal form and understand the algorithms which given a set of functional dependencies can do table decomposition into BCNF

BS in Computer Science Program Outcomes Supported:

These are the BSCS Program Outcomes supported by this course:

1. An ability to apply knowledge of computing and mathematics to solve problems
2. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
3. An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
4. An ability to use current techniques, skills, and tools necessary for computing practice

Required Texts/Readings

Textbook

- Database Systems: The Complete Book (2nd edition) by Garcia-Molina, Ullman, and Widom
- ISBN-13: 978-0-13-187325-4
- ISBN-10: 0-13-187325-3
- Available on [Amazon](http://www.amazon.com/Database-Systems-Complete-Book-Edition/dp/0131873253/ref=dp_ob_image_bk) at http://www.amazon.com/Database-Systems-Complete-Book-Edition/dp/0131873253/ref=dp_ob_image_bk
- [Textbook web site](http://infolab.stanford.edu/~ullman/dscb.html) at <http://infolab.stanford.edu/~ullman/dscb.html>

Other Readings

- Database System Concepts by Silberschatz and Korth
- An Introduction to Database Systems by C. J. Date
- Modern Database Management by Hoffer, Prescott, and McFadden
- MySQL by Paul DuBois

Software

This software needed for the project (although substitutions can be approved by the instructor):

- [MySQL server](http://dev.mysql.com/downloads/mysql/) available at <http://dev.mysql.com/downloads/mysql/>
- [MySQL Connectors - JDBC Driver for MySQL \(Connector/J\)](http://www.mysql.com/products/connector/) available at <http://www.mysql.com/products/connector/>
- [MySQL WorkBench](http://www.mysql.com/products/workbench/) available at <http://www.mysql.com/products/workbench/>

This software might be used:

- XML Editing and Validation Tool: [XML Copy Editor](http://xml-copy-editor.sourceforge.net/) available at <http://xml-copy-editor.sourceforge.net/>
- XSLT and XQuery Processor: [SAXON](http://saxon.sourceforge.net/) available at <http://saxon.sourceforge.net/>

Other equipment / material requirements

You will also need your own computer to do online exercises.

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](http://www.sjsu.edu/senate/docs/S12-3.pdf) at <http://www.sjsu.edu/senate/docs/S12-3.pdf>.

Quizzes/Interactive Exercises

- On-line quizzes and interactive exercises at <https://lagunita.stanford.edu/>. These exercises will reinforce knowledge of relational algebra, SQL, functional dependencies, and normal forms (student learning outcomes 1, 2, and 4).

Project

- A team project will be given in the middle of October. Form a group of three for the project.
- The project involves database design and modeling, creation, data population, query, and database application programming using JDBC.
- The project will exercise knowledge of SQL and JDBC or similar programming interface (student learning outcomes 2 and 3) and will exercise database design skills (student learning outcome 4).

Exams

- A midterm exam will test understanding of terminology related to relational databases, knowledge of SQL, ability to use SQL to solve a problem in retrieving information from a relational database or modify the relational database, and relational algebra (student learning outcomes 1, 2, and 4).
- The final exam will retest the knowledge and skills tested in the midterm and also test knowledge of more advanced features of SQL such as transactions, indexing, constraints, and triggers, and test familiarity with the purposes of non-relational databases (student learning outcomes 1, 2, and 4).

Notes

- On-line submissions can be made multiple times, but only the last submission will be used.
- Deadline is 11:30pm on the given due date unless otherwise noted.
- E-mail submissions will not be accepted for grading.

NOTE that [University policy F69-24](http://www.sjsu.edu/senate/docs/F69-24.pdf) at <http://www.sjsu.edu/senate/docs/F69-24.pdf> states that “Students should attend all meetings of their classes, not only because they are responsible for material discussed therein, but because active participation is frequently essential to insure maximum benefit for all members of the class. Attendance per se shall not be used as a criterion for grading.”

Grading Policy

You will receive the final grade based on the weighted average score on your performance. The grading weights are as follows.

- Online Interactive Exercises: 20%
- Midterm: 25%
- Final Exam: 30%
- Project: 25%

25% of students will receive A, 25% B, 25% C. F will be assigned to students that cheat or fail to make an effort on a significant proportion of the class work and participation. This policy could change with notice to my students. A + and – will be assigned to the upper 25% approximately and lower 25% approximately of students with the same letter grade.

For those who couldn't take the midterm or worked hard but had a bad day on the exam day ending up with a low score, I offer the following opportunity to possibly replace your midterm score with the final score. If your final exam (percentage) grade is higher than your midterm (percentage) grade, then I will replace the midterm grade with your final exam grade. For example, if you have a 60% on your midterm and you receive an 80% on the final exam, I will replace the 60% by 80% in the computation of your course grade.

Note that “All students have the right, within a reasonable time, to know their academic scores, to review their grade-dependent work, and to be provided with explanations for the determination of their course grades.” See [University Policy F13-1](http://www.sjsu.edu/senate/docs/F13-1.pdf) at <http://www.sjsu.edu/senate/docs/F13-1.pdf> for more details.

Classroom Protocol

- Put cell phones in airplane mode during class times.
- Wait for the end of class or office hours before approaching me about matters that do not concern the class as a whole (such as how I graded your midterm).
- Those sharing information during exams will have points deducted from their exams.

University Policies

General Expectations, Rights and Responsibilities of the Student

As members of the academic community, students accept both the rights and responsibilities incumbent upon all members of the institution. Students are encouraged to familiarize themselves with SJSU's policies and practices pertaining to the procedures to follow if and when questions or concerns about a class arises. See [University Policy S90-5](http://www.sjsu.edu/senate/docs/S90-5.pdf) at <http://www.sjsu.edu/senate/docs/S90-5.pdf>. More detailed information on a variety of related topics is available in the [SJSU catalog](http://info.sjsu.edu/web-dbgen/splash/catalog.html), at <http://info.sjsu.edu/web-dbgen/splash/catalog.html>. In

general, it is recommended that students begin by seeking clarification or discussing concerns with their instructor. If such conversation is not possible, or if it does not serve to address the issue, it is recommended that the student contact the Department Chair as a next step.

Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester's [Catalog Policies](http://info.sjsu.edu/static/catalog/policies.html) section at <http://info.sjsu.edu/static/catalog/policies.html> . Add/drop deadlines can be found on the current academic year calendars document on the [Academic Calendars webpage](http://www.sjsu.edu/provost/services/academic_calendars/) at http://www.sjsu.edu/provost/services/academic_calendars/ . The [Late Drop Policy](http://www.sjsu.edu/aars/policies/latedrops/policy/) is available at <http://www.sjsu.edu/aars/policies/latedrops/policy/> . Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the [Advising Hub](http://www.sjsu.edu/advising/) at <http://www.sjsu.edu/advising/> .

Consent for Recording of Class and Public Sharing of Instructor Material

[University Policy S12-7](http://www.sjsu.edu/senate/docs/S12-7.pdf), <http://www.sjsu.edu/senate/docs/S12-7.pdf> , requires students to obtain instructor's permission to record the course and the following items to be included in the syllabus:

- “Common courtesy and professional behavior dictate that you notify someone when you are recording him/her. You must obtain the instructor's permission to make audio or video recordings in this class. Such permission allows the recordings to be used for your private, study purposes only. The recordings are the intellectual property of the instructor; you have not been given any rights to reproduce or distribute the material.”
 - It is suggested that the greensheet include the instructor's process for granting permission, whether in writing or orally and whether for the whole semester or on a class by class basis.
 - In classes where active participation of students or guests may be on the recording, permission of those students or guests should be obtained as well.
- “Course material developed by the instructor is the intellectual property of the instructor and cannot be shared publicly without his/her approval. You may not publicly share or upload instructor generated material for this course such as exam questions, lecture notes, or homework solutions without instructor consent.”

Academic integrity

Your commitment, as a student, to learning is evidenced by your enrollment at San Jose State University. The [University Academic Integrity Policy S07-2](http://www.sjsu.edu/senate/docs/S07-2.pdf) at <http://www.sjsu.edu/senate/docs/S07-2.pdf> 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. The [Student Conduct and Ethical Development website](http://www.sjsu.edu/studentconduct/) is available at <http://www.sjsu.edu/studentconduct/> .

Campus Policy in Compliance with the American Disabilities Act

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. [Presidential Directive 97-03](http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf) at http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf requires that students with disabilities requesting accommodations must register with the [Accessible Education Center](http://www.sjsu.edu/aec) (AEC) at <http://www.sjsu.edu/aec> to establish a record of their disability.

CS157A: Introduction to Database Management Systems, Fall 2015, Course Schedule

| Weeks | Topics | Chapters |
|--------|---|----------|
| 1 | Introduction to Database Systems Concepts | 1 |
| 2 | Relational Model and Relational Databases | 2 |
| 3 | Relational Algebra | 2, 5 |
| 3 to 8 | SQL | 6 |
| 7 | JDBC | N/A |
| 9 | Relational Design Theory (Normal Forms) | 3 |
| 10 | Midterm | |
| 11 | Transactions, ACID properties | 6 |
| 12 | Indexes | 8 |
| 13 | Constraints and Triggers | 7 |
| 13 | Security and User Authorization | 10 |
| 14 | High-Level Database Models (ER, UML, etc) | 4 |
| 15 | OLAP (On-Line Analytical Processing) and other data models, formats, and database systems (NoSQL, big data systems, information retrieval systems, column-oriented, exchange formats) | 10 |
| 15,16 | Project presentations (December 3 and 8) | 12 |