QFXX/0408-4.0E	Course Plan for Bachelor program - Study Plan Development and Updating Procedures/ Artificial Intelligence Department

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	☐ MANDATORY UNIVERSITY REQUIREMENT	☐ UNIVERSITY ELECTIVE REQUIREMENTS	☐ FACULTY MANDATORY REQUIREMENT	☐ Support course family requirements	☐ Mandatory requirements / ☐ √ Elective requirements
Teaching style	☐ **Full online learning**		☐ **√ Blended learning**		☐ **Traditional learning**
Teaching model	☐ **2Synchronous: 1asynchronous**		☐ **√ 2 face to face : 1synchronous**		☐ **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	☐ **√ Class room**	☐ labs	☐ **√ Virtual educational platform**	☐ Others
Necessary equipment and software				
Supporting people with special needs				
For technical support				

QFXX/0408-4.0E	Course Plan for Bachelor program - Study Plan Development and Updating Procedures/ Artificial Intelligence Department

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.

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** Homogenious and Heterogenious 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.**

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		