



46. Course Specification of Database Systems

I. Course Identification and General Information					
1.	Course Title:	Database Systems			
2.	Course Code & Number:	CCE323			
3.	Credit hours:	C.H			Total
		Th.	Tu.	Pr.	
		2	-	2	-
4.	Study level/ semester at which this course is offered:	Fourth Year/ Second Semester			
5.	Pre –requisite (if any):	Data Structure and Algorithms			
6.	Co –requisite (if any):	None.			
7.	Program (s) in which the course is offered:	B.Sc. of Computer and Control Engineering			
8.	Language of teaching the course:	Arabic & English			
9.	Location of teaching the course:	Class Room (Faculty of Engineering)			
10.	Prepared By:	Prof. Abdul Raqib Abdo Asaad			
11.	Date of Approval				

II. Course Description
<p>This course aims to provide students with the fundamentals theories and concepts related to the design and implementation of database systems. Database systems have many various environmental applications in society, software development, IT and marketing. Course topics include an introduction to database systems, the Structural Query Language (SQL), the basic concepts and techniques on data organization in secondary storage, and advanced database design concepts. This course is supported with lectures and practical lab work to develop students skills related to practices in database system design and implementation for different environments and applications.</p>

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III. Course Intended learning outcomes (CILOs) of the course		Referenced PILOs
a1	Define the database design theory and methodology as well as the main stage of the database system development lifecycle	A1
a2	Recognize the main phases of database design.	A2
b1	Analyze user requirements for the simplification of the database design process.	B1, B2
b2	Represent attributes using database normalization technique.	B4
c1	Design a complete database system for a desired application.	C2
c2	Apply integrity constraints using SQL.	C4
d1	Work effectively either individually or in a group to achieve final course's project or during laboratory activities.	D1
d2	Follow the standards to achieve reports and presentations while assigned in solving tasks related to database design and implementation.	D4

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1- Define the database design theory and methodology as well as the main stage of the database system development lifecycle	Lectures Dialogue and discussion Projects	Written Test and Quizzes Reports evaluation Presentations evaluation Assignments
a2- Recognize the main phases of database design.	Lectures Dialogue and discussion Projects	Written Test and Quizzes Reports evaluation Presentations evaluation Assignments

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(B) Alignment Course Intended Learning Outcomes of Intellectual Skillsto Teaching Strategies and Assessment Strategies		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1- Analyze user requirements for the simplification of the database design process.	Lectures Case study Laboratory Projects	Written Test and Quizzes Reports evaluation Presentations evaluation Assignments
b2- Represent attributes using database normalization technique.	Lectures Case study Laboratory Projects	Written Test and Quizzes Reports evaluation Presentations evaluation Assignments

(C) Alignment Course Intended Learning Outcomes of Professional and Practical Skillsto Teaching Strategies and Assessment Strategies		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1- Design a complete database system for a desired application.	Lectures Case study Laboratory Exercise Projects	Written Test and Quizzes Reports evaluation Presentations evaluation Assignments
c2- Apply integrity constraints using SQL.	Lectures Case study Laboratory Exercise Projects	Written Test and Quizzes Reports evaluation Presentations evaluation Assignments

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(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1- Work effectively either individually or in a group to achieve final course's project or laboratory activities during	Case study Laboratory Projects	Observation Reports evaluation Presentations evaluation
d2- Follow the standards to achieve reports and presentations while assigned in solving tasks related to database design and implementation.	Projects	Reports evaluation Presentations evaluation

IV. Course Content					
A – Theoretical Aspect					
Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	Contact hours
1.	Introduction to database systems	a1	<ul style="list-style-type: none"> • Traditional File-based systems • Database approach • Architecture for database systems • Roles in database environment • History of DBMS • Advantages and disadvantages of DBMS 	1	2
2.	Database environment	a1	<ul style="list-style-type: none"> • Three level ANSI-SPARC architecture • Database languages • Database model and conceptual modeling. • Function of a DBMS • Components of DBMS • Multi-user DBMS architectures 	1	2

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3.	Relational data model	a1, a2	<ul style="list-style-type: none"> • Relational model and terminology • Relational keys and integrity constraints • Relational Algebra • Relational Calculus 	2	4
4.	Database planning, design and administration	a1, a2, b1, c1	<ul style="list-style-type: none"> • Database system development lifecycle • Database planning and system definition • Requirements collection and analysis • Database design phases • DBMS selection 	2	4
5.	Entity-Relationship (ER) data model	a1, a2, b1, c1	<ul style="list-style-type: none"> • Entity and Relationship types • Strong and weak entity types • Attributes on relationships • Structural constraints. 	1	2
6.	Entity-Relationship (ER) data model (Cont.)	a1, a2, b1, c1	<ul style="list-style-type: none"> • Hashing techniques • Database Procedural Design Steps using ER diagram, • Problems with ER models. 	1	2
7.	Relational database design, normal form	a1, a2, b1, b2, c1	<ul style="list-style-type: none"> • Normalization purpose and advantages • Data redundancy and update • Anomalies • Functional dependencies • 1NF, 2NF, AND 3NF • Database design theory and methodology 	2	4
8.	File organization and indexes	a1, a2, b1	<ul style="list-style-type: none"> • Secondary storage devices • File organization concepts and techniques • Indexes 	2	4

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			<ul style="list-style-type: none"> Guidelines for selecting file organization 		
9.	Advanced Topics in Database Systems	a1, a2, b1, b2	<ul style="list-style-type: none"> Recovery Concurrency Security Object oriented database Advanced database design concepts Advances applications in database 	2	4
Number of Weeks /and Units Per Semester				14	28

B - Practical Aspect				
Order	Topics List	Number of Weeks	Contact hours	Learning Outcomes
1.	Introduction to Access	1	2	a1, a2, b1, c1, d1
2.	Types of records in Access	1	2	a1, a2, b1, c1, d1
3.	Forms and Query	1	2	a1, a2, b1, c1, d1
4.	Introduction to SQL	1	2	a1, a2, b1, b2, c1, c2, d1
5.	Create tables	1	2	a1, a2, b1, b2, c1, c2, d1
6.	Constraints on tables	1	2	a1, a2, b1, b2, c1, c2, d1
7.	Data changing	1	2	a1, a2, b1, b2, c1, c2, d1
8.	Select statement	1	2	a1, a2, b1, b2, c1, c2, d1
9.	Order data	1	2	a1, a2, b1, b2, c1, c2, d1
10.	Joint	1	2	a1, a2, b1, b2, c1, c2, d1
11.	Sub-queries	1	2	a1, a2, b1, b2, c1, c2, d1
12.	Functions	1	2	a1, a2, b1, b2, c1, c2, d1
13.	Introduction to Oracle developer, forms and reports	1	2	a1, a2, b1, b2, c1, c2, d1
14.	Final Lab Exam	1	2	a1, a2, b1, b2, c1, c2, d1
Number of Weeks /and Units Per Semester		14	28	

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V. Teaching strategies of the course

- Lectures
- Dialogue and discussion
- Case study
- Laboratory
- Projects
- Exercise

VI. Reports & Assignments

No	Assignments	Aligned CILOs	Week Due	Mark
1.	Assignment: Relational Database, Database Design and Planning and Database Design using ER diagram	a1, a2, b1, b2, c1, d1	3 rd to 9 th	3.5
2.	Assignment & Reports: Database Design using Normalization, Database Integrity, Database Recovery and Concurrency	a1, a2, b1, b2, c1, d1, d2	10 th to 15 th	3.5
3.	Laboratory reports: on SQL Select Statement with all of its different variances.	b1, b2, c1, c2, d2	Weekly	8
Total Marks				15

VII. Schedule of Assessment Tasks for Students during the Semester

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1.	Reports & Assignments	Weekly	15	10%	a1, a2, b1, b2, c1, d1, d2
2.	Course project	15 th	22.5	15%	a1, a2, b1, b2, c1, c2, d2
3.	Midterm Exam	8 th	22.5	15%	a1, a2, b1, b2, c1, c2
4.	Final Lab. Exam	14 th	15	10%	a1, a2, b1, b2, c1, c2
5.	Final Exam	16 th	75	50%	a1, a2, b1, b2, c1, c2
Total			150	100%	

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VIII. Learning Resources	
Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).	
1- Required Textbook(s) (maximumtwo)	
	1. C.J. Date (2003), “An Introduction to Database Systems”, Eighth Edition, Pearson. 2. RamezElmasri and Shamkant B. Navathe(2015),“Fundamentals of Database Systems”,Seventh Edition, Pearson.
2- Essential References	
	1. SikhaSahaBaguiandRichard Walsh Earp(2011),“Database Design Using Entity-Relationship Diagrams”, SecondEdition, Auerbach Publications. 2. Thomas M. Connolly and Carolyn E. Begg (2009), “Database Systems: A Practical Approach to Design, Implementation and Management”, Fifth Edition, Pearson.
3- Electronic Materials and Web Sites etc.	

IX. Course Policies:	
1.	Class Attendance: - The students should have more than 75% of attendance according to rules and regulations of the faculty.
2.	Tardy: - The students should respect the timing of attending the lectures. They should attend within 15 minutes from starting of the lecture.
3.	Exam Attendance/Punctuality: - The student should attend the exam on time. The punctuality should be implemented according to rules and regulations of the faculty for mid-term exam and final exam.
4.	Assignments & Projects: - The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time.

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5.	<p>Cheating:</p> <ul style="list-style-type: none"> - If any cheating occurred during the examination, the student is not allowed to continue and he has to face the examination committee for enquiries.
6.	<p>Plagiarism:</p> <ul style="list-style-type: none"> - If one student attends the exam on another behalf; he will be dismissed from the faculty according to the policy, rules and regulations of the university.
7.	<p>Other policies:</p> <ul style="list-style-type: none"> - All the teaching materials should be kept out the examination hall and mobile phones are not allowed. - Mutual respect should be maintained between the student and his teacher and also among students. Failing in keeping this respect is subject to the policy, rules and regulations of the university.

Reviewed By	<p><u>Vice Dean for Academic Affairs and Post Graduate Studies: Asst. Prof. Dr. Tarek A. Barakat</u></p> <p><u>President of Quality Assurance Unit: Assoc. Prof. Dr. Mohammed Algorafi</u></p> <p><u>Name of Reviewer from the Department: Assoc. Prof. Dr. Farouk Al-Fuhaidy</u></p>
	<p><u>Deputy Rector for Academic Affairs Asst. Prof. Dr. Ibrahim AlMutaa</u></p> <p><u>Assoc. Prof. Dr. Ahmed Mujahed</u></p> <p><u>Asst. Prof. Dr. Munasar Alsubri</u></p>

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46. Course Plan of Database Systems

I. Information about Faculty Member Responsible for the Course						
Name of Faculty Member	Prof. Abdul Raqib Abdo Asaad	Office Hours				
Location & Telephone No.		SAT	SUN	MON	TUE	WED
E-mail						

II. Course Identification and General Information						
1.	Course Title:	Database Systems				
2.	Course Number & Code:	CCE323				
3.	Credit hours:	C.H				Total
		Th.	Tu.	Pr.	Tr.	
		2	-	2	-	
4.	Study level/year at which this course is offered:	Fourth Year/ Second Semester				
5.	Pre –requisite (if any):	Data Structure and Algorithms				
6.	Co –requisite (if any):	None.				
7.	Program (s) in which the course is offered	B.Sc. of Computer and Control Engineering				
8.	Language of teaching the course:	Arabic & English				
9.	System of Study:	Semesters				
10.	Mode of delivery:	Lecture				
11.	Location of teaching the course:	Class Room (Faculty of Engineering)				

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III. Course Description

This course aims to provide students with the fundamentals theories and concepts related to the design and implementation of database systems. Database systems have many various environmental applications in society, software development, IT and marketing. Course topics include an introduction to database systems, the Structural Query Language (SQL), the basic concepts and techniques on data organization in secondary storage, and advanced database design concepts. This course is supported with lectures and practical lab work to develop students skills related to practices in database system design and implementation for different environments and applications.

- IV. Intended learning outcomes (ILOs) of the course:**
1. Define the database design theory and methodology as well as the main stage of the database system development lifecycle
 2. Recognize the main phases of database design.
 3. Analyze user requirements for the simplification of the database design process.
 4. Represent attributes using database normalization technique.
 5. Design a complete database system for a desired application.
 6. Apply integrity constraints using SQL.
 7. Work effectively either individually or in a group to achieve final course's project or during laboratory activities.
 8. Follow the standards to achieve reports and presentations while assigned in solving tasks related to database design and implementation.

V. Course Content

A – Theoretical Aspect

Order	Units/Topics List	Sub Topics List	Number of Weeks	Contact hours
1.	Introduction to database systems	<ul style="list-style-type: none"> • Traditional File-based systems • Database approach 	1 st	2

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		<ul style="list-style-type: none"> • Architecture for database systems • Roles in database environment • History of DBMS • Advantages and disadvantages of DBMS 		
2.	Database environment	<ul style="list-style-type: none"> • Three level ANSI-SPARC architecture • Database languages • Database model and conceptual modeling. • Function of a DBMS • Components of DBMS • Multi-user DBMS architectures 	2 nd	2
3.	Relational data model	<ul style="list-style-type: none"> • Relational model and terminology • Relational keys and integrity constraints • Relational Algebra • Relational Calculus 	3 rd ,4 th	4
4.	Database planning, design and administration	<ul style="list-style-type: none"> • Database system development lifecycle • Database planning and system definition • Requirements collection and analysis • Database design phases • DBMS selection 	5 th ,6 th	4
5.	Entity-Relationship (ER) data model	<ul style="list-style-type: none"> • Entity and Relationship types • Strong and weak entity types • Attributes on relationships • Structural constraints. 	7 th	2

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6.	Midterm Exam	<ul style="list-style-type: none"> • ALL Previous Topics 	8 th	2
7.	Entity-Relationship (ER) data model (Cont.)	<ul style="list-style-type: none"> • Hashing techniques • Database Procedural Design Steps using ER diagram, • Problems with ER models. 	9 th	2
8.	Relational database design, normal form	<ul style="list-style-type: none"> • Normalization purpose and advantages • Data redundancy and update • Anomalies • Functional dependencies • 1NF, 2NF, AND 3NF • Database design theory and methodology 	10 th , 11 th	4
9.	File organization and indexes	<ul style="list-style-type: none"> • Secondary storage devices • File organization concepts and techniques • Indexes • Guidelines for selecting file organization 	12 th , 13 th	4
10.	Advanced Topics in Database Systems	<ul style="list-style-type: none"> • Recovery • Concurrency • Security • Object oriented database • Advanced database design concepts • Advances applications in database 	14 th , 15 th	4
11.	Final Exam	<ul style="list-style-type: none"> • ALL Topics 	16 th	2
Number of Weeks /and Units Per Semester			16	32

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B - Practical Aspect			
Order	Topics List	Number of Weeks	Contact hours
1.	Introduction to Access	1 st	2
2.	Types of records in Access	2 nd	2
3.	Forms and Query	3 rd	2
4.	Introduction to SQL	4 th	2
5.	Create tables	5 th	2
6.	Constraints on tables	6 th	2
7.	Data changing	7 th	2
8.	Select statement	8 th	2
9.	Order data	9 th	2
10.	Joint	10 th	2
11.	Sub-queries	11 th	2
12.	Functions	12 th	2
13.	Introduction to Oracle developer, forms and reports	13 th	2
14.	Final Lab Exam	14 th	2
Number of Weeks /and Units Per Semester		14	28

VI. Teaching strategies of the course
<ul style="list-style-type: none"> • Lectures • Dialogue and discussion • Case study • Laboratory • Projects • Exercise

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VII. Reports & Assignments				
No	Assignments	Aligned CILOs	Week Due	Mark
1.	Assignment: Relational Database, Database Design and Planning and Database Design using ER diagram	a1, a2, b1, b2, c1, d1	3 rd to 9 th	3.5
2.	Assignment & Reports: Database Design using Normalization, Database Integrity, Database Recovery and Concurrency	a1, a2, b1, b2, c1, d1, d2	10 th to 15 th	3.5
3.	Laboratory reports: on SQL Select Statement with all of its different variances.	b1, b2, c1, c2, d2	Weekly	8
Total Marks				15

VIII. Schedule of Assessment Tasks for Students during the Semester					
No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1.	Reports & Assignments	Weekly	15	10%	a1, a2, b1, b2, c1, d1, d2
2.	Course project	15 th	22.5	15%	a1, a2, b1, b2, c1, c2, d2
3.	Midterm Exam	8 th	22.5	15%	a1, a2, b1, b2, c1, c2
4.	Final Lab. Exam	14 th	15	10%	a1, a2, b1, b2, c1, c2
5.	Final Exam	16 th	75	50%	a1, a2, b1, b2, c1, c2
Total			150	100%	

IX. Learning Resources
Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).
1- Required Textbook(s) (maximum two)

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	<ol style="list-style-type: none"> 1. C.J. Date (2003), “An Introduction to Database Systems”, Eighth Edition, Pearson. 2. RamezElmasri and Shamkant B. Navathe(2015),“Fundamentals of Database Systems”,Seventh Edition, Pearson.
2- Essential References	
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4.	Assignments & Projects: - The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time.
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6.	<p>Plagiarism:</p> <ul style="list-style-type: none"> - If one student attends the exam on another behalf; he will be dismissed from the faculty according to the policy, rules and regulations of the university.
7.	<p>Other policies:</p> <ul style="list-style-type: none"> - All the teaching materials should be kept out the examination hall and mobile phones are not allowed. - Mutual respect should be maintained between the student and his teacher and also among students. Failing in keeping this respect is subject to the policy, rules and regulations of the university.

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