

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Database Systems		Module Delivery	
Module Type	Core		☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☒ Practical ☐ Seminar	
Module Code	AIE215			
ECTS Credits	4			
SWL (hr/sem)	100			
Module Level	2	Semester of Delivery		3
Administering Department	Artificial intelligence		College	College of Engineering
Module Leader	Abbas Abdulaali		e-mail	ab.jasim23@gmail.com
Module Leader's Acad. Title	Assistant Lecturer		Module Leader's Qualification	M.Sc.
Module Tutor	Abbas Abdulaali		e-mail	ab.jasim23@gmail.com
Peer Reviewer Name	Name 		e-mail	Hasnaa.Mohammad@uoyen.edu.iq
Scientific Committee Approval Date	27/9/2025		Version Number	1.0

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



Module Aims, Learning Outcomes and Indicative Contents			
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Objectives أهداف المادة الدراسية	1. Introduce fundamental concepts of database systems. 2. Understand data structures, operations, and data modeling. 3. Study the architecture of database systems and their components. 4. Enable students to use SQL and relational algebra for data definition and manipulation. 5. Introduce query languages and their applications. 6. Familiarize students with NoSQL databases. 7. Train students in practical database design and implementation.		
Module Learning Outcomes	Knowledge	A1	A1.1 Define and identify basic concepts and components of database systems. A1.2 Describe and explain the structure and functions of relational databases. A1.3 Apply and implement SQL commands to create, modify, and manage relational databases. A1.4 Analyze database structures to identify data relationships and dependencies
		A4	A4.1 Interpret user requirements and classify data entities for database design. A4.2 Analyze data requirements and model relationships using ER diagrams. A4.3 Design and develop normalized relational schemas for database implementation. A4.4 Evaluate and optimize database designs for performance and data integrity.
	Skills	B1	B1.1 Function effectively in collaborative database projects, contributing to modeling, normalization, and SQL implementation B1.2 Function as a member of multidisciplinary teams combining database design and software development.
		B2	B2.1 Communicate effectively using graphical and documentation tools such as MySQL Workbench and phpMyAdmin. B2.2 Communicate verbally and in writing with peers and supervisors regarding database project



	<table border="1"> <tr> <td data-bbox="499 244 611 501">Ethics</td><td data-bbox="611 244 1474 501"> C1 C1.1 Define ethical standards and data integrity principles in database systems. C1.2 Demonstrate ethical commitment to data confidentiality, access control, and responsible system use. </td></tr> </table>	Ethics	C1 C1.1 Define ethical standards and data integrity principles in database systems. C1.2 Demonstrate ethical commitment to data confidentiality, access control, and responsible system use.
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abblndicative Contents المحتويات الإرشادية	Part A – Introduction to Database Systems 1. Basic concepts of databases, data, and information. 2. Database system environment and architecture. 3. Data models: hierarchical, network, relational, and NoSQL. 4. Database users, administrators, and DBMS functions. Part B – Relational Model and SQL 1. Structure of the relational model: tables, attributes, tuples. 2. Keys and constraints (primary, foreign, unique). 3. Relational algebra operations: selection, projection, join, union, difference. 4. SQL basics: DDL (CREATE, DROP, ALTER). 5. SQL DML (INSERT, UPDATE, DELETE). 6. SQL queries with WHERE, ORDER BY, and logical operators. 7. SQL joins (INNER, LEFT, RIGHT, FULL). 8. Aggregate functions and GROUP BY. 9. Subqueries, nested queries, and views. Part C – Database Design and Normalization 1. Entity-Relationship (ER) modeling. 2. Mapping ER diagrams to relational schemas. 3. Functional dependencies. 4. Normalization: 1NF, 2NF, 3NF, BCNF. 5. Denormalization and design trade-offs. Part D – Advanced Database Topics 1. Transactions and ACID properties. 2. Concurrency control and locking mechanisms. 3. Database recovery and backup strategies. 4. Indexing and query optimization. 5. Database security, authorization, and integrity constraints. Part E – Emerging Trends 1. Overview of NoSQL databases (document-based, key-value, graph, column-oriented). 2. Comparison between SQL and NoSQL approaches. 3. Introduction to distributed databases and cloud databases.		



	Part F – Practical Training (XAMPP Environment) 1. Installing and configuring XAMPP. 2. Creating and managing databases in MySQL. 3. Using phpMyAdmin for database administration. 4. Implementing a database project from requirements to deployment.
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Lectures: to present theoretical concepts of database systems, relational models, SQL, and advanced topics. • Laboratory Sessions (XAMPP): to provide hands-on experience in database creation, SQL queries, normalization exercises, and database projects. • Interactive Discussions: to encourage critical thinking and problem-solving by analyzing real-world database scenarios. • Assignments and Quizzes: to reinforce understanding of theoretical and practical aspects of databases. • Project Work: to integrate theoretical knowledge with practical implementation by designing and developing a database system. • Self-Study and Reading: to encourage students to review references, practice SQL queries, and explore new database technologies such as NoSQL.

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



Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
SFormative assessment	Quizzes	2	10% (10)	5 and 10	A1
	Assignments	2	10% (10)	2 and 12	A1, A4, B1
	Projects / Lab.	1	10% (10)	Continuous	A4, B1, B2, C1
	Report	1	10% (10)	13	B2, C1
Summative assessment	Midterm Exam	2hr	10% (10)	7	A1, A4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)		
المناهج الاسبوعي النظري		
	Material Covered	Los
Week 1	Introduction to Databases – Concepts and Importance	A1
Week 2	Database System Architecture	A1
Week 3	Data Models and Relational Model	A1
Week 4	Relational Algebra Operations	A1
Week 5	SQL Basics (DDL, DML)	A1
Week 6	SQL Queries with Conditions and Joins	A1
Week 7	Advanced SQL: Aggregation and Grouping	A1
Week 8	Entity-Relationship (ER) Modeling	A4
Week 9	Normalization: 1NF, 2NF	A4
Week 10	Normalization: 3NF, BCNF	A4
Week 11	Transactions and Concurrency Control	A4,C1
Week 12	Recovery and Database Security	A4,C1
Week 13	Indexing and Query Optimization	A4
Week 14	Introduction to NoSQL Databases	A1,B2
Week 15	Course Review and Project Presentation	A4,B2,C1



Delivery Plan (Weekly Lab. Syllabus)		
المنهاج الاسبوعي للمختبر		
	Material Covered	Los
Week 1	Introduction to XAMPP and MySQL	A1
Week 2	Creating Databases and Tables	A1
Week 3	Basic SQL Commands (INSERT, SELECT)	A1
Week 4	Queries with WHERE and ORDER BY	A1
Week 5	Joins (INNER, LEFT, RIGHT)	A1,B1
Week 6	Aggregate Functions (COUNT, SUM, AVG)	A1
Week 7	Subqueries and Views	A4
Week 8	ER Modeling in MySQL Workbench	A4,B1
Week 9	Schema Normalization Exercises	A4
Week 10	Transactions and ACID in MySQL	A4,C1
Week 11	Triggers and Stored Procedures	A4,B1
Week 12	User Accounts and Database Security in XAMPP	C1
Week 13	Backup and Recovery Operations	C1
Week 14	Introduction to MongoDB (NoSQL)	A1,B2
Week 15	Final Project Implementation and Demo	A4,B2,C1

Learning and Teaching Resources		
مصادر التعلم والتدريس		
Text		Available in the Library?
Required Texts	Ramez Elmasri & Shamkant B. Navathe, <i>Fundamentals of Database Systems</i>, 7th Edition, Pearson, 2017.	Yes



	Abraham Silberschatz, Henry F. Korth, S. Sudarshan, <i>Database System Concepts</i>, 7th Edition, McGraw-Hill, 2020	
Recommended Texts	- Jukic, Nenad, Susan Vrbsky, and Svetlozar Nestorov. <i>Database Systems: Introduction to Databases and Data Warehouses</i>. Prospect Press, 2016. - Coronel, Carlos, and Steven Morris. <i>Database Systems: Design, Implementation, & Management</i>. Cengage Learning, 2016	No
Websites	https://eng.alayen.edu.iq//colleges/e/42	

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.				

