



DEPARTMENT OF MATHEMATICS AND COMPUTER & INFORMATION SCIENCE

SYLLABUS

DATABASE MANAGEMENT SYSTEMS CS4550

Prerequisite: Grade of **C** or higher in Computer Programming II–**CS 2511** and Data Structures & Algorithms–**CS 3810**.

COURSE DESCRIPTION:

Basic concepts: data, information, data independence and need for DBMS facilities. The relational model: schema, subschema, relational algebra, relational calculus, Database design: entity-relationship (ER) model and normal forms. Interacting with database with SQL, Advanced SQL: Trigger, stored procedures. Performance considerations, integrity, security and transaction processing. Project using MySQL.

COURSE OBJECTIVES: Students successfully completing this course will be able to:

1. Design a relational database, given data requirements
2. Tune the performance for relational databases.
3. Write efficient SQL queries
4. Understand the basics of relational databases: relational model, relational algebra, query processing, and query optimization.
5. Understand the translation from SQL queries to physical query plans
6. Understand the basis of concurrency control
7. Demonstrate the ability to properly document a database system and programming assignments.

TEXTBOOKS:

- Database Systems: Design, Implementation, and Management, 13 Edition by Coronel & Morris. ISBN:9781337627900
- Elmasri, Ramez, and Shamkant B. Navathe. *Fundamentals of Database Systems*, 7th Edition. Pearson Education Limited, 2015. SBN-13: 978-0133970777

Topics Covered*:

- 1. Database Concepts: *Database Systems & Data Models (Chapters 1 & 2)***
 - a. Difference between DB, DBMS and DB Applications Program
 - b. Evolution of data processing
 - c. Data and program independence
 - d. Data models and database schemas

- 2. Design Concepts: *Relational database model & ER Modeling (Chapters 3 & 4)***
 - a. keys, dependencies
 - b. Relational Algebra
 - c. Relationships within the Relational Database
 - d. ER Model

- 3. Design Concepts: *Advanced Data Modeling & Normalization (Chapters 5 & 6)***
 - a. Extended ER Model
 - b. Normal Forms
 - c. Normalization Process

- 4. Advanced Design & Implementation: *SQL & Advanced SQL (Chapters 7 & 8)***
 - a. DDL: CREATE, ALTER, DROP
 - b. DML: SELECT, set operations: UNION, INTERSECT, JOIN, Aggregates, Subqueries
 - c. Views
 - d. Procedural SQL (Triggers, Procedures)

- 5. Advanced Database Concepts: *Transaction Management & Concurrency Control (Chapter 10)***
 - a. Transactional properties & Management
 - b. Concurrency Control- lost updates, uncommitted data, inconsistent retrievals
 - c. Concurrency control with Locks and Timestamping

- 6. Advanced Database Concepts: *Query processing and Optimization (Chapter 11)***
 - a. Query Processing
 - b. Indexes & Query optimization

* The instructor has the right to update the contents if needed.