" حيث تصبح الرؤية واقعاً"

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Detailed Course Description - Course Plan Development and Updating Procedures/ Department of Software Engineering	QF01/0408-3.0E

Faculty	Science and Information Technology	Department	Software Engineering
Course number	0114442	Course title	Database Management Systems
Number of credit hours	3	Pre-requisite/co-requisite	Database

Brief course description

The aim of the course is to introduce students to the current techniques, methods and results from the active field of database systems and data management. Typical topics include query planning and optimization, transaction processing and concurrency control, database security and distribution, advanced database models, systems, and applications such as data mining, data warehousing and OLAP; file structures, indexing, and hashing.

	Course goals and learning outcomes
Goal 1	To comprehend the disk storage, basic file structures, and hashing and modern storage Architectures
Learning outcomes	1.1 To know and study the disk storage and basic file structures. 1.2 To apply the hashing techniques
Goal 2	To understand the indexing structures for files
Learning outcomes	2.1 To devise the appropriate ways to store and index data. 2.2 To demonstrate the understanding of indexing structures for files
Goal 3	To learn the algorithms used for query processing and optimization
Learning outcomes	3.1 The student should know how to use algorithms for query processing and optimization 3.2 To understand how to use query tree and heuristic approaches for query optimization 3.3 To comprehend how to use cost-based approach for query optimization
Goal 4	To discuss and explain transaction processing concept and theory
Learning outcomes	4.1 To discuss and describe the DBMS concepts for transaction processing 4.2 To know and understand the desirable properties (ACID) of transactions
Goal 5	To understand the concurrency control techniques
Learning outcomes	5.1 To realize the DBMS techniques to concurrency control 5.2 To apply concurrency control techniques to sample transaction workloads to ensure ACID properties are maintained.

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	5.3 To apply locks for concurrency control in indexes
Goal 6	To understand database recovery techniques
Learning outcomes	6.1 To understand database recovery techniques and concepts 6.2 To apply techniques for recovery from transaction failure. 6.3 To know recovery techniques for deferred and immediate updates.
Goal 7	To understand the main concepts of distributed databases
Learning outcomes	7.1 To discuss the idea of distributed databases 7.2 To apply the basic techniques used with distributed database 7.3 To know the advantages of distributed databases over centralized systems.
Goal 8	To understand the data mining concepts
Learning outcomes	8.1 To understand the concepts of data mining 8.2 To illustrate the idea of knowledge discovery in database
Goal 9	To understand the idea of data warehouse and OLAP
Learning outcomes	9.1 To introduce the key concepts of data warehousing 9.2 To compare, analysis and evaluate methods/technologies in developing data warehouses
Textbook	FUNDAMENTALS OF DATABASE SYSTEM (7th edition) By Ramez Elmasri, Shamkant B. Navathe, Publisher: Pearson (2017).
Supplementary References	1. Database Systems: a practical approach to design, implementation and management (6th edition) by Thomas M. Connolly, Carolyn E. Begg, Publisher: Pearson; 6 edition (January 18, 2014). 2. Introducing Microsoft SQL Server; by Ross Mistry and, Stacia.(2012) 3. Database Concepts (7th Edition) by David M. Kroenke , David J. Auer ISBN-10: 0133544621 (2014) 4. Oracle PL/SQL Programming: Covers Versions Through Oracle Database 12c Steven Feuerstein , Bill Pribyl (2014) 5. Database Systems design, Implementation and Management (12th Edition) by Carlos Coronel, Steven Morris, Publisher: Cengage Learning, (2016)

Course timeline				
Week	**Number of hours**	**Course topics**	**Pages (textbook)**	**Notes**
01	1 1 1	**Chapter 16 : Disk Storage, Basic File Structures, and Hashing and Modern Storage Architectures** • Introduction • Secondary storage device	572-585	
02	1 1 1	• Hashing techniques • Modern storage architectures	602-611 618-621	

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03	1 1 1	**Chapter 17: Indexing Structures for Files and Physical Database Design** • Types of Single- level ordered indexes	632-660	
04	1 1 1	• Multilevel indexes • Dynamic Multilevel indexes using B-tree		
05	1 1 1	**Chapter 19: Query Optimization** • Query trees and heuristics for query optimization • Choice of query execution plans	722-743 761-768	
06	1 1 1	• Using selectivities in cost-based optimization • An example of query optimization in data warehouses • Overview of query optimization in Oracle		
07	1 1 1	**Chapter 20 : Introduction to Transaction Processing Concepts and Theory** • Introduction to transaction processing • Transaction and system processing • Desirable properties of transactions	776-805	
08	1 1 1	• Characterizing schedules based on recoverability • Characterizing schedules based on serializability • Transaction support in SQL		
09	1 1 1	**Chapter 21 : Concurrency Control Techniques** • Two-phase locking techniques concurrency control • Concurrency control based on Timestamp ordering	812-827 835-836	
10	1 1 1	• Multiversion concurrency control techniques • Using locks for concurrency control in indexes		
11	1 1 1	**Chapter 22 : Database Recovery Techniques** • Recovery concepts • NO-UNDO/REDO Recovery based on Deferred update	844-855 861-862	
12	1 1 1	• Recovery techniques based on immediate update • Recovery in Multidatabase systems		

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13	1 1 1	**Chapter 23: Distributed Databases** • Distributed database concepts • Data fragmentation, replication and allocation techniques for distributed database design	872-888	
14	1 1 1	• Overview of concurrency control and recovery in distributed databases • Overview of transaction management in distributed database		
15	1 1 1	**Chapter 28: Data Mining Concepts** • Overview of data mining technology • Association rules • Classification • Clustering	1100-1120	
16	1 1 1	**Chapter 29: Data Warehousing. Some important Concepts and OLAP** • Introduction, definition and terminology • Characteristics of data warehouses • Data modeling for data warehouses	1132-1140	

Theoretical course evaluation methods and weight	Participation = 10% First exam 20% Second exam 20% Final exam 50%	**Practical (clinical) course evaluation methods**	Semester students' work = 50% (Reports, research, quizzes, etc.) Final exam = 50%

Approved by head of department	Dr. Ahmad	**Date of approval**	

Extra information (to be updated every semester by corresponding faculty member)

Name of teacher	Dr. Dara Aqel	Office Number	
Phone number (extension)		Email	___d.aqel@zug.edu.jo
Office hours	12-1 (Sunday, Tuesday, Thursday) 11-12.30 (Monday, Wednesday)		