

Syllabus: Principles of Database Systems

Course Description:

Topics include database concepts and architecture, data modeling, formal query languages such as relational algebra, commercial query language SQL, database access from application programs and a brief examination of advanced concepts including transactions, distributed databases, security and XML.

Text Book:

Hector Garcia Molina, Jeffrey Ullman, Jeniffer Widom: Database Systems : The Complete Book, Pearson, Prentice Hall.

Contents (subject to Change):

1. Introduction
2. Relational Database Modeling
 1. The relational model of data
 2. Basics of the relational model
 3. Defining a relational scheme in SQL
 4. An Algebraic Query Language
 5. Constraints on Relations
3. Design Theory for Relational Databases
 1. Functional Dependencies
 2. Rules about Functional Dependencies
 3. Design of Relational Database Schemas
 4. Decomposition
 5. Third Normal Form
 6. Multivalued Dependencies
 7. Algorithmic discovery of multivalued dependencies
4. High Level Database Models
 1. Entity / Relationship Models
 2. Design Principles
 3. Constraints in the E/R Model
 4. Weak Entity Sets
 5. From E/R diagrams to Relational Designs
 6. Converting Subclass Structures to Relations
 7. Unified Modeling Language
 8. From UML to Relations
 9. Object Definition Language
 10. From ODL design to Relational Designs
5. Algebraic and Logical Query Languages
6. SQL
7. Constraints and Triggers
8. Views and Indices
9. How to use SQL in a Server Environment
10. Security and user authorization
11. Object Relational Model
12. Semistructured Data
 1. Semistructured Data Model

2. XML
3. Document Type Definitions
4. XML Schema
5. Programming Languages for XML
13. Query Execution and Optimization
14. Transactions and Concurrency Control
15. Distributed Databases

Software Used

I expect you to install MySQL in the form of MariaDB on your system.
I expect you to install Python 3.8, which comes with sqlite.

Grading

Weekly Homework (in printed, word-processed form, no electronic submission without explicit exception)	30%
Midterm Examination	30%
Final Examination	40%

Instructor

Thomas Schwarz, SJ, CU 320B (but I am moving this semester to the second floor of CU)

Course Web Page

tschwarz/mscs.mu.edu/Classes