MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Database Management Systems / أنظمة قواعد البيانات**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CYBT201				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level			**Semester of Delivery**	3	
Administering Department	Department of Cybersecurity Technical Engineering		**College**	Technical Engineering College of Computer and Artificial Intelligence - Kirkuk	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	2/11/2026		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This module aims to introduce students to the fundamental concepts, theories, and practical design of Database Management Systems (DBMS). It focuses on database architecture, data modeling using Entity-Relationship (ER/EER) diagrams, relational data model, relational algebra, Structured Query Language (SQL for DDL, DML, DCL), functional dependencies, normalization techniques (1NF to BCNF), transaction processing, concurrency control, recovery, indexing, and an introduction to distributed and NoSQL databases.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Understand DBMS architecture, data independence, relational model concepts, and database development lifecycles. Design and construct Entity-Relationship (ER) and Enhanced ER (EER) diagrams for real-world enterprise applications. Map ER/EER models into relational database schemas with appropriate integrity constraints. Master Structured Query Language (SQL) for database creation, modification, complex queries, views, stored procedures, and triggers. Apply functional dependencies and normalization algorithms (1NF, 2NF, 3NF, BCNF) to eliminate data redundancy and anomalies. Understand transaction processing, ACID properties, concurrency control protocols, and database recovery techniques. Develop, query, and manage relational databases practically using modern SQL engines (e.g., MySQL, PostgreSQL, or MS SQL Server).
Indicative Contents المحتويات الإرشادية	The module will cover the following key areas: Introduction to Databases, DBMS Architecture, 3-Schema Architecture, and Data Independence Conceptual Data Modeling: Entity-Relationship (ER) Diagrams and Enhanced ER (EER) Modeling Relational Data Model, Constraints, and Mapping ER/EER Diagrams to Relational Schemas Relational Algebra: Select, Project, Join, Union, Difference, and Cartesian Product Structured Query Language (SQL) DDL: Creating, Altering, and Dropping Tables with Integrity Constraints SQL DML: Data Manipulation, Aggregations, GROUP BY, HAVING, and Complex Multi-Table Joins Advanced SQL: Subqueries, Correlated Subqueries, Views, Stored Procedures, and Triggers Database Normalization: Functional Dependencies, Normal Forms (1NF, 2NF, 3NF, BCNF), and De-normalization Transaction Management & Concurrency Control: ACID Properties, Serializability, Two-Phase Locking (2PL), and Deadlocks File Organization, Indexing (B-Trees / Hash Indexes), and Introduction to Distributed & NoSQL Databases (MongoDB)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The module will employ a combination of strategies including: Lectures: To provide theoretical foundations on database design, relational algebra, normalization theory, and transaction management. Group Discussions: To analyze case studies and design appropriate database schemas for real-world scenarios. Problem-Solving Sessions: To practice ER diagramming, relational algebra expressions, and normalization algorithms. Practical Lab Sessions: Hands-on experience executing SQL statements, building database applications, and managing DBMS servers. Tutorials: To delve into complex topics like query optimization, concurrency control, and B-Tree indexing. Mid-term and final exams: To assess comprehensive theoretical knowledge and database design skills. Preparatory Week: To give students time to revise and clarify any difficulties before the final exam.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	5% (5)	5, 10	LO #1, 3 and 5
	Assignments	2	5% (5)	2, 12	LO #2, 4 and 6
	Projects / Lab.	1	10% (10)	Continuous	LO #7
	Report	1	10% (10)	13	LO #3, 5 and 7
	Midterm Exam	2 hr	20% (20)	8	LO #1 - 4

Summative assessment	**Final Exam**	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Databases & DBMS: File Processing Systems vs. DBMS, Advantages, and Database Users.
Week 2	Database System Architecture: Three-Schema Architecture, Data Independence (Physical & Logical), and Data Models.
Week 3	Entity-Relationship (ER) Modeling: Entities, Attributes, Entity Sets, Relationships, Keys, and ER Diagrams.
Week 4	Enhanced ER (EER) Modeling: Specialization, Generalization, Aggregation, and Categorization.
Week 5	Relational Data Model: Domains, Tuples, Relations, Relational Keys (Primary, Foreign, Candidate), and Constraints.
Week 6	ER/EER-to-Relational Mapping: Algorithm for Mapping ER Constructs into Relational Database Schemas.
Week 7	Relational Algebra: Core Operations (Select, Project, Union, Set Difference, Cartesian Product, Rename) and Joins.
Week 8	Mid-term Exam (الفصل منتصف اختبار) & Introduction to SQL: DDL Commands (CREATE, ALTER, DROP, Primary/Foreign Keys).
Week 9	SQL DML Essentials: Data Insertion, Updates, Deletions, SELECT Queries, WHERE Clause, and Sorting.
Week 10	Advanced SQL Queries: Aggregate Functions (COUNT, SUM, AVG, MIN, MAX), GROUP BY, HAVING, and INNER/OUTER Joins.
Week 11	Complex SQL Concepts: Subqueries, Correlated Subqueries, Views, Stored Procedures, and Triggers.
Week 12	Database Normalization Theory: Informal Design Guidelines, Functional Dependencies, Primary Keys, and 1NF & 2NF.
Week 13	Advanced Normalization: Third Normal Form (3NF), Boyce-Codd Normal Form (BCNF), and Multi-valued Dependencies.

Week 14	Transaction Processing: Concept of Transactions, ACID Properties, Schedules, and Serializability.
Week 15	Concurrency Control & Database Security: Locking Techniques (2PL), Deadlock Handling, Recovery, and Access Control.
Week 16	**Overview of Storage, Indexing (B-Trees), Distributed Databases, NoSQL (MongoDB) / Final Examination.**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to DBMS Tools (MySQL Workbench / MS SQL Server) and GUI Environment Setup.
Week 2	Lab 2: Data Definition Language (DDL): Creating Databases, Tables, Primary Keys, Foreign Keys, and CHECK Constraints.
Week 3	Lab 3: Data Manipulation Language (DML): Inserting Data, Modifying Records, Deleting Rows, and Basic SELECT Queries.
Week 4	Lab 4: Writing Advanced SQL Queries: Joins (Inner, Left, Right, Full), GROUP BY, HAVING, and Subqueries.
Week 5	Lab 5: Creating and Managing Views, Stored Procedures, Functions, and Automated Triggers in SQL.
Week 6	Lab 6: Database Normalization Case Study & Connecting Database Engines with Python/C# Applications.
Week 7	Lab 7: Revision, Database Design Project Presentation, Practical Exam, and Course Assessment.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Elmasri, R., & Navathe, S. B. (2016). "Fundamentals of Database Systems" (7th ed.). Pearson.	Yes
Recommended Texts	Silberschatz, A., Korth, H. F., & Sudarshan, S. (2019). "Database System Concepts" (7th ed.). McGraw-Hill Education.	Yes
Websites	Yes	

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.