	Ministry of Higher Education and Scientific Research - Iraq Al-Nahrain University College of Science Computer Science Department	

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Database I			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	COMP3115				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	5		**Semester of Delivery**	1	
Administering Department	Computer science		**College**	Science	
Module Leader	Dr. Rasool Hisham Al-Saadi		**e-mail**	rasool.hisham@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	PhD	
Module Tutor	Dr. Rasool Hisham Al-Saadi		**e-mail**	rasool.hisham@nahrainuniv.edu.iq	
Peer Reviewer Name	Dr. Zainab Namh Abdula		**e-mail**	zainab.namhabdula@nahrainuniv.edu.iq	
Scientific Committee Approval Date	01/09/2025		**Version Number**	1.0	
Lab Instructors	Assistant Professor Dr. Zainab Namh Abdula Assistant Professor Zahraa Abdulhussien Jaaz Assistant Lecturer Azhar Flaih Hassan Zahu				

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aim of this module is to introduce students to the fundamental concepts and principles of database systems. The course focuses on the design, implementation, and manipulation of relational databases. Students will learn how to model real-world data using conceptual and logical data models, design normalized database schemas, and interact with databases using Structured Query Language (SQL). The module also aims to develop practical skills in database creation, querying, and management using a relational database management system (RDBMS).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this module, students will be able to: 1. Explain the fundamental concepts of database systems and the advantages of database approaches over file-based systems. 2. Identify the components and architecture of database management systems (DBMS). 3. Design conceptual database models using Entity–Relationship (ER) diagrams. 4. Transform ER models into relational schemas. 5. Retrieve and manipulate data using SQL Data Manipulation Language (DML) queries. 6. Implement basic database constraints and relationships. 7. Use joins and subqueries to query data from multiple tables. 8. Demonstrate practical database skills using a relational database management system.
Indicative Contents المحتويات الإرشادية	1. Introduction to Database Systems 2. ANSI/Spark Data Model 3. Functional Components of Database System 4. Data Models 5. Entity–Relationship (ER) Modeling 6. Relational Model 7. Relational Algebra 8. SQL Fundamentals 9. SQL Data Manipulation 10. Constraints and Data Integrity

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The module will be delivered through a combination of lectures and practical laboratory sessions to ensure both theoretical understanding and practical skills development. • Lectures will introduce core database concepts, including data modeling, relational database design, and SQL. Lectures will include demonstrations and

	discussions to reinforce understanding. • Laboratory sessions will provide hands-on experience in designing databases and writing SQL queries using a relational database management system (MySQL). • Practical exercises will allow students to apply theoretical concepts to real-world database design and query problems. • Guided tutorials and problem-solving sessions will help students practice ER modeling, normalization, and query formulation. • Assignments and small projects will encourage independent learning and the application of database concepts to practical scenarios. • Class discussions and examples will be used to connect theoretical concepts with real-world database applications.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
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**	1	10% (10)	Continuous	All
	Assignments	1	5% (5)		All
	Projects / Lab.	1	15% (15)	Continuous	All
	Report	1	10% (10)	13	
Summative assessment	**Midterm Exam**	2 hr	10% (10)		All
	Final Exam	3hr	50% (50)		All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to **Information Systems, Databases, and Database Management Systems (DBMS)**. Objectives of DBMS. Introduction to **file-based systems** and their limitations.
Week 2	**Drawbacks of file-based systems** and the **DBMS approach**. Advantages of DBMS: centralized data management, data independence, and data consistency.
Week 3	**ANSI/SPARC architecture**, data abstraction, levels of abstraction, **database schema vs database instance**, and data independence.
Week 4	**Components and interfaces of DBMS**: hardware, software, data, procedures, people interacting with databases, and **data dictionary**.
Week 5	**Functional components of DBMS** and **storage manager**. Overview of **database architecture** and introduction to **database design**.
Week 6	**Data modeling using the Entity–Relationship (ER) model**. Introduction to **ER diagrams**, entities and attributes.
Week 7	**Entity set classification**, **attribute classification**, relationship degree and **relationship classification** with ER diagram examples.
Week 8	**Midterm Exam**
Week 9	Introduction to the **Relational Model**, **Codd's rules**, relational model properties, relation schema and relation instance.
Week 10	**Keys in relational databases** (super key, candidate key, primary key). **Relational integrity and constraints**.
Week 11	**Relational Algebra**: role of relational algebra in DBMS. Basic operations: **selection, projection, union, intersection, difference, and Cartesian product**.
Week 12	**Join operations in relational algebra**: types of joins including **natural join, equi-join, theta join, and outer join**, with query examples.
Week 13	**Structured Query Language (SQL)**: introduction, SQL command categories, **Data Manipulation Language (DML)**, inserting, updating, deleting data.
Week 14	**SQL querying**: SELECT statement, DISTINCT, aliases, WHERE clause, logical operators (AND, OR, NOT), **BETWEEN, LIKE, IN**, ordering results.

Week 15	**Advanced SQL querying**: grouping and aggregation, **GROUP BY and HAVING**, selecting data from multiple tables (joins and UNION). Course review and solving practice problems.

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab Introduction and MySQL Workbench Installation
Week 2	Workbench interface, different data types, and column constraint options.
Week 3	Create a schema, understand character sets and collations, define table fields, and create a simple table (with data)
Week 4	Retrieving data using the SELECT statement, work with aliases, and sort the results
Week 5	Filtering data using the WHERE clause with logical operators.
Week 6	Virtual columns and practice using LIKE, BETWEEN, IN, AND, OR, and NOT operators
Week 7	Grouping and Aggregate Functions
Week 8	Mid Term Exam
Week 9	Foreign keys and relationship types with Reverse Engineering (ER Diagram)
Week 10	Indexes and their types
Week 11	Selecting Data from more than one table (inner join)
Week 12	Selecting Data from Different Tables (outer join)
Week 13	Designing a database (Schema and Data)
Week 14	Practice and review
Week 15	Final Term Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	•S. Sumathi, S. Esakkirajan, "Fundamentals of Relational Database Management Systems", Springer, 2007.	

Recommended Texts	•Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", 4th Edition, Addison Wesley, 2003. • Raghu Ramakrishnan , Johannes Gehrke, "Database Management Systems", 3rd Edition, McGraw Hill, 2003. • Paul Wilton, John W. Colby, "Beginning SQL", Wiley Publishing, Inc. 2005.	
Websites		

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.