San José State University
College of Science / Department of Computer Science
CS157B, Database Management Systems II, Section 1, Spring 2019

Course and Contact Information

Instructor:	Dr. Katarzyna Tarnowska
Office Location:	MacQuarrie Hall (MH) 215
Telephone:	(408) 9245076
Email:	Katarzyna.tarnowska@sjsu.edu
Office Hours:	Monday 3PM – 4PM & Wednesday 10:30-11:30AM
Class Days/Time:	Monday & Wednesday, 12PM – 1:30PM
Classroom:	Duncan Hall 450
Prerequisites:	CS 157A (with a grade of "C-" or better); Computer Science, Applied and Computational Math, or Software Engineering Majors only; or instructor consent.

Course Description

Survey course. Object-oriented data model, definition language, query language. Object relational database systems. Database trends like active, temporal, multimedia, deductive databases. Web database topics, namely, architectures, introduction to interface languages. Team projects.

Course Goal

To deepen students' knowledge about database application programming. To give students an understanding of database implementation, concurrency, recovery, as well as current trends in databases.

Course Objectives

1. To understand how a DBMS systems is physically implemented
2. To know various techniques for making indexes such as B-trees and hash tables as well as the difference between dense and non dense indexes.
3. To know about how queries are parsed and optimized.
4. To learn about transaction processing and concurrency control
5. To learn about recovery algorithms
6. To learn about data mining algorithms
7. To learn about technologies related to OLAP.

Course Learning Outcomes (CLO)

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

1. Know common database record formats
2. Given an index structure based on a B-tree or extensible hashing be able to figure out the effect of performing an insert or a delete
3. Create a simple query transaction in a modern DBMS system.
4. Tune queries and know how to perform query performance evaluations

5. Know database recovery techniques
6. Be able to use isolation levels for concurrency control in a popular DBMS
7. Be able to create or deploy a query mediator for a system with at least two data sources.
8. Be able to determine how the A Priori algorithm would operate on a toy dataset
9. Design and deploy analytical databases for OLAP

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

Other readings

- Raghu Ramakrishnan, Johannes Gehrke. Database Management Systems. McGraw-Hill. 3rd Ed. ISBN: 0072465638. 2002.
- Ramez Elmasri and Shamkant B. Navathe. Fundamentals of Database Systems, 5th Ed. Addison Wesley. ISBN-13: 978-0321369574.
- 2006.
- Margaret Dunham. Data Mining Introductory and Advanced Topics. Prentice Hall. ISBN-13: 978013088892. 2003.
- Oracle Database Administrator's Guide

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 Software for Students Owned Machines at http://its.sjsu.edu/services/software/microsoft-students/index.html
- Microsoft's Dreamspark program is currently available to all SJSU students allowing no-cost access to SQL Server – download instructions at https://sjsu.onthehub.com/WebStore/Welcome.aspx

Course Requirements and Assignments

- 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."
- Team projects – design and deploy analytical databases for OLAP
- Individual presentation on the chosen survey topic (30 minute presentation)
- Final exam with multiple choice questions and open-ended questions.

Final Examination or Evaluation

The final examination 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 an appropriate documentation must be provided beforehand.

Grading Information

Determination of Grades

The components of the final grade will be distributed as follows:

- Final exam 60% 60 points
- Project 30% 30 points
- Presentation 10% 10 points

Letter grades will be assigned according to the following policy:

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-
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. Late students will not be admitted to the classroom.
- Behavior: eating, personal loud discussions, cell phones, laptops are not allowed in the classroom. Skateboards are not allowed in the classroom or outside 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."

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/.

CS157B / Database Management Systems II, Spring 2019, Course Schedule

Tentative Course Schedule

The schedule is subject to change.

Week	Date	Topics, Readings, Assignments, Deadlines
1	1/28	Introduction to course
1	1/30	Introduction to Data Warehouses and Data Mining
2	2/4	File and System Structure, Chapter 13
2	2/6	File and System Structure, Chapter 13
3	2/11	File and System Structure, Chapter 13
3	2/13	File and System Structure, Chapter 13
4	2/18	File and System Structure, Chapter 13, Presentation: “In-database Machine Learning”
4	2/20	File and System Structure, Chapter 13, Presentation: “In-Memory Databases”
5	2/25	Indexing and Hashing, Chapter 14
5	2/27	Indexing and Hashing, Chapter 14
6	3/4	Indexing and Hashing, Chapter 14
6	3/6	Indexing and Hashing, Chapter 14
7	3/11	Query Processing, Chapter 15 & 16
7	3/13	Query Processing, Chapter 15 & 16
8	3/18	Query Processing, Chapter 15 & 16
8	3/20	Crash recovery, Chapter 17
9	3/25	Crash recovery, Chapter 17
9	3/27	Crash recovery, Chapter 17, Presentation 1: “Distributed Databases”
10	4/1	Cesar Chavez Day – Campus Closed
10	4/3	Spring Recess – Campus Closed
11	4/8	Concurrency Control, Chapter 18
11	4/10	Concurrency Control, Chapter 18
12	4/15	Concurrency Control, Chapter 18
12	4/17	Transaction Processing, Chapter 19
13	4/22	Transaction Processing, Chapter 19

Week	Date	Topics, Readings, Assignments, Deadlines
13	4/24	Transaction Processing, Chapter 19
14	4/29	Transaction Processing, Chapter 19
14	5/1	Big Data and NoSQL
15	5/6	Big Data and NoSQL
15	5/8	Big Data and NoSQL
16	5/13	Review
Final Exam	5/17	DH 450, 9:45AM – 12PM