

School of Computer Science

Course Title: Database Management

Date: 1/23/04

Course Number: COP-4540

Number of Credits: 3

Subject Area: Computer Systems	Subject Area Coordinator: Nagarajan Prabakar email: prabu@cis.fiu.edu
Catalog Description: Covers logical aspects of databases including Relational, Entity-Relationship, and Object-Oriented data models, database design, SQL, relational algebra, tuple calculus, domain calculus, and physical database organization.	
Textbook: Fundamentals of Database Systems, 4 th Edition Elmasri and Navathe Addison Wesley (ISBN: 0321122267)	
References: DATABASE System Concepts, 4 th Edition Silberschatz, Korth, and Sudharshan McGraw Hill (ISBN: 0072554819)	
Prerequisites Courses: COP 3530	
Corequisites Courses: None	

Type: Required

Prerequisites Topics:

- Function call/return, recursion
- Sequential, random access, index files
- Linked list, indexing, hashing techniques

Course Outcomes:

1. Be exposed to information systems
2. Be familiar with database system and database architecture
3. Master the design conceptual schemas
4. Master normalization theory and the mapping of a conceptual schema to a relational schema
5. Master the expression of queries in SQL, relational algebra, and relational calculus
6. Be familiar with physical database design
7. Be familiar with writing application programs that use SQL

School of Computer Science
COP-4540
Database Management

Outline

Topic	Number of Lecture Hours	Outcome
<ul style="list-style-type: none"> • Information systems <ul style="list-style-type: none"> ○ Information storage and retrieval ○ Information capture and representation ○ Information privacy, integrity, security, and preservation ○ Scalability, and efficiency 	3	1
<ul style="list-style-type: none"> • Database systems <ul style="list-style-type: none"> ○ History and motivation for database systems ○ Components of database systems ○ DBMS functions ○ Database architecture and data independence ○ Use of a database query language 	4	2
<ul style="list-style-type: none"> • Data model <ul style="list-style-type: none"> ○ Conceptual models (E-R, semantic, UML) ○ Relational data model ○ Object-oriented model ○ Object-relational model 	4	3
<ul style="list-style-type: none"> • Relational databases <ul style="list-style-type: none"> ○ Mapping conceptual schema to a relational schema ○ Entity and referential integrity ○ Relational algebra and relational calculus 	8	3,4
<ul style="list-style-type: none"> • Database query languages <ul style="list-style-type: none"> ○ Overview of database languages ○ SQL (data definition, query formulation, update sublanguage, constraints, integrity) ○ Embedding SQL queries in a procedural language ○ Introduction to Object Query Language 	8	5,7
<ul style="list-style-type: none"> • Relational database design <ul style="list-style-type: none"> ○ Functional dependency ○ Normal forms (1NF, 2NF, 3NF, BCNF) ○ Multivalued dependency (4NF) ○ Join dependency (PJNF, 5NF) 	6	4
<ul style="list-style-type: none"> • Physical database design <ul style="list-style-type: none"> ○ File structures: index, hash, B-tree ○ Files with variable length records ○ Database efficiency and tuning 	4	6

**School of Computer Science
COP-4540
Database Management**

Course Outcomes Emphasized in Laboratory Projects / Assignments

	Outcome	Number of Weeks
1	Conceptual schema design Outcome: 3	2
2	Database query design (relational algebra) Outcomes: 5	2
3	Database query design (relational calculus and SQL) Outcomes: 5	2
4	Mapping of a conceptual schema to a relational schema Outcomes: 4	2
5	Embedding SQL queries in an application program Outcomes: 7	2

Oral and Written Communication:
No significant coverage

Social and Ethical Implications of Computing Topics
No significant coverage

School of Computer Science
COP-4540
Database Management

Approximate number of credit hours devoted to fundamental CS topics

Topic	Core Hours	Advanced Hours
Algorithms:		1.0
Software Design:		
Computer Organization and Architecture:		
Data Structures:		1.0
Concepts of Programming Languages:		1.0

Theoretical Contents

Topic	Class time
Set theory	0.5
Predicate calculus	0.5

Problem Analysis Experiences

1.

Conceptual schema design

Solution Design Experiences

1.

Mapping a conceptual schema to a relational schema
--
2.

Design of database queries

**School of Computer Science
COP-4540
Database Management**

The Coverage of Knowledge Units within Computer Science Body of Knowledge¹

Knowledge Unit	Topic	Lecture Hours
<u>IM1</u>	Information storage & retrieval; capture & representation; privacy, integrity, security, and preservation; Scalability and efficiency	3
<u>IM2</u>	Database system, database architecture, data independence, DBMS functions	4
<u>IM3</u>	Conceptual models: E-R, semantic, UML, relational, object-oriented, object-relational	4
<u>IM4</u>	Conceptual schema to relational schema, integrity constraints, relational algebra and calculus	8
<u>IM5</u>	SQL: definition, retrieval, update, and integrity queries; embedding queries in a procedural language	8
<u>IM6</u>	Relational database design: functional dependencies, normal forms, multivalued and join dependencies	6
<u>IM9</u>	Indexed files, hashed files, B-trees, files with variable length records, database efficiency and tuning	4

¹See <http://www.computer.org/education/cc2001/final/chapter05.htm> for a description of Computer Science Knowledge units