

QF01/0408-4.0E	Course Plan for Master program - Study Plan Development and Updating Procedures/ Department
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Study plan No.	2021/2022		University Specialization		Software Engineering	
Course No.	0104761		Course name		Advanced Database management system	
Credit Hours	3		Prerequisite Co-requisite			
Course type	<input type="checkbox"/> MANDATORY UNIVERSITY REQUIREMENT	<input type="checkbox"/> UNIVERSITY ELECTIVE REQUIREMENTS	<input type="checkbox"/> FACULTY MANDATORY REQUIREMENT	<input type="checkbox"/> Support course family requirements	<input type="checkbox"/> Mandatory requirements	<input checked="" type="checkbox"/> Elective requirements
Teaching style	<input type="checkbox"/> Full online learning		<input checked="" type="checkbox"/> Blended learning		<input type="checkbox"/> Traditional learning	
Teaching model	<input type="checkbox"/> 2Synchronous: 1asynchronous		<input checked="" type="checkbox"/> 2 face to face : 1synchronous		<input type="checkbox"/> 3 Traditional	

Faculty member and study divisions' information (to be filled in each semester by the subject instructor)

Name	Academic rank	Office No.	Phone No.	E-mail	
Dr.Feras Ahmed Altarawneh	Assistant professor	117	325	f.altarawneh@zuj.edu.jo	
Division number	Time	Place	Number of students	Teaching style	Approved model

Brief description

This module builds on the introductory module in databases. It intends to introduce more advanced topics in databases such as data mining and data warehousing, distributed databases and client server architecture after introducing the DBMS implementation.

Learning resources

Course book information (Title, author, date of issue, publisher ... etc)	"FUNDAMENTALS OF DATABASE SYSTEMS", Seventh Edition. Ramez Elmasri and Shamkant B. Navathe. 2017 by Pearson..
Supportive learning resources (Books, databases, periodicals, software, applications, others)	<ol style="list-style-type: none"> 1- Pang-Ning Tan, Michael Steinbach, and Vipin Kumar, "Introduction to Data Mining", Addison Wesley, 2006. 2- Han J., Kamber M., "Data Mining: Concepts and Techniques", Morgan Kaufmann, 2006. 3- ilberschatz, A., Korth, H.F. and Sudarshan, S. "Database System Concepts", 5th. Ed., McGraw-Hill Higher Education, 2006. 4- Coronel, R., "Database Systems: Design, Implementation and Management" Course Technology- Thomson Learning, 2002. 5- Date, C.J., "An Introduction to Database Systems", 8th. Ed., Addison-Wesley, 2004. 6- Patrick Valduriez M. TamerOzsu, "Principles of Distributed Database Systems", 2th Ed., Prentice Hall, 1999.Lecturers Notes and Handouts

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Supporting websites				
The physical environment for teaching	<input checked="" type="checkbox"/> Class room	<input checked="" type="checkbox"/> labs	<input checked="" type="checkbox"/> Virtual educational platform	<input type="checkbox"/> Others
Necessary equipment and software	SQL			
Supporting people with special needs				
For technical support				

Course learning outcomes (S= Skills, C= Competences K= Knowledge,)

No.	Course learning outcomes	The associated program learning output code
Knowledge		
K1	The knowledge of the fundamental principles, and concepts, architectural of database technology.	MK1
K2	awareness of the query processing and optimization	MK2
K3	Understanding of the hashing and indexing structures in data base systems.	Mk2
K4	Understanding the knowledge related transaction processing, data mining concepts, information retrieval, and distributed database.	Mk2
Skills		
S1	An ability to discuss the main concepts and the architecture of database systems.	MS1
S2	An ability to apply different query operations and use query size estimation rules.	MS3
S3	An ability to select the best hashing and indexing methods. .	MS1, MS3
S4	An ability to compare, analysis and evaluate different control techniques of concurrency and database recovery techniques.	MS1
S5	An ability to distinguish between the data mining and data warehouse.	MS1
Competences		
C1	An ability to create different database systems in diverse application domains.	MC1
C2	An ability to work with diverse team and communicate effectively	MC1
C3	An ability to learn from, and get expertise from different domains.	MC3

Mechanisms for direct evaluation of learning outcomes

Type of assessment / learning style	Fully electronic learning	Blended learning	Traditional Learning (Theory Learning)	Traditional Learning (Practical Learning)
First exam	0	0	%20	0
Second / midterm exam	%30	%30	%20	30%
Participation / practical	0	0	10	30%

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applications				
Asynchronous interactive activities	%30	%30	0	0
final exam	%40	%40	%50	40%

Note: Asynchronous interactive activities are activities, tasks, projects, assignments, research, studies, projects, work within student groups ... etc, which the student carries out on his own, through the virtual platform without a direct encounter with the subject teacher.

Schedule of simultaneous / face-to-face encounters and their topics

Week	Subject	learning style*	Reference **
1	Introduction: Database concepts, architecture, and Data modeling	Lecture	7, 10, 11, 13
2	Relational model: Concepts, Constraints, Query language Database design: Functional dependencies, Normalization	Lecture	29 489
3	SQL: complex queries, queries, triggers, views, and scheme modification	Lecture	237-262
4	Strategies for query processing: Translating SQL queries, sorting, selection operation, JOIN operation, other operation	Lecture	685 718
5	- Query optimization: query tree and heuristics, query execution plan, cost-based optimization	Lecture	721-761
6	Indexing and Hashing Structures for Files: <ul style="list-style-type: none"> lacing file records on disk, Operations on file, Files of ordered and unordered records, Hashing techniques 	Lecture	590-602
7	Introduction to transaction processing: <ul style="list-style-type: none"> Concepts and theory 	Lecture	775-793
8	Concurrency control techniques: <ul style="list-style-type: none"> Two- phase locking technique, time-stamping technique, validation technique, granularity, deadlock handling 	Lecture	811-837
9	Database recovery techniques: Recovery concept, log based recovery,	Lecture	843-863

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	failure with loss of nonvolatile storage, remote backup system		
10	Distributed database : Concepts, design, types, data fragmentation, replication, allocation techniques, others MID EXAM	Lecture	871-905
11	NOSQL database Big data storage system Mapreduce and hadoop	Lecture	941-966
12	Enhanced data model: Introduction to active database, Temporal database, Spatial database, Multimedia database, Deductive database	Lecture	993-1024
13	Introduction to information retrieval And web search: concepts, retrieval models, text preprocessing, queries in IR systems, web search and analysis	Lecture	1052-1077
14	Data mining: Concepts, algorithms, types of data, data reprocessing, data quality, Classification using decision tree	Lecture	1-88 Ref2
15	SVM, KNN, artificial neural networks, clustering, data warehousing, web mining, and graph mining.	Lecture	145-315 Ref.,2,3
16	Final Exam		

* Learning styles: Lecture, flipped learning, learning through projects, learning through problem solving, participatory learning ... etc.

** Reference: Pages in a book, database, recorded lecture, content on the e-learning platform, video, website ... etc.

Schedule of asynchronous interactive activities (in the case of e-learning and blended learning)

Week	Task / activity	Reference	Expected results
1	Define the following terms: data, database, DBMS, database system, database catalog, program-data independence, user view, DBA, end user, canned transaction, deductive database system, persistent object, meta-data, and transaction-processing application	Page 27, 1.1	All definitions of the previous terms
2	Discuss the characteristics of relations that make them different from ordinary tables and	Page 80 3.6	Set of relations characteristics
3	Write appropriate SQL DDL statements for declaring the LIBRARY relational	Page 112 4.8	SQL DDL statements

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	database schema of Figure 4.6. Specify the keys and referential triggered actions.		
4	Discuss how each of the following constructs is used in SQL, and discuss the various options for each construct. Specify what each construct is useful for. a. Nested queries. b. Joined tables and outer joins. c. Aggregate functions and grouping. d. Triggers. e. Assertions and how they differ from triggers. f. Views and their updatability. g. Schema change commands.	Page 141 5.4	SQL Queries
5	What is meant by the term heuristic optimization? Discuss the main heuristics that are applied during query optimization.	Page 723 19.4	The main characteristics of heuristic optimization
6	What are the differences among primary, secondary, and clustering indexes? How do these differences affect the ways in which these indexes are implemented? Which of the indexes are dense, and which are not?	Page 671 18.2	Txt of discussion
7	Discuss the different measures of transaction equivalence. What is the difference between conflict equivalence and view equivalence?	Page 772 21.8	Set of differences between conflict equivalence and view equivalence
8	Prove that the basic two-phase locking protocol guarantees conflict serializability of schedules. (Hint: Show that if a serializability graph for a schedule has a cycle, then at least one of the transactions participating in the schedule does not obey the two-phase locking protocol.)	Page 804 22.20	examples
9	Describe the shadow paging recovery technique. Under what circumstances does it not require a log?	Page 828 23.15	shadow paging recovery technique
10	Discuss what is meant by the following terms: degree of homogeneity of a DDBMS, degree of local autonomy of a DDBMS, federated DBMS, distribution transparency, fragmentation transparency, replication transparency, multidatabase system	Page 920 25.3	Set of definitions
11	Discuss the Big data storage system	Page 956	Text of discussion
12	Give the differences between the	Page 678	Definition of each term

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	Temporal database, Spatial database, Multimedia database, Deductive database		
13	What is meant by navigational, informational, and transformational search?	Page 102 27.3	Definition of each term
14	What are the different phases of the knowledge discovery from databases? Describe a complete application scenario in which new knowledge may be mined from an existing database of transactions.	Page 1063 28.1	Set of steps related how to discover new knowledge.
15	What is a data warehouse? How does it differ from a database	Page 1081 29.1	The different between data warehouse and DB
16			