



Ministry of Higher Education and
Scientific Research - Iraq
University of Diyala
College of Engineering for Artificial
Intelligence Technology
Department of Cybersecurity Engineering



الملحق ٤: وصف المادة الدراسية

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Database		Module Delivery
Module Type	Core		☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar
Module Code	CSE 209		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	2	Semester of Delivery	
Administering Department	Cybersecurity Eng.	College	College of Artificial Intelligence Engineering Technology
Module Leader	Ministry	e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	14/05/2026	Version Number	1.0

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



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Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	By the end of this module, students will be able to: 1. Understand the fundamental concepts of database systems and database management systems (DBMS). 2. Analyze and design relational databases using standard database modeling techniques. 3. Apply normalization and schema design principles to improve database efficiency and integrity. 4. Develop SQL queries for data definition, manipulation, and retrieval. 5. Understand database security, authorization, and distributed database concepts. 6. Explore modern database technologies, including NoSQL systems and database connectivity techniques. 7. Apply database concepts in practical computing and information management applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this module, students should be able to: 1. Explain the architecture and components of DBMS environments. 2. Design Entity-Relationship (ER) models and convert them into relational schemas. 3. Apply normalization techniques up to Third Normal Form (3NF). 4. Construct SQL statements for database creation, querying, and manipulation. 5. Analyze relational algebra operations and their applications. 6. Implement joins, subqueries, indexing, and database views. 7. Evaluate database security mechanisms and access control methods. 8. Distinguish between relational and NoSQL database systems. 9. Describe distributed database systems and database connectivity technologies. 10. Develop practical database applications using modern database tools.
Indicative Contents المحتويات الإرشادية	• Introduction to Databases and DBMS Concepts • Database Architecture and Data Models • Entity-Relationship Modeling and UML Concepts • Relational Database Design and Schema Mapping • Keys, Constraints, and Normalization Techniques • Relational Algebra and Query Processing • Structured Query Language (SQL) • SQL Joins, Views, Subqueries, and Indexing • Database Design Methodologies and Life Cycle • Logical and Physical Database Design • Database Security and Authorization • Distributed Database Management Systems (DDBMS) • Database Connectivity Technologies • NoSQL Databases and Emerging Database Technologies • Functional Dependencies and Schema Optimization



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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The module will be delivered using a combination of: • Interactive lectures and classroom discussions. • Practical laboratory sessions using DBMS software. • Database design exercises and case studies. • Individual and group-based assignments. • SQL programming and query-writing activities. • Demonstrations of database security and administration concepts. • Continuous assessment through quizzes, projects, reports, and examinations.
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Student Workload (SWL)

الحمل الدراسي للطلاب محسوب ل ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	47	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	3.1
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (5)	6 and 14	LO #1 to #10
	Assignments	2	10% (5)	4, 7 and 10	LO #1 - #7
	Class Work	2	10% (5)		
	Projects / Lab.	1	10%		
	Report				
Summative assessment	Midterm Exam	1 hr	10% (10)	9	LO #1 to #6
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		



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Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Databases and DBMS: DBMS concepts, history, and architecture Discussion on DBMS applications
Week 2	Database Architecture & Data Models: 3-schema architecture and data models Compare relational vs. non-relational
Week 3	Entity-Relationship (ER) Modeling: Create ER diagrams for sample systems Group modeling exercise, ER-Diagram, and Unified Modeling Language.
Week 4	Relational Model & Schema Design: Mapping ER to relational schemas, Discussion of keys and constraints, features of good relational database design, atomic domain, and Normalization (1NF, 2NF, 3NF).
Week 5	Relational Algebra & Query: introduction, Selection, projection, set operations, renaming, Joins, Division, syntax, semantics, Operators, grouping and ungrouping, relational comparison.
Week 6	Structured Query Language (SQL): Basics DDL & DML operations in SQL, Write simple queries in DBMS
Week 7	MIDTERM EXAM
Week 8	SQL Joins, Subqueries, Views, and Indexing: Join operations and subqueries Index usage
Week 9	Database Design: The Systems Development Life Cycle, The Database Life Cycle, Conceptual Design
Week 10	Logical Design and Physical Design: Determine Performance Measures, Database Design Strategies, Centralized Versus Decentralized Design
Week 11	Database Security and Authorization: User roles, access control, backups
Week 12	Distributed Database Management Systems: DDBMS Advantages and Disadvantages, DDBMS Components, Levels of Data and Process Distribution
Week 13	Database Connectivity: Native SQL Connectivity , ODBC, DAO, and RDO , ADO.NET, Java Database Connectivity
Week 14	NoSQL & Emerging Database Technologies: Types of NoSQL (key-value, document, graph) Use-case comparison
Week 15	Normalization and Functional Dependencies: Demonstrate normalization up to 3NF, Design schema improvement
Week 16	Preparatory week before the final Exam



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Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Introduction to DBMS Environment and Database Tools
Week 2	Creating Databases and Tables using SQL
Week 3	Designing ER Diagrams for Sample Systems
Week 4	Mapping ER Models to Relational Schemas
Week 5	Applying Normalization Techniques (1NF–3NF)
Week 6	Relational Algebra Exercises and Query Design
Week 7	SQL Queries using SELECT, INSERT, UPDATE, DELETE
Week 8	Midterm Practical Assessment
Week 9	SQL Joins and Subqueries Implementation
Week 10	Creating Views and Using Indexes
Week 11	Database Design Case Study
Week 12	User Roles, Access Control, and Backup Operations
Week 13	Introduction to Distributed Database Concepts
Week 14	Database Connectivity using JDBC/ODBC
Week 15	Introduction to NoSQL Databases and Simple Applications

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	- Database System Concepts by Abraham Silberschatz, Henry F. Korth, and S. Sudarshan - Fundamentals of Database Systems by Ramez Elmasri and Shamkant B. Navathe - Database Management Systems by Raghu Ramakrishnan and Johannes Gehrke	No
Recommended Texts	- SQL Queries for Mere Mortals by John L. Viescas and Michael J. Hernandez - Modern Database Management by Jeffrey A. Hoffer, V. Ramesh, and Heikki Topi	No



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	• NoSQL Distilled by Pramod J. Sadalage and Martin Fowler	
Websites	• Oracle Database Documentation • MySQL Official Documentation • Microsoft SQL Server Documentation • PostgreSQL Documentation • W3Schools SQL Tutorial ○ • GeeksforGeeks Database Management System Tutorials	

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.				