George Mason University

Department of Computer Science

CS 450: Database Concepts

Summer 2016

Prof. Ami Motro

Description

This upper-level undergraduate course is an introductory course in the area of databases, with a focus on *database models and languages*. Topics to be covered include: database design with the Entity-Relationship model, the relational data model and its algebra, SQL and database programming, and the theory of relational database design; additional topics will be covered as time permits.

Course Outcomes

1. Knowledge of fundamental concepts of file and database management.
2. Knowledge of database design principles, and ability to model real-world environments using the ER model.
3. Knowledge of the formal principles of the relational database model and its query languages, and ability to design relational databases and express queries in the relational algebra and calculus.
4. Knowledge of the Structured Query Language (SQL) and database programming principles, and ability to author SQL queries and implement Java database applications using the Oracle database system.
5. Knowledge of the basic principles of the mathematical theory of database design, and ability to design databases that adhere to Boyce-Codd Normal Form.
6. Experience in the complete database creative process: from database design, to database constuction, to database programming.

Time and Place

Monday, Wednesday, Friday 1:20-4:20, AB (Art & Design) 2026

Instructor

Dr. Ami Motro
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Office hours: Monday and Wednesday, 4:30-5:30 pm

Teaching Assistant

Nasrin Akhter
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Prerequisites

Grade of C or better in CS 310 (Data Structures) and CS 330 (Formal Methods and Models).
Specifically, good background in

1. Discrete mathematics (e.g., set theory and mathematical logic)
2. Programming (good knowledge of Java) ✓
3. Data structures and algorithms
4. Computer architecture and operating systems

Prerequisites are strictly enforced!

Requirements

Three exams and seven homework assignments and projects, most requiring computer work.
The final grade will be based on exams (75%) and homework assignments (25%).

Textbooks

Comprehensive instructor notes ("slides") will be made available. These two books are recommended
for further reading:

1. *Database Systems - An Application-Oriented Approach, Introductory Version, 2nd Edition*
   Kifer, Bernstein, and Lewis
   Addison-Wesley/Pearson, 2004
   ISBN-10: 0321228383
   ISBN-13: 9780321268457
2. *Oracle 10g Programming: A Primer*
   Sunderraman
   Addison-Wesley, 2008
   ISBN-10: 0321463048
   ISBN-13: 978-0321463043

CS-450: Summer 2016 Course Schedule

Typed + HW - PDF file

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The schedule of instruction will be *approximately* as follows:
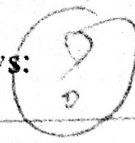
Class	Date		Topic
1	Mon 27 June		
2	Wed 29 June		
3	Fri 31 July		
-	Mon 4 July		--- no class ---
4	Wed 6 July		
5	Fri 8 July		
6	Mon 11 July		Exam 1
7	Wed 13 July		
8	Fri 15 July		
9	Mon 18 July		
10	Wed 20 July		Exam 2
11	Fri 22 July		
12	Mon 25 July		
13	Wed 27 July		
-	Fri 29 July		Exam 3

Notes:

1. **Reading**: Some of the material might not be covered in the lectures. Such material is intended for self-study, and knowledge of it will be assumed in homework and exams.

2. **Homework**: Due to the tight schedule, late homework will not be accepted. Graded homework will ususaly be returned in the lecture after submission.
   Homework subjects:
   1. Provide ER diagram for an environment described.
   2. Convert your ER diagram to relational database design.
   3. Downlod RAEVAL. Construct test tables for your design. Provide relational algebra queries for a set of queries and test them in RAEVAL.
   4. Oracle Project: Create Oracle database for your design. Load it with data.
   5. Oracle project: Provide SQL expression for a set of queries and test them in Oracle.
   6. Oracle project: Implement a Java application program that accesses your database.
   7. Solve various database design theory problems.

3. **Exams**: Each exam will cover approximately one third of the course and will last 60 minute (the lecture will continue following the exam). All exams are "closed book" type.

4. **Final grade**: The final grade will be approximately: homework 25%, and each exam 25%. Incompletes will be allowed only for personal emergencies, not for work overload (either at school or at work).