

## Syllabus of Record

**Program:** CET Siena

**Course Code / Title:** (SN/CS 4750) Database Systems

**Total Hours:** 45

**Recommended Credits:** 3

**Primary Discipline / Suggested Cross Listings:** Computer Science / Data Science

**Language of Instruction:** English

**Prerequisites / Requirements:** UVA students: CS2150 Program and Data Representation or (CS2120 Discrete Mathematics and Theory 1 and CS3140 Software Development Essentials). For students from another institution: prior coursework in Data Structures and Programming at same level required.

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### Description

This course provides a study of data models, data description languages, and query facilities including relational algebra and SQL, data normalization, physical data organization and indexing, security issues and object databases. The knowledge of the above topics is applied in the design and implementation of a semester-long group project in which students design and develop databases as part of an entire information system. This course is structured as a 35% lab component with 65% in-class teaching.

### Objectives

Through their participation in this course, students:

- Learn to design and develop databases as part of an entire information system.
- Learn the conceptual and logical model for relational databases.
- Master skills of designing, creating, and querying a relational database.

### Course Requirements

Active participation is essential in this course. Students are expected to attend each class and lab, as outlined in the CET Attendance Policy. Students are expected to read all assigned materials and complete homework before each class session. Reading assignments are generally 20-30 pages per class session. Graded assignments include:

- Homework: weekly lab assignment
- Final Exam: Part One consists of questions regarding the topics covered in the lectures, documented in textbooks, slides and the in-depth exercises. Part Two is carried out in the laboratory.
- Final Project: Design databases as part of an information system.

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### Grading

The final grade is determined as follows:

- Participation: 20%
- Homework/Lab: 20%
- Final Exam: 40%
- Final Project: 20%

### Readings

Atzeni, Paolo, Stefano Ceri, Stefano Paraboschi and Riccardo Torlone. *Database Systems: Concepts, Languages & Architectures*, New York: McGraw-Hill, 1999.

Elmasri, Ramez and Shamkant Navathe, *Fundamentals of Database Systems*. London: Pearson, 2017.

Van der Lans, Rick. *Introduction to SQL*. Boston: Addison-Wesley, 2000.

### Outline of Course Content

Every topic addressed in class is supplemented by lab sessions. Two to three weeks are spent on each of the below topic areas.

Topic 1: Introduction to Databases

Topic 2: Relational Model

Topic 3: Languages for Relational Databases

- Relational algebra
- Relational calculus

Topic 4: Entity-Relationship Model

Topic 5: The design of a Database

- Conceptual Database
- Logical Database
- Physical Database

Topic 6: SQL: Structured Query Language

Topic 7: Normalization of Relational Schemes