CSC4402 - Introduction to Database Systems

Syllabus

I. **Course Outline and Objective:** CSC4402 is an introductory course on database management systems. The course deals with the notion of database systems, from the user point of view. The objective of the course is to introduce the fundamental concepts of database systems, acquaint the students with the use of current relational database systems, and build a solid foundation for advanced studies in database area.

II. **The Organization of the Course:** The course is divided into the following 6 parts:

(1) **Basic Concepts and Relational Data Model.**
Chapter 1 and Chapter 2.
This part introduces basic terminology, the notion of database systems, data independence, data abstraction, the advantage of database systems, data models (E-R model, the relational model, etc.), data storage and query processing, and database system architecture.

The formal model underlying relational database systems is briefly covered. The three aspects of the relational data model, namely, relational data structure, relational data manipulation, relational data integrity, are discussed. We will briefly cover relational algebra.

(2) **The SQL language.**
Chapters 3, 4, and 5.

(3) **Database Design.**
Chapters 6 and 7.
We will discuss E-R modeling method (Chap. 6) for database design. The functional dependency based normalization approach to relational databases design is covered in Chap. 7. This includes the notion of normal forms, the algorithms to perform decomposition to 3NF, to BCNF, etc.

(4) **Application Development and Big Data.**
Chapters 8, 9, and 10.
Complex data types, application development, database and the Web, big data.

(5) **Storage and Query Processing**
Chapters 13, 14, 15, and 16.
Storage structures, Indexing, query processing and query optimization.

(6) **Transaction Management**
Chapters 17 and 18.
Transactions and concurrency control. The notion of transactions, ACID properties of transactions, concurrent schedules, serializability, locking protocols.