

# COMP 3311: Database Management Systems (Fall, 2023-24)

## Course Overview

A database management system (DBMS) is primarily concerned with efficiently and effectively managing data. This course introduces the topic through lectures, tutorials and by providing hands-on experience in designing, implementing and querying a database using a commercial database management system. The first half of the course focuses on how to analyze and represent the (structured) data requirements of an application using the entity-relationship (E-R) model and the relational model as well as how to query relational data using structured query language (SQL). The second half of the course focuses on the key services provided by a relational database management system to store, query and safeguard data in a multi-user environment. Recent technologies for managing less-structured data and developing database applications are briefly discussed.

## Course Intended Learning Outcomes

On successful completion of this course, students are expected to be able to:

1. Explain important concepts in database management systems, including principles of database systems, conceptual modeling and data models, logical and physical database design, query languages and query processing and database services including concurrency, crash recovery and integrity.
2. Apply database theories to practical database applications.
3. Analyze a real-life problem, design a database system and implement a computer-based system using a major commercial database management system.

## Syllabus (by major course topics)

- E/R Model
- Relational Model and Algebra
- SQL
- Functional Dependencies
- Relational Database Design
- Physical File Organization
- Database Indexing
- Physical Database Organization
- Database Access Methods
- Transactions, Recovery and Concurrency Control
- Database API and Database Connectivity
- NOSQL and Big Data

## Textbook

Logical Databases (Mainly before midterm) [Database System Concepts](#), A. Silberschatz, H. Korth, and S. Sudarshan. [SKS]

Physical Databases (Mainly after midterm) [Principles of Database Management](#), W. Lemahieu, S.V. Broucke, and B. Baesens.[LBB]

## **Reference**

[Database Management Systems](#), Raghu Ramakrishnan and Johannes Gehrke.

## **Grading Scheme**

There are 3 components for the course assessment: 40% final, 30% midterm, and 30% assignments.