

Classroom: CS 102B

Meeting time: Mondays, Wednesdays 4:00 p.m. - 5:15 p.m.

Instructor: Shawn X. Wang, Ph.D., Professor

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Office: CS 532

Office Hours: by email or Zoom meeting Tue, Wed, Thu 10:30 - 11:30 a.m.

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Textbooks

Ramez Elmasri & Shamkant B. Navathe, Fundamentals of Database Systems, Seventh Edition, Addison-Wesley Pub.

Prerequisites

Computer Science CPSC 131.

Catalog Descriptions

Fundamental theories and design of database systems, the Structured Query Language (SQL), basic concepts and techniques of data organization in secondary storage. Topics include introduction to database systems, ER model, relational model, index structures and hashing techniques.

Objectives

This course focuses on database system design and development using relational database model. The students will acquire fundamental knowledge about relational database systems that are used in today's public and private sectors; study database design and development principles and procedures; develop a web database application using open-source software PHP and MySQL.

Goals

- To provide the theory needed in understanding database management, database design, and their applications.
- To introduce the concepts, notations and techniques of relational database, Structural Query Language (SQL), conceptual modeling, integrity and normalization, physical storage and optimization, query and transaction processing.

- To introduce the concepts, notations, and techniques of storing and retrieving information in the secondary storage.
- To teach the basic skills of manipulating record files, including searching, sorting, indexing, and hashing.
- To teach database design from the reality. You will learn how to design a database, starting from the real world, to the conceptual model, to the relational model, and then finally to the underlying tables. You will also learn how to fine tune your design to a better one.
- To assure you learn something and get the grade you deserve for the work you put in.

Policies

- **Class attendance is required.** Your participation in the discussion is strongly encouraged. The best time and place to ask questions is in the class. Getting more involved is the only way to learn better.
- **Homework assignments** and due dates will be announced in the classes and also posted to the class Canvas website. Late homework will not receive any credits. It is your responsibility to hand in homework on time even when it is only partly completed. You are strongly encouraged to complete the homework independently. However the primary goal of homework is for you to acquire the knowledge. Thus discussion with your classmates is allowed. It is your responsibility to make sure you understand everything after the discussion and **hand in your own copy of solutions**. There will be about 5 homework assignments. A link for submission will be created in Canvas for each homework assignment.
- **Exams are in class, open book and class notes.** Calculators are allowed during the exams. Cheating will not be tolerated. Penalty ranges from getting zero for the exam to getting an 'F' for the course. There will be two midterms and a final exam.
- **The term project is to be completed in groups.** Each group has three students. One group should hand in only one copy of the project and clearly indicate who are the group members on the front page. The complete project should be uploaded to one of the accounts assigned to you on our Department server. Only projects that are tested correctly will receive full credits.

The final grade will be based on the following breakdown:

Attendance	5%
Assignments	15%
Project	10%
Midterm 1	20%
Midterm 2	20%
Final Exam	30%

The letter grade will be assigned as follows:

96% - 100%	A+
90% - 95%	A
87% - 89%	A-
84% - 86%	B+
80% - 83%	B
77% - 79%	B-
74% - 76%	C+
70% - 73%	C
67% - 69%	C-
64% - 66%	D+
60% - 63%	D
57% - 59%	D-
56% or less	F

The instructor reserves the right to adjust the grades up according to the performance of the whole class. However, there will not be any exceptions for any individual students. Please check the class Canvas site for class announcements, homework assignments, and your current status in the class.

Tentative Schedule

Weeks	Chapters	Topics
1 - 3	1, 2, 3	What is a database management system? A brief history of database management system. Design a database using the Entity-Relationship model.
4	5	The Relational Data Model
5	9	From the ER diagram to Relations
Mar 1	Midterm 1	In class, Open book and class notes; covers ER Model and Relational Model
7, 8	8, 6	The Relational Algebra and The Structural Query Language (SQL)
9	7	More SQL, DDL
Apr 3	Midterm 2	open book and class notes; Covers Relational Algebra and SQL
11		Introduction to MySQL and PHP
12		Secondary storage and system software. Fundamental file structure concepts - how is information organized in files? How to identify the boundaries of records and fields? e.g. record structures and field structures.
13		Organizing files for performance - dynamic index structure - binary search trees.
14		Improve performance by balancing the index structures. B+ trees and prefix B+ trees.
15		Hashing techniques.
May 17	Final Exam	(5:00 p.m. - 6:50 p.m.) - open book and class notes - covers the materials after the midterms.