

A. Course Description

Course Code	
Course Title	Introduction to Database Systems
Credit Hours	4(3+1)
Assessment Instruments with Weights (quizzes, midterms, final, assignments, presentation, lab work, etc.)	As shared in slides.
Course Instructors	Ayesha Majid
Course Coordinator / QCH	Dr. Muhammad Yaseen
Lab Instructors	
Office Hours	
Plagiarism Policy	All the parties involved in first cheating case in Midterm or Final term will be awarded 'F' for the course.
Current Catalog Description	<ul style="list-style-type: none">• The course aims to introduce basic database concepts, different data models, data storage, retrieval and database design techniques.• The course primarily aims to introduce the concepts of relational data model.• This course includes detailed discussion on various features of Databases such as Design, ER Model, Relational Model, and Normalization.• Introduction to SQL and its practical use. It will also include practical demonstration and use of a commercial database packages.• Introduction to the advance topics of Databases like data mining, data warehousing & indexing etc.
Textbook	<ul style="list-style-type: none">• Ramez Elmasri, Fundamentals of Database Systems (6th Edition)
Reference Books	<ul style="list-style-type: none">• C. J. Date, An Introduction to Database Systems (8th Edition)• Raghu Ramakrishnan, Database Management Systems (3rd Edition)• Silberschatz Korth sudarshan, Database System Concepts (6th Edition)
Course Objectives	<ul style="list-style-type: none">• Describe the fundamental elements of relational database management systems• Explain the basic concepts of relational data model, entity relationship model, relational database design, relational algebra and SQL.• Design ER-models to represent simple database application scenarios• Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.• Improve the database design by normalization

Course Goals	The goal of this course is to learn about the fundamentals of relational DBMS i.e. how to Design relational databases, Use a relational database, Build a
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	relational database, Be able to create, access, and manipulate a database through SQL and from an application. Also to make concepts of normalization clear in order to build a good relational schema. To make students efficient enough to understand the problems and make out a relational database for the problem situation. Grasp fundamental concepts in design and different aspects of databases. Familiarize them to the latest trends in database field.			
Topics Covered in the Course, with Number of Lectures on Each Topic	Attached			
Lab Projects	Yes			
Theory & Lab Exam	Mid Term: Theory 1. Hrs + Lab 3 Hrs Final Term: Theory 3 Hrs + lab 3 Hrs			
Class Time Spent on (in credit hours)	Theory	Problem Analysis	Solution Design	Labs
	1	1	1	1

Course learning outcomes

CLO#	Course Learning Outcome (CLO)	Taxonomy Level	Mapping to PLO
CLO 1	1. Design a relational model of a database.	Understand	(PLO 3)
CLO 2	2. Apply normalization rules to normalize a database.	Apply	(PLO 3)
CLO 3	3. Implement a database on a DBMS	Apply	(PLO 5)

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Week	Lecture	Topics Covered
1	1	Introduction to databases, Comparison to File system.
	2	Using High-Level Conceptual Data Models for Database Design, Entity Types, Entity Sets, Attributes, and Keys, Relationship Types, Relationship Sets, Roles

2	3	Structural Constraints, Weak Entity Types, ER Diagrams, Naming Conventions, Introduction to keys (unique attributes)
	4	Enhanced ER With Examples
3	5	Relational Database Design Using ER-to-Relational Mapping (relational schemas)
	6	Introduction to SQL (DDL) Create database, show database, create table Adding constraint in create table (e.g., default, unique, foreign key (cascade), primary key, not null) Drop database Desc table (description) Drop table Drop column Rename table Rename column
4	7	Alter table (add, modify, drop) Insert Statement and variations (all attribute, row with null attribute, Optional attribute) Update Statement, Delete Statement
	8	Introduction to SQL (DML) Select statement without conditions Wild card (*) vs <attribute list> Select statement with conditions & Where Clause with comparison operator (<, >, <=, >=, <>, =) Where clause, IS NULL, IS NOT NULL Special operators Between, like wild cards (_, %), order by, distinct, limit
6	9	Multi-table Select (Cross Product), Joins (Inner, Natural, left outer join, right outer join, equi join)
	10	Months between function, to_char, to_date, to_number, ltrim, rtrim etc
7	13	Aggregate functions (sql) (Count, max, min, sum, avg) Group by and use of Having clause
	14	Simple Nested Query using where attribute IN/NOT IN (Query) clause, Any and All.
	16	revision
8		MID TERM
9	17	Co-related Nested Query using Exists and Not Exists.
	18	Union, union all, intersection, minus in SQL. Indexing, view, procedure,
10	19	Functional Dependencies, Inference Rules, Closure of

		Attributes
	20	Identifying Keys from Functional Dependencies (super keys, candidate keys and primary key)
11	21	Equivalent Sets of Fds, Minimal Cover
	22	Normalization: 1nf 2nf, 3nf, BCNF
12	23	Introduction to No SQL & Mongo Db installation, Mongo shell, Insertion, deletion and updation in mongo db
	24	Comparison operators, logical operators in mongo db
13	25	Advance functions in mongo
	26	Advance functions in mongo
14	27	some more on other databases
	28	some more on other databases
15	29	Project viva
	30	Project viva