

College of San Mateo
Official Course Outline

1. **COURSE ID:** CIS 132 **TITLE:** Introduction to Databases
Units: 3.0 units **Hours/Semester:** 48.0-54.0 Lecture hours; and 96.0-108.0 Homework hours
Method of Grading: Grade Option (Letter Grade or Pass/No Pass)

2. **COURSE DESIGNATION:**

Degree Credit

Transfer credit: CSU; UC

3. **COURSE DESCRIPTIONS:**

Catalog Description:

This course covers database design and the use of database management systems. It includes an introduction to the relational model, relational algebra, and SQL. It also covers XML data including DTDs and XML Schema for validation, and an introduction to the query and transformation languages XPath, XQuery, and XSLT. The course includes relational design principles based on dependencies and normal forms. Additional database topics introduced are indexes, views, transactions, authorization, integrity constraints, triggers, on-line analytical processing (OLAP), and emerging NoSQL (Not only SQL) databases for cloud and desktop computing.

4. **STUDENT LEARNING OUTCOME(S) (SLO'S):**

Upon successful completion of this course, a student will meet the following outcomes:

1. Create and assure the quality of a suitable data model for a given application.
2. Use normalization to transform a relational schema into a set of normalized relations (3NF).
3. Use SQL for database creation, manipulation and control.
4. Employ data storage and indexing options and perform query optimization.
5. Perform basic database administration tasks.
6. Employ XML technologies to query, manipulate and transform data.
7. Develop NoSQL desktop and cloud database solutions.

5. **SPECIFIC INSTRUCTIONAL OBJECTIVES:**

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

1. Create and assure the quality of a suitable data model for a given application.
2. Use normalization to transform a relational schema into a set of normalized relations (3NF).
3. Use SQL for database creation, manipulation and control.
4. Employ data storage and indexing options and perform query optimization.
5. Perform basic database administration tasks.
6. Employ XML technologies to query, manipulate and transform data.
7. Develop NoSQL desktop and cloud database solutions.

6. **COURSE CONTENT:**

Lecture Content:

Topical Outline

1. Introduction
 - A. History of Databases
 - B. Database Concepts
 - C. Relational Model and Theory
 - D. Introduction of SQL
2. SQL Basics
 - A. SQL Syntax
 - B. Database Creation
 - C. Table Management
 - D. MySQL Data Types
 - E. Indexing
 - F. SQL Operators
 - G. Queries
 - H. Transactions
 - I. Metadata

3. Database Design Fundamentals
 - A. Database Concepts
 - B. Entities, Attributes, and Relationships
 - C. Design Methods
 - D. Design Requirements
 - E. Primary and Secondary Keys
 - F. Normalization
4. Database Administration
 - A. Defining and Using Views
 - B. Security
 - C. Indexes
 - D. Integrity Constraints
 - E. Triggers
 - F. Introduction to OLAP
5. Databases and XML
 - A. DTDs
 - B. XML Schema
 - C. XPath
 - D. XQuery
 - E. XSLT
6. Introduction to NoSQL Databases
 - A. Overview of NoSQL Databases
 - B. NoSQL vs Relational Databases
 - C. NoSQL Database Queries
 - D. Cloud Computing with NoSQL Databases

7. REPRESENTATIVE METHODS OF INSTRUCTION:

Typical methods of instruction may include:

- A. Lecture
- B. Directed Study
- C. Activity
- D. Discussion
- E. Other (Specify): Lecture will be used to introduce new topics. Teacher will model problem-solving techniques. Class will solve a problem together, each person contributing a potential "next step". Students will participate in short in-class projects (in teacher-organized small groups) to ensure that students experiment with the new topics in realistic problem settings. Teacher will invite questions AND ANSWERS from students, generating discussion about areas of misunderstanding. Teacher will create and manage an internet conference for discussion of course topics. Students will work in small groups to collaborate on assignments.

8. REPRESENTATIVE ASSIGNMENTS

Representative assignments in this course may include, but are not limited to the following:

Writing Assignments:

Students will complete and submit exercises and assignments on a weekly or biweekly basis.

Typical assignments would include:

- Designing a relational database employing the normalization process
- Querying a relational database
- Updating and deleting database records
- Writing and using stored procedures, functions and prepared statements
- Employing XML and DTDs to retrieve data and describe table structure
- Using XPath, XQuery and XSLT to extract and manipulate table and web-based data
- Non-relational, distributed database design and creation using NoSQL web-based databases

Reading Assignments:

Students will read assigned chapters in the textbook and supplemental handouts.

Other Outside Assignments:

Students will be required to watch videos and participate in weekly webinars.

9. REPRESENTATIVE METHODS OF EVALUATION

Representative methods of evaluation may include:

- A. Class Participation
- B. Class Work
- C. Exams/Tests
- D. Homework
- E. Projects
- F. Quizzes
- G. Written examination
- H. Bi-weekly quizzes (short answer-from textbook material) to provide feedback to students and teacher. Assessment of student contributions during class discussion and project time. Individual database design assignments. Midterm and Final exams (short answer from textbook material), general problem solving (similar to in-class work), short database design segments (similar to assignments). Assessment of group participation on course projects, including peer-assessment of participation and contribution to the group effort.

10. **REPRESENTATIVE TEXT(S):**

Possible textbooks include:

- A. Ullman, Jeff and Widom, Jennifer. *A First Course in Database Systems*, 3rd ed. ed. Prentice Hall, 2007
- B. Silberschatz, Korth and Sudarshan. *Database System Concepts*, 7th ed. ed. McGraw-Hill, 2019
- C. Braharu. *Database For Beginners: Relational Database Concepts and Model*, 1st ed. Independently published, 2018
- D. DeBarros. *Practical SQL: A Beginner's Guide to Storytelling with Data*, 1st ed. No Starch Press, 2018
- E. Nield. *Getting Started with SQL: A Hands-On Approach for Beginners*, 1st ed. O'Reilly, 2016

Origination Date: November 2020

Curriculum Committee Approval Date: January 2021

Effective Term: Fall 2021

Course Originator: Mounjed Moussalem