

Course Number: CIS 230

Course Title: Database Systems

Number of Units: 4

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

Prerequisite: CIS 101, 110

Catalog Description

Relational query languages. Semantic data models. Logical and physical database design. Privacy issues. Implementation techniques (catalogs, query optimization, concurrency control, security and integrity enforcement).

Expanded Description

1. Overview, Models, and Applications of Database Systems
 - Introduction to the basic goals, functions, models, components, Applications, and social impact of database systems.
 - History and motivation for database systems application programs, Users, administration.
 - Functions supported by a typical database system; access methods, security and concurrency, fourth generation environments.
 - Recent developments and applications (e.g., Hypertext, Hypermedia, optical disks).
 - Components of database systems; data, dictionary, database management system.
2. Database Design
 - Data models (E-R, relational, and object-oriented).
 - The relational model. Relational algebra. SQL. Examples of existing relational management systems.
 - Logic as a data model.
 - Theory of normal forms and database design.
 - Physical organization (characteristics of disks and disk blocks. Storage of relations. Indexing: B-trees and hashing).
3. Query languages (relational algebra, relational calculus)
4. Language paradigms and database languages
5. User interfaces and graphical query languages
6. Query optimization
7. Data dictionary
8. Implementation of a relational database kernel
9. Concurrency, recovery and security
 - Transaction processing
 - Concurrency control
 - Recovery from failure
 - Security and integrity

10. Introduction to distributed database systems
11. Case studies of commercial database languages and system

Software

MySQL, www.mysql.com, is a true multi-user, multi-threaded SQL database server. This is currently free. Microsoft Access is available for PCs.

Course Objectives and Role in Program

The objective of this course is to develop the main database system concepts. The students will be introduced to database design, which is a crucial first step in the development. The knowledge of database systems plays a significant role in many applications students develop for courses in the program.

Learning Outcomes

At the end of the course students will be able to

- 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.

Method of Evaluation

Student learning will be evaluated on the basis of

- Completeness and quality of a term project developed in several stages.
- 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

“Fundamentals of Database Systems”, 3rd edition, Elmasri and Navathe, Addison-Wesley, 1999.

Recommended Reference

“Database Management Systems”, 2nd edition, R. Ramakrishnan and J. Gehrke, McGraw Hill, 2000

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Last Revision Approved: July 18, 2005