COMSATS University Islamabad
Department of Computer Science
Course Description Form (CDF)

Course Information	
Course Code: **CSC270**	Course Title: **Database Systems**
Credit Hours: **4(3,1)**	Lecture Hours/Week: **3**
Lab Hours/Week: **3**	Pre-Requisites: **CSC211- Data Structures and Algorithms**

Catalogue Description:

This course introduces the fundamental concepts of database systems. Topics include: Introduction to Databases & Information Systems; Evolution of Database Systems; Components; Architecture; Functions; Relational Model; Relational Algebra; Relational Calculus; Data Modeling; Relational Data Model; Relational Algebra & Calculus; Integrity Constraints; Conceptual Models; Entity-Relationship (E-R) Model; Enhanced E-R Model; Mapping Conceptual Schema to Relational Schema; Functional Dependency & Normalization; Structured Query Language (SQL); Views; Materialized Views; Non-Relational/No SQL Databases; MongoDB as NoSQL Database; Document Model; and Transaction Management.

Unit wise Major Topics:

Unit	Topic	No. of Teaching Hours
1.	Databases & Information Systems: Basic Concepts, Evolution, Advantages & Disadvantages, Database Environment, Approaches & Roles; Components; Architecture; Functions; Data Dependences, and Applications.	6
2.	Relational Model: Relation, Domains, Properties, Attributes; Relational Keys; DB Schema; and Integrity Constraints.	3
3.	Relational Algebra (Operations): Unary, Set, Join, Division, Aggregation & Grouping; and Relational Calculus: Domain & Tuple.	6
4.	Data Modeling: Conceptual Models, Relational Database Design; E-R Model; and Enhanced E-R Model.	9
5.	Normalization: Purpose, Data Redundancy & Anomalies; Process: First Normal Form, Second Normal Form, Third Normal Form, and Boyce-Codd Normal Form.	7.5
6.	SQL: DDL, DML, DCL; Views; Materialized Views; and Database Authorization.	4.5
7.	Non-relational / No SQL Databases: MongoDB as NoSQL Database; MongoDB Sharing & Replication; and Document Model.	4.5
8.	Transaction Management: Support, Failure & Recovery, Concurrency Control, and Transaction & Storage.	4.5
Total Contact Hours		**45**

Mapping of CLOs and SOs

Sr.#	Unit #	Course Learning Outcomes	Blooms Taxonomy Learning Level	SO
CLO's for Theory				
CLO-1	1	Explain database concepts and principles.	*Understanding*	1
CLO-2	2-3	Apply the concept of domain and tuple relational calculus.	*Applying*	1-2
CLO-3	4-5	Apply data modeling and normalization techniques to design database for small to medium size enterprise	*Applying*	2-3
CLO-4	8	Describe the principles of transaction management.	*Understanding*	1
CLO's for Lab				
CLO-5	6-7	Apply data processing operations on both relational and non-relational DBMS.	*Applying*	4,9
CLO-6	1-8	Develop a database system for medium size enterprise in a team environment.	*Creating*	2,4,5,9

CLO Assessment Mechanism

Assessment Tools	CLO-1	CLO-2	CLO-3	CLO-4	CLO-5	CLO-6
Quizzes	Quiz 1	Quiz 2	Quiz 3	Quiz 4	-	-
Assignments	-	Assignment 1	Assignment 2-4	-	Lab Assignments	-
Mid Term Exam	Mid Term Exam	Mid Term Exam	Mid Term Exam	-	-	-
Final Term Exam	Final Term Exam					-
Project	-	-	-	-	-	Lab Project

Text and Reference Books

Text Books:
1. Database systems: A Practical Approach to Design, Implementation, And Management, Thomas Connoll y, Carolyn Begg, Pearson, 2015.
2. MongoDB: The Definitive Guide, Shannon Bradshaw, Eoin Brazil, Kristina Chodorow, O'Reilly Media, 2019.

Reference Books:
1. Fundamentals of Database Systems, Elmasri, R, Navathe, Pearson, 2016.
2. Database System Concepts, Silberschatz, Korth, Sudarshan, McGraw Hill, 2019.