KINGDOM OF SAUDI ARABIA

MINISTRY OF EDUCATION

SHAQRA UNIVERSITY

(045)

COLLEGE OF COMPUTING AND INFORMATION TECHNOLOGY

المملكة العربية السعودية

وزارة التعليم

جامعة شقراء

(٠٤٥)

كلية الحاسب الآلي وتقنية المعلومات

Database Management System (215عال)

Course Description and Objectives

This course include a wide array of topics, the main objective of this course is to expose the student to the various ideas of database design concept, storage and file structure, indexing and hashing techniques, query processing and optimization, transaction processing, concurrency control, and recovery system.

The outcomes of this course as follow:
1. Evaluate and determine business information problem and find the requirements of a problem in terms of data.
2. Design the database schema with the use of appropriate data types for storage of data in database.
3. Use different types of physical implementation of database
4. Use database for concurrent use.
5. To understand an introductory background in concurrency control and recovery.
6. To learn how to backup data from database.

References
Required:

1. Fundamentals of Database Systems, Elmasri & Navathe, Addison Wesley, 4th Edition, 2004.

Recommended:

1. Database System Concepts, Abraham Silberschatz, Henry F. Korth & S. Sudarshan, McGraw Hill.
2. Database Systems, A practical Approach to design, implementation, and Management, Thomas Connoly & Carolyn Begg, Fifth Edition, 2003.
3. Database System Concept, Avi Silberschatz, Henry F. Korth, S. Sudarshan, 5th, 2005.

Prerequisite: Introduction to Database (201 تقن)

Evaluation & Assessment Methods

Test 1:	15%
Test 2:	15%
Homework & assignment:	10%
Quizzes & lab Test:	10%
Projects:	10%
Final Exam:	40%

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Weeks	Topic Name	Sub Topic	Reading Chapter
Week1	**Introduction: Databases and Database Users**	• Characteristics of the Database Approach • Actors on the Scene and Workers behind Scene • Advantages of Using the DBMS Approach • A Brief History of Database Applications • When Not to Use a DBMS	*Textbook Chapter 1 page 3-27*
Week2	**Database System Concepts and Architecture**	• Data Models, Schemas, and Instances • Three-Schema Architecture and Data Independence • Database Languages and Interfaces • The Database System Environment • Centralized and Client/Server Architectures for DBMSs. • Classification of Database Management Systems	*Textbook Chapter 2 page 29-52*
Week3	**The Relational Data Model and Relational Database constraints**	• Relational Model Concepts. • Relational Model Constraints and Relational Database Schemas • Update Operations, Transactions, and Dealing with Constraint Violations • Codd's Rule for Relational Database.	*Textbook Chapter 3 Page 59-80*
Week4	**Structured Query language (SQL)**	• SQL Data Definition and Data Types • Specifying Constraints in SQL • Basic Retrieval Queries in SQL	*Textbook Chapter 4 page 87-111*

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Weeks	Topic Name	Sub Topic	Reading Chapter
		• Data Manipulation • Additional Features of SQL	
Week5	**More SQL: Complex Queries, Triggers, Views, and Schema Modification**	• More Complex SQL Retrieval Queries • Specifying Constraints as Assertions and Actions as Triggers • Views (Virtual Tables) in SQL • Schema Change Statements in SQL	*Textbook Chapter 5 page 115-140*
Week6	**Mid-term 1**		
Week7	**The Relational Algebra and Relational Calculus**	• Unary Relational Operations: SELECT and PROJECT • Relational Algebra Operations from Set Theory • Binary Relational Operations: JOIN and DIVISION • Additional Relational Operations • Examples of Queries in Relational Algebra • The Tuple Relational Calculus • The Domain Relational Calculus	*Textbook Chapter 6 page 147-185*
Week8	**The Enhanced Entity-Relationship (EER) Model**	• Subclasses, Super-classes, and Inheritance • Specialization and Generalization • Constraints and Characteristics of Specialization and Generalization Hierarchies • Modeling of UNION Types Using Categories • A Sample UNIVERSITY EER Schema, Design Choices, and Formal Definitions • Relational Database Design Using ER-	*Textbook Chapter 8 page 245-260*

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Weeks	Topic Name	Sub Topic	Reading Chapter
		to-Relational Mapping (page 286) • Mapping EER Model Constructs to Relations	
Week9	**Object, Object-Relational, and XML: Concepts, Models, Languages, and Standards**	• Overview of Object Databases Concept • Object Database Extensions to SQL • XML: Extensible Markup Language • Structured, Semi-structured, and Unstructured Data • XML Hierarchical (Tree) Data Model • XML Documents, DTD, and XML Schema • Storing and Extracting XML Documents from Databases and Relational Databases	*Textbook Chapter 11 page 353-369 & Chapter 12 page 415-436*
Week10	**Advance on Data Storage and Querying**	• Review on Storage and File Structure • Placing File Records on Disk • Operations on Files • Files of Unordered Records (Heap Files) • Files of Ordered Records (Sorted Files) • Hashing Techniques	*Textbook Chapter 17 page 583-606*
Week11	**Query Processing and Optimization, and Database Tuning**	• Query Processing • Using Heuristics in Query Optimization • Using Selectivity and Cost Estimates in Query Optimization	*Textbook Chapter 19 page 679-436*

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Weeks	Topic Name	Sub Topic	Reading Chapter
		• Overview of Query Optimization in Oracle • Semantic Query Optimization	
Week 12	**Mid-term 2**		
Week13	**Transaction Processing, Concurrency Control, and Recovery.** **Database System Architecture**	• Introduction to Transaction Processing • Transaction and System Concepts Desirable Properties of Transactions • Characterizing Schedules Based on Recoverability • Characterizing Schedules Based on Serializability • Two-Phase Locking Techniques for Concurrency Control • Concurrency Control Based on Timestamp Ordering	*Textbook* *Chapter 21 page 743-759* *&* *Chapter 22 page 778-788*
Week 14	**Database System Architecture**	• Database System Architectures • Distributed & Parallel Databases concept • Types of Distributed Database Systems • Distributed Database Architectures • Data Fragmentation, Replication, and Allocation Techniques for Distributed Database Design • An introductory on Mobile database concept	*Textbook* *Chapter 25 page 877-894*
Week15	**Presentation & Revision for Final Exam**		