

Course Number: IE 225

Course Title: Industrial and Commercial Data Systems

Number of Units: 4

Schedule: Three hours of lecture and one hour of discussion per week.

Prerequisite: None

Catalog Description

Database system architecture; management and analysis of files; the relational model and algebra; the SQL database language; database programming techniques; database design using Entity-Relationship, extended E-R; Basics of normalization. Introduction to database security, query processing and transaction management. Design-oriented project. The course emphasizes industrial and commercial application requirements.

Expanded Description

1. Introduction: History and Motivation for Database Systems, Fourth Generation Environments. Flat File, Data, Database System, Database, Data Dictionary
2. The Entity-Relationship Model: ER Diagram, Role of ER Diagrams, Non-Binary Relationships, Representations of Strong & Weak Entity Sets, Representation of Relationship Sets, Generalization and Aggregation.
3. Data Models: Relational Approach, Hierarchical Approach and Network Approach. Comparison between These Models.
4. Storage Structure: File Organization and Addressing Schemes.
5. Relational Data Structure
6. Normalization: Purpose of Normalization, Functional Dependencies, and Normal Forms.
7. Relational Algebra and Relational Calculus
8. Structured Query Language: Data Definition Language and Data Manipulation Language
9. Query Optimization
10. Transaction Processing
11. Concurrency Control and Automatic Recovery
12. Database Security
13. Database Administrator and Responsibilities of DBA

Students make use of a DBMS to gain experience and insight. Major emphasis will be on term project. Students will deliver the product, the implemented and tested database, as well as complete documentation on the design and implementation to the instructor.

Course Objectives and Role in Program

This is a required core course for the IESM program. The objective of this course is to learn fundamental principles of database management systems (including conceptual and data modeling, physical data access structures, normalization, and implementation) from the viewpoint of application of database software, rather than development of such software. Students will complete Design-oriented term project during the course. The course provides the necessary background so students can pursue applications and further development of database system concepts and implementations in subsequent courses.

Learning Outcomes

Students completing this course will be able to perform the following:

- Explain what the main flaws of a computerized file system are and how a database system can overcome these problems.
- Design and program a relational database system
- Describe the features of a database and a database management system.
- Create usable and understandable documentation of the database design and implementation.

Method of Evaluation

Student learning will be evaluated on the basis of

- Completeness and quality of a term project developed in several stages.
- Completeness and quality of weekly homework assignments.
- Grade on midterm examination.
- Grade on final examination.
- Class participation.

The weight assigned to each element of evaluation will be determined by the instructor of the course on the first day of the class.

Required Textbook

1. *Fundamentals of Database Systems, 3rd edition*, Elmasri and Navathe, Addison-Wesley, 2001.
2. *Access Database: Design & Programming*, Roman, O'Reilly, 1999.

Recommended Reference

1. *Database Design and Programming, John Carter, 2nd edition, McGraw Hill, 2002.*
2. *Database Design for Mere Mortals*, Hernandez, Addison-Wesley, 1997.

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