



National Computing Education Accreditation Council NCEAC



NCEAC.DOC.001-E

COURSE DESCRIPTION

NAME OF INSTITUTION	Lahore Garrison University
PROGRAM (S) TO BE EVALUATED	Computer Science , Fall 2022

Course Description : This course covers the fundamentals of database architecture, database management systems, and database systems. Principles and methodologies of database design, and techniques for database application development. This course is designed to provide students database application and design skills through the use of MySQL and SQL Server database software

Course Code	CSC352																		
Course Title	Database Systems																		
Credit Hours	3+1																		
Prerequisites by Course(s) and Topics	None																		
Assessment Instruments with Weights (homework, quizzes, midterms, final, programming assignments, lab work, etc.)	SESSIONAL (Quizzes, Assignments, Presentations) =25 % Midterm Exam =25 % Final Exam = 50%																		
Course Coordinator	Ms.Aisha Riaz																		
URL (if any)																			
Current Catalog Description	Database Systems Course Outline																		
Textbook (or Laboratory Manual for Laboratory Courses)	Database Systems: A Practical Approach to Design, Implementation, and Management, 6th Edition by Thomas Connolly and Carolyn Begg																		
Reference Material	Database Systems: The Complete Book, 2nd Edition by Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom																		
Course Goals	• List and explain the fundamental concepts of a relational database system. • Utilize a wide range of features available in a DBMS package. • Analyze database requirements and determine the entities involved in the system and their relationship to one another. • Develop the logical design of the database using data modelling concepts such as entity-relationship diagrams. • Create a relational database using a relational database package. • Manipulate a database using MySQL & SQL. • Assess the quality and ease of use of data modelling and diagramming tools																		
Course Learning Outcomes (CLOs):	<table><tr><th>At the end of the course the students will be able to:</th><th>Domain</th><th>BT Level*</th></tr><tr><td>Explain fundamental database concepts</td><td>C</td><td>2</td></tr><tr><td>Design conceptual, logical and physical database schemas using different data models.</td><td>C</td><td>5</td></tr><tr><td>Identify functional dependencies and resolve database anomalies by normalizing database tables.</td><td>C</td><td>2</td></tr><tr><td>Use Structured Query Language (SQL) for database definition and manipulation in any DBMS</td><td>C</td><td>4</td></tr><tr><td>* BT= Bloom's Taxonomy, C=Cognitive domain, P=Psychomotor domain, A= Affective domain</td><td></td><td></td></tr></table>	At the end of the course the students will be able to:	Domain	BT Level*	Explain fundamental database concepts	C	2	Design conceptual, logical and physical database schemas using different data models.	C	5	Identify functional dependencies and resolve database anomalies by normalizing database tables.	C	2	Use Structured Query Language (SQL) for database definition and manipulation in any DBMS	C	4	* BT= Bloom's Taxonomy, C=Cognitive domain, P=Psychomotor domain, A= Affective domain		
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Identify functional dependencies and resolve database anomalies by normalizing database tables.	C	2																	
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Topics Covered in the Course, with Number of Lectures on Each Topic
(assume 15-week instruction and one-hour lectures)

Week	Lecture	Topics Covered
Week 1	1	Introduction to Database Differences between data and information. File-Based file system Limitations of the file-based system Database Management systems. DDL & DML(Introduction) History of Database Management System. Advantages & Disadvantages of Database systems.
	2	Data Models Views Components of DBMS Environment Roles in Databases
Week 2	3	The Three-Level ANSI-SPARC Architecture External Level, Conceptual, Internal Level. Schemas, Mapping, and instances Data Independence Database Languages Functions of a DBMS
	4	Components of a DBMS Multi-User DBMS Architecture Teleprocessing File-Server Architectures Traditional Two-Tier Client-Server Architecture Three-Tier Client-Server Architecture Transaction Processing Monitors
Week 3	5	Relationship Types Degree of Relationship Types Recursive Relationship Attributes Simple and composite Attributes Single-Valued and Multi-Valued Attributes Derived Attributes
	6	Strong and Weak Entity Types Attributes on Relationship Structural Constraints One-to-One (1:1) Relationships One-to-Many (1:*) Relationships Many-to-Many (*:*) Relationships Multiplicity for Complex Relationships Cardinality and Participation Constraints
Week 4	7	Introduction to Relational Database Model A Logic View of Data Characteristics of a Relational Table
	8	Types of Keys, Relational Database keys. Integrity Rules Views Updating Views
Week 5	9	The Extended Entity-Relationship Model Entity Super-Types and Subtypes Specialization Hierarchy
	10	Inheritance Subtype Discriminator The Extended Entity-Relationship Model
Week 6	11	Introduction to SQL Objectives of SQL History of SQL Importance of SQL Terminology Writing SQL Commands Data Manipulation
	12	Simple Queries Sorting Results (ORDER BY Clause) Using the SQL Aggregate Functions Grouping Results (GROUP BY Clause) Subqueries ANY and ALL Multi-Table Queries EXISTS and NOT EXISTS Combining Result Tables
Week 7	13	The Relational Algebra Unary Operations Set Operations
	14	Join Operations Division Operation Aggregation and Grouping Operations Summary of the Relational Algebra Operations
Week 8	1 hours	Mid Term
Week 9	15	Cartesian /Cross Product , Joins
	16	Types of Joins (Natural, theta, outer joins) Query trees Translating relational algebra to query trees
Week 10	17	Normalization Its Purpose (to remove redundancy) Anomalies related to Normalization Normal Forms
	18	Conversion to First Normal Form Conversion to Second Normal Form
Week 11	19	Conversion to Third Normal Form Higher-Level Normal Forms Fourth Normal Form(4NF)
	20	Normalization and Database Design Normalization Practice
Week 12	21	Introduction to SQL Objectives of SQL History of SQL Importance of SQL Terminology Writing SQL Commands Data Manipulation Simple Queries Sorting Results(ORDER BY Clause)
	22	Using the SQL Aggregate Functions Grouping Results (GROUP BY Clause) Subqueries ANY and ALL Multi-Table Queries EXISTS and NOT EXISTS Combining Result Tables
Week 13	23	The Relational Algebra Unary Operations Set Operations Join Operations Division Operation
	24	Aggregation and Grouping Operations Summary of the Relational Algebra Operations
Week 14	25	What is Transaction? Transaction States Properties of Transactions Concurrency control and why it is needed?
	26	The lost update The dirty read problem The inconsistent analysis problem Why recovery needed? Types of Failure
Week 15	27	Concurrency Control Techniques 2PL 2PL to remove Lost update problem Dirty Read Problem Inconsistent Analysis Problem
	28	Two phase Locking Problems Deadlocks Deadlocks Prevention Deadlock Detection
Week 16	29	Basic time stamping Thomas Write Rule
	30	Security in Database
Week 17	2 hours	Final Term

Laboratory Projects/Experiments Done in the Course	
Programming Assignments Done in the Course	

Instructor Name	Ms.Aisha Riaz
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Instructor Signature	
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Date	
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