



MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية



Module Information			
معلومات المادة الدراسية			
Module Title	Database Systems Design and Development		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	IT2203		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	2	Semester of Delivery	4
Administering Department	Information Technology	College	College of Computer Science & Information Technology
Module Leader	Hussein Zaki Jassim Al-Mankoushi	e-mail	hussein@uowa.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	M.Sc.
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	01/06/2023	Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	IT231	Semester	3
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Aims أهداف المادة الدراسية</p>	<ol style="list-style-type: none"> 1. Provide a solid understanding of database concepts, principles, and best practices. 2. Familiarize students with the design, implementation, and management of databases. 3. Cover topics such as data modeling, normalization, and query optimization. 4. Develop practical skills in using database management systems and query languages. 5. Cultivate critical thinking and problem-solving abilities in the context of database design and administration. 6. Prepare students to apply their knowledge in real-world scenarios. 7. Equip students to contribute to effective database solutions in the IT industry.
<p>Module Learning Outcomes مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> 1. Understand the fundamental concepts and principles of databases, including data models, schemas, and normalization. 2. Demonstrate proficiency in designing, implementing, and managing databases using a database management system (DBMS). 3. Apply data modeling techniques to develop logical and physical database designs that meet specified requirements. 4. Construct and execute complex SQL queries to retrieve, update, and manipulate data stored in a database. 5. Evaluate and optimize query performance through the use of indexing, query tuning, and other optimization techniques. 6. Implement and enforce data integrity constraints, including entity relationships, referential integrity, and data validation rules. 7. Employ appropriate security measures to protect data and ensure database confidentiality, integrity, and availability. 8. Utilize backup and recovery procedures to safeguard data and restore databases in the event of failures or disasters.
<p>Indicative Contents المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <ol style="list-style-type: none"> 1. Advanced Database Design: <p>Entity-Relationship Modeling: Extensions and enhancements to ER modeling, such as subtypes, supertypes, and specialization/generalization.</p> <p>Object-Oriented Data Modeling: Concepts of object-oriented databases and their modeling techniques, including inheritance, encapsulation, and polymorphism.</p>

	<p>UML Diagrams: Utilizing Unified Modeling Language (UML) to model databases, including class diagrams, object diagrams, and sequence diagrams.</p> <p>2. Transaction Management and Concurrency Control:</p> <p>ACID Properties: Understanding the properties of atomicity, consistency, isolation, and durability in database transactions.</p> <p>Concurrency Control: Techniques for managing concurrent access to the database, including locking, timestamp-based protocols, and optimistic concurrency control.</p> <p>Recovery and Undo/Redo Logging: Mechanisms for ensuring database consistency in the face of failures, including log-based recovery and transaction rollback/commit.</p> <p>3. Query Optimization and Execution:</p> <p>Query Processing: The stages involved in processing a database query, including parsing, optimization, and execution.</p> <p>Query Optimization: Techniques for selecting the most efficient query execution plan, such as cost-based optimization, join ordering, and index selection.</p> <p>Query Execution: Strategies for executing queries, including algorithms for sorting, joining, and aggregating data.</p> <p>4. Data Storage and Indexing:</p> <p>File Structures: Storage structures for database files, such as heap files, sorted files, and hashed files.</p> <p>Indexing Techniques: Different indexing structures for efficient data retrieval, including B-trees, hash indexes, and bitmap indexes.</p> <p>Multi-Dimensional Data Structures: Introduction to data structures like R-trees and quad-trees for indexing spatial and multidimensional data.</p> <p>5. Database Security and Authorization:</p> <p>Database Security: Concepts of access control, authentication, and authorization in database systems.</p> <p>Security Models: Different security models, such as discretionary access control (DAC), mandatory access control (MAC), and role-based access control (RBAC).</p> <p>Encryption and Auditing: Techniques for encrypting data and auditing database activities for security and compliance purposes.</p>
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	<p>The learning and teaching strategies for studying the database subject in an IT department involve a balanced approach of theoretical understanding and practical application. Lectures, interactive discussions, and case studies provide the necessary theoretical foundation. Practical exercises, group work, and projects enable hands-on experience with database management systems. Workshops, demos, and industry examples offer real-world insights. Online resources, assessments, and feedback aid in reinforcing learning. Virtual labs and continuous learning emphasize practical skills development and staying updated with industry trends. These strategies ensure a comprehensive understanding of databases and their relevance in the IT field.</p>

Student Workload (SWL)			
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	65	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	85	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	
	Assignments	2	10% (10)	2, 12	
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	
Summative assessment	Midterm Exam	2hr	10% (10)	7	
	Final Exam	3hr	50% (50)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to databases: concepts, importance, and applications Relational database management systems (RDBMS)
Week 2	Overview: Introduction to Structured Query Language (SQL)
Week 3	Database design principles and data models
Week 4	Entity-Relationship (ER) modeling and ER diagrams
Week 5	Database constraints: primary key, foreign key

Week 6	Database constraints unique, and check constraints
Week 7	Database administration and security: user management, permissions, and access control
Week 8	Backup and recovery strategies for databases
Week 9	Indexing and query optimization techniques
Week 10	Transaction management and concurrency control in databases
Week 11	Relational model and relational calculus
Week 12	Relational model and relational algebra
Week 13	Transaction management and concurrency control in databases
Week 14	Transaction management and concurrency control in databases
Week 15	Database performance monitoring.
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Set up a database environment using a preferred database management system
Week 2	Create tables in the database based on the schema design
Week 3	Populate the tables with sample data to simulate real-world scenarios. Include a sufficient amount of data to perform meaningful queries.
Week 4	SELECT Queries: Write and execute basic SELECT queries to retrieve data from single tables.
Week 5	Use various clauses like WHERE, ORDER BY, and LIMIT to filter, sort, and limit the results.
Week 6	Practice different types of join operations
Week 7	NNER JOIN, LEFT JOIN, RIGHT JOIN, FULL JOIN) to combine data from multiple tables
Week 8	Create subqueries within SELECT statements to perform more complex queries
Week 9	Utilize aggregate functions (e.g., COUNT, SUM, AVG, MIN, MAX)
Week 10	Group data based on certain criteria using the GROUP BY clause. Apply the HAVING clause to filter the grouped data based on conditions.
Week 11	Practice functions like CONCAT, SUBSTRING, and LIKE
Week 12	Practice functions like CONCAT, SUBSTRING, and LIKE
Week 13	Practice writing queries with multiple levels of nested subqueries.
Week 14	Practice writing queries with multiple levels of nested subqueries.
Week 15	Implementation of an integrated database management project for each student

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Elmasri, Ramez, and Shamkant Navathe. Fundamentals of database systems. AddisonWesley Publishing Company, 2018.	Yes
Recommended Texts	Database design, application and development.	No
Websites	http://www.sqlcourse.com/	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				