

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	CET3203			
ECTS Credits	6			
SWL (hr/sem)	180			
Module Level	3	Semester of Delivery		6
Administering Department	CET	College	EETC	
Module Leader	Osama Abbas Hussein		e-mail	Osama.abbas@mtu.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	PhD	
Module Tutor	Ali Nafaa Gaafar		e-mail	ali_nafaa@mtu.edu.iq
Peer Reviewer Name	Dr. Mahmoud Shuker Mahmoud		e-mail	mahmoud.shukur@mtu.edu.iq
Scientific Committee Approval Date	13/06/2023	Version Number	1.0	

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	1. To learn the theory of the database. 2. To understand The Entity Relationship Model. 3. To Introduce SQL and SQL and relational database concepts. 4. To understand the Constraints imposed in a database. 5. Learn about Boolean Operators in SQL. 6. Learn about Normalization of a database. Learn about Storage and Query Processing, transaction, and recovery.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. To learn the theory of the database. 2. To understand The Entity Relationship Model. 3. To Introduce SQL and SQL and relational database concepts. 4. To understand the Constraints imposed in a database. 5. Learn about Boolean Operators in SQL. 6. Learn about Normalization of a database. Learn about Storage and Query Processing, transaction, and recovery.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part-A [15 Hrs] Introduction to the theory: What is the benefit of using a database versus a shared file system? What is Data models and the relational database system? Data independence versus data-dependent data and how a database addresses these two issues. The Three-level Architecture and why it is necessary. What are the characteristics of each of these levels and the role of the database administrator in establishing the separation of these levels? What is database management systems, its components and how they work together? Part-B [20Hrs] The Entity Relationship Model: ER diagrams, resolution of M:N relationships, and Table Instance Charts (TICs). Translations of TICs into relational tables. Introduction to SQL and relational database concepts: Relations and attributes. Candidate and primary keys. Foreign keys and why they are necessary. Introduction to relational operators and how they are applied. Creating and deleting tables. Constraints imposed in a database: Updating and deleting rows in a table using the UPDATE TABLE, DELETE TABLE, and the DROP TABLE command with and without constraints. Implementation of the Selection and Projection operators.

	Ordering the results of a table according to a given attribute in ascending or descending orders. Part-C [20 Hrs] Boolean Operators in SQL: pattern matching using the LIKE clause, % and underscore characters. Arithmetic Operations and use of built-in functions in SQL. Introduction to Group functions using the Group by clause and additional built in functions. Processing dates and time and basic arithmetic with dates. Formatting of dates and times. Normalization of a database.: First, second and third normal forms. How to detect anomalies and use of the Armstrong's axioms for determining functional dependencies. Importance of normalizing a database and the types of anomalies that may be encountered in First, Second, and Third Normal Forms. How to recognize, prevent, and how to get rid of anomalies in these forms. Part-D [20 hrs] Continuation of the normalization process: BCNF form and Dependency preservation. Algorithms to ensure dependency preservation. The Join operator and its different types. Advantages and disadvantages of higher normal forms from an operational point of view. Storage and Query Processing: RAID, Storage access, indexing and hashing, query processing and query optimization. Part-E [3] [10] Transaction Management and concurrency control: Transactions (concepts, state) and concurrency control (methods). Database Recovery: Concept and Recovery Techniques
--	---

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module focuses on fostering active student engagement during exercises, fostering the development of critical thinking skills, and encouraging participation. This will be accomplished through a combination of classroom instruction, interactive tutorials, and the inclusion of engaging experiments that involve sampling activities that capture students' interest. The aim is to refine and enhance students' critical thinking abilities while ensuring their active involvement in the learning process.
--------------------------	---

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	88	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	92	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	1850		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	5% (10)	6, 10	LO #3,4 , LO #7, 8
	Assignments	2	5% (10)	8, 13	LO # 6, 9, 10, 11 and 12
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	14	LO # 10, 11, 12 and 13
Summative assessment	Midterm Exam	2 hr	20% (10)	7	LO # 1-6
	Final Exam	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to the theory: What is the benefit of using a database versus a shared file system? What is Data models and the relational database system? Data independence versus data-dependent data and how a database addresses these two issues. The Three-level Architecture and why it is necessary. What are the characteristics of each of these levels and the role of the database administrator in establishing the separation of these levels? What is database management systems, its components and how they work together?
Week 2	
Week 3	The Entity Relationship Model: ER diagrams, resolution of M:N relationships, and Table Instance Charts (TICs). Translations of TICs into relational tables.
Week 4	Introduction to SQL and relational database concepts: Relations and attributes. Candidate and primary keys. Foreign keys and why they are necessary. Introduction to relational operators and how they are applied. Creating and deleting tables.
Week 5	
Week 6	Constraints imposed in a database: Updating and deleting rows in a table using the UPDATE TABLE, DELETE TABLE, and the DROP TABLE command with and without constraints. Implementation of the Selection and Projection operators. Ordering the results of a table according to a given attribute in ascending or descending orders.
Week 7	
Week 8	Boolean Operators in SQL: pattern matching using the LIKE clause, % and underscore characters. Arithmetic Operations and use of built-in functions in SQL. Introduction to Group functions using the Group by clause and additional built in functions. Processing dates and time and basic arithmetic with dates. Formatting of dates and times.
Week 9	
Week 10	Normalization of a database.: First, second and third normal forms. How to detect anomalies and use of the Armstrong's axioms for determining functional dependencies. Importance of normalizing a database and the types of anomalies that may be encountered in First, Second, and Third Normal Forms. How to recognize, prevent, and how to get rid of anomalies in these forms.
Week 11	Continuation of the normalization process: BCNF form and Dependency preservation. Algorithms to ensure dependency preservation. The Join operator and its different types. Advantages and disadvantages of higher normal forms from an operational point of view, join algorithm types.
Week 12	Storage and Query Processing: RAID, Storage access, indexing and hashing, query processing and query optimization.
Week 13	Transaction Management and concurrency control: Transactions (concepts, state) and concurrency control (methods).
Week 14	Database Recovery: Concept and Recovery Techniques
Week 15	Non-Relational Database systems: Document, Key-value, Column, Graph.
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	An Overview of Database and SQL Query language: Introduction to PHP and MySQL, Setup steps, HTML Review Form Handling
Week 2	Basic PHP syntax, Comments, outputs
Week 3	Arithmetic and variable operation
Week 4	PHP: control statements, Loops, and Arrays
Week 5	Creating Database, tables in SQL
Week 6	Attribute Data Types and Domains in SQL
Week 7	The Entity Relationship (ER) Model: Drawing and converting entities with a relationship to relation table
Week 8	SQL Server Constraints, Select, Inserting to Data from Database
Week 9	Updating, Deleting, ordered By Data from Database
Week 10	Group Functions: AVG, MIN, MAX, SUM
Week 11	Join in SQL Server
Week 12	View data from Database
Week 13	Nested sub-queries
Week 14 & 15	Complete web application using PHP and MySQL

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Book#1: C. J. Date, "Introduction to Database Systems", 8th Ed. Publisher: Addison-Wesley, 2003 Book#2: Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", 7 th Ed. Publisher: Pearson, 2016.	NO
Supporting Texts	Reference#1: A. Silberschatz, H. F.Korth, and S. Sudarshan, "Database System Concepts", 5th Ed. McGraw-Hill (2006). 1 . Reference#2: Database Systems the Complete Book by H. Garcia-Molina and et al. Prentice Hall; 2nd Edition	No

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.				