

1. Course number and name

CptS 451: Introduction to Database Systems

2. Credits and contact hours

3 credits, 3 lecture hours

3. Instructor's or course coordinator's name

Sakire Arslan Ay

4. Textbook, title, author, and year

R. Ramakrishnan and J. Gehrke. 2003. *Database Management Systems* (3rd ed.).

ISBN-13: 978-0072465631; ISBN-10: 0072465638. McGraw-Hill. (Required)

H. Garcia-Molina, J. Ullman, and J. Widom. 2009. *Database Systems: The Complete Book* (2nd ed.). ISBN: 0131873253. Pearson. (Recommended)

5. Specific course information

a. *Catalog description*: Introduction to database concepts, data models, database languages, database design, implementation issues.

b. *Prerequisites or corequisites*: CPT S 215, CPT S 223, or CPT S 233, with a C or better; Certified major in CptS, CE, EE, or SE.

6. Specific goals for the course

Upon successful completion of this course, students should be able to:

- Learn about the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra, and SQL (1b, 1c, 1e).
- Design entity-relationship models to represent simple database application scenarios (2a, 2b, 2c, 2d, 2g).
- Implement relational schemas using SQL (2g).
- Improve the database design by normalization (1a, 1b, 1c, 1d, 1e).
- Formulate and run SQL queries on data; practice advanced SQL features (2a, 2b, 2c, 2d, 2g, 6a, 6b).
- Get hands-on experience by building a database application (both front-end and the backend) from initial description through design, creation, and implementation. (2a, 2b, 2c, 2d, 2e, 2f, 2g, 5d, 5e, 5f, 5g, 6a, 6b).
- Learn about basic database storage structures and access techniques: file and page organizations, indexing methods including B+ tree and hashing (1b, 1c, 1d, 1e).
- Learn about the ACID properties (transactions) of a modern relational database systems and how a database management system implements transactions (1b, 1c, 1d, 1e).

7. Brief list of topics to be covered

- Fundamental elements of relational database management systems
- Data models for databases
- Entity-relationship and relational data models
- Relational Algebra
- Query formulation using SQL

- Normalization of database schemas
- Advanced query formulation with SQL
- SQL view design and integration
- SQL stored procedures and triggers
- Basic database storage structures and access techniques: file and page organizations, indexing methods including B+ tree and hashing
- Physical database design
- Transaction management