

Database Systems (CS 308)

Course Prerequisites: CS 2134 (Data Structures and Algorithms) and CS3224 (Operating Systems) or equivalent. Good programming skills in C/C++ and familiarity with elements of operating systems and with basic data structures such as search trees and hashing.

Time and Location: T 6:00–8:50 pm, room LC102.

Instructor: Prof. Torsten Suel, suel@poly.edu, phone 260–3354.

Office Hours: To be announced.

Course Webpage: <http://cis.poly.edu/cs308/>

Required text: A. Silberschatz, H. Korth, S. Sudarshan, *Database System Concepts*, 5th Edition, McGraw-Hill, 2005.

Grading Policy: Problem sets: 20%. Project: 20%. Midterm: 20%. Final exam: 40%.

General Information: The course aims to give a broad introduction to database systems, including the relational data model, query languages, index and file structures, query processing and optimization, concurrency and recovery, transaction management, and database design, plus optional material at the end if time permits. The workload of the course is expected to be above average, and class attendance is strongly recommended.

Programming Assignments: In addition to written homeworks, there will one or two programming assignments and a two-part project using Oracle:

1. Programming Assignments: How to use Oracle, create schemas, pose queries.
2. Project Part I: Designing a complex schema and queries for a given application scenario.
3. Project Part II: implement a two-tier or three-tier application, e.g., with C/C++ and embedded SQL or ODBC, or Java and JDBC, based on the schema and scenario from Part I.

Course Outline (tentative)

1. Introduction (Chapters 1 to 3) (*weeks 1-2*)
 - (a) Overview
 - (b) Relational Model
 - (c) Relational Algebra
 - (d) Basic SQL
 - (e) Getting Started with Oracle
2. Relational Queries (Chapters 4 and 5) (*weeks 3-4*)
 - (a) Advanced SQL
 - (b) Integrity Constraints
 - (c) Relational Calculus and Other Query Languages
3. Database Design (Chapters 6 to 8) (*weeks 4-5*)
 - (a) ER Model
 - (b) Relational Design and Normal Forms
 - (c) Application Development
4. Storage and Indexing (Chapters 11 and 12) (*weeks 6-7*)
 - (a) Disk Models
 - (b) External Sorting
 - (c) Disk and File Organization
 - (d) Indexing

Midterm (week 8)

5. Query Processing (Chapters 13 and 14) (*week 9*)
 - (a) Query Evaluation
 - (b) Query Optimization
6. Database System Architecture, Tuning, and Administration (parts of Chapters 20, 23, 26 to 29) (*week 10*)
 - (a) Database Architectures
 - (b) Administration and Tuning
 - (c) Oracle and other DB Architectures
7. Transaction Management (Chapters 15 to 17) (*weeks 11-12*)
 - (a) Transactions
 - (b) Concurrency Control
 - (c) Recovery
8. Databases and the Web (*week 13, if time permits*)
 - (a) Architecture of the Web
 - (b) Web Search Engines
 - (c) Text Indexing and Information Retrieval
 - (d) Semistructured Data and XML