

QFXX/0408-4.0E	Course Plan for Bachelor program - Study Plan Development and Updating Procedures/ Artificial Intelligence Department
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Study plan No.	2021\2022		University Specialization		Artificial Intelligence
Course No.	0142339		Course name		Advanced Database
Credit Hours	3		Prerequisite Co-requisite		Database
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 type="checkbox"/> <input checked="" type="checkbox"/> Blended learning		<input type="checkbox"/> Traditional learning
Teaching model	<input type="checkbox"/> 2Synchronous: 1asynchronous		<input type="checkbox"/> <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	
Division number	Time	Place	Number of students	Teaching style	Approved model

Brief description

This course provides the following topics: Transaction, Failures, Inconsistency, Query Optimization, Indexing and Hashing, Distributed Databases, Special Data Types, Storage Units, RAID, and various advanced database topics.

Learning resources

Course book information (Title, author, date of issue, publisher ... etc)	Database System Concepts, 7th edition, McGraw Hill Book Company, 2019, by Avi Silberschatz, Henry F.Korth and S.Sudarshan.				
Supportive learning resources (Books, databases, periodicals, software, applications, others)	1. Database Systems: Design, Implementation, and Management, 2012, Peter Rob, Carlos Coronel, and Steven Morris.				
Supporting websites					
The physical environment for teaching	<input type="checkbox"/> <input checked="" type="checkbox"/> Class room	<input type="checkbox"/> labs	<input type="checkbox"/> <input checked="" type="checkbox"/> Virtual educational platform	<input type="checkbox"/> Others	
Necessary equipment and software					
Supporting people with special needs					
For technical support					

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

No.	Course learning outcomes	The associated program learning output code
Knowledge		
K1	To understand the concepts of the Transaction Management and Concurrency Control.	MK3
K2	To understand the causes, types, and solutions of transaction failure.	MK3
K3	To understand the distributed database main concepts.	MK3
K4	To grasp the basic concepts of various advanced database topics.	MK3
Skills		
S1	To apply the transaction properties.	MS3
S2	To identify the type of transaction failure and apply the recovery methods to solve the failure.	MS3
S3	To apply the distributed database concepts.	MS3
S4	To use the advanced database methods to solve real-life problems.	MS3
Competences		
C1	To apply the main concepts of Transaction Management and Concurrency Control for problems solving in real life.	MC1
C2	To build smart applications based on advanced database methods.	MC3
C3	To create advanced and distributed database applications that match the requirements and needs of the labor market.	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 applications	0	0	10	30%
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.

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

Week	Subject	learning style*	Reference **
1	Transactions Concept, Properties, States. Applications.	Lectures	799-812 (Ref1)
2	Recovery Systems Types of failures, Recovery methods, Log based recovery. Failure with loss of Nonvolatile storage.	Lectures	907-947 (Ref1)
3	Concurrency Control Introduction, Consistency Problems, Locks.	Lectures	835-853 (Ref1)
4	Query Processing Measures of Query cost, Selection, Sorting, Join.	Lectures	689-695 (Ref1)
5	Query Optimization Transformation of Relational Expression, Estimating statistics of expression results.	Lectures	743-778 (Ref1)
6	General Review and Exercises	Lectures	
7	Hashing and Indexing Basic concepts, Ordered Index, Static Hashing	Lectures	623-670 (Ref1)
8	Storage and File Structure Overview of physical storage media, Magnetic Disk and Flash Storage, RAID.	Lectures	587-615 (Ref1)
9	Parallel Databases Basic Concepts. Difference between parallel and distributed systems.	Lectures	1003-1019 (Ref1)
10	Distributed Databases Homogenous and Heterogenous databases, Two phase commit protocol, Basic Distributed Database concepts	Lectures	1019-1023 (Ref1)
11	Distributed Databases Fragmentation, Transparency.	Lectures	Ref2
12	General Review and Exercises	Lectures	
13	Database Security	Lectures	Ref2
14	Project Presentations	Lectures	
15	Project Presentations	Lectures	
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.

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

Week	Task / activity	Reference	Expected results
1	Homework 1 on Transactions	Ref1	To understand the concepts of the Transaction Management.
2	Homework 2 on Recovery Systems	Ref1	To understand the concepts of Recovery Systems.
3	Homework 3 on Concurrency Control	Ref1	To understand the concepts of Concurrency Control.
4	Homework 4 on Query Processing	Ref1	To understand the concepts of Query Processing.
5	Homework 5 on Query Optimization	Ref1	To understand the concepts of Query Optimization.
6	Homework 6 - Presentations	Ref1	
7	Homework 7 on Hashing and Indexing	Ref1	To understand the concepts of Hashing and Indexing.
8	Homework 8 on Storage and File Structure	Ref1	To understand the concepts of Storage and File Structure.
9	Homework 9 on Parallel Databases	Ref1	To understand the concepts of Parallel Databases.
10	Homework 10 on Distributed Databases	Ref1	To understand the concepts of Distributed Databases.
11	Homework 11 on Distributed Databases	Ref2	To understand the concepts of Distributed Databases.
12	Homework 12 - Presentations	Ref2	
13	Homework 13 on Database Security	Ref2	To understand the concepts of Database Security.
14	Project Presentations	Ref1+ Ref2	To apply the concepts of advanced database.
15	Project Presentations	Ref1+ Ref2	To apply the concepts of advanced database.
16	Final Exam		