



Capital University of Science and Technology

Department of Computer Science

CS2313 - Introduction to Database Systems

Course Title: Introduction to Database Systems (CS2313)

Pre-requisite(s): Introduction to Programming (CS1133)

Credit Hours: 3

Instructor(s):

Text Book(s): Title: Database Systems, “A Practical Approach to Design, Implementation and Management”, Sixth Edition, Thomas Connolly, Carolyn Begg, Addison Wesley

Reference Book(s): Modern Database Management, Jeffrey A. Hoffer, Ramesh Venkataraman, Heikki Topi 12th Pearson

Web Reference: <https://www.w3schools.com/sql/> [SQL]

Course Introduction:

Database Systems is among the core courses in almost all Computing-related degree programs, like CS, SE, IT and others. Use of database has become so common so obvious in modern applications, that it is considered a default component in most of applications developed today. Any computer professional would have to deal with database in his/career. So it is an important course and students should have clear concepts about the theoretical concepts of subject and should also have practical hands-on any DBMS using SQL.

Course Objectives:

After the completion of this course the students will be quite familiar with the importance of databases, core concepts, database design and its refinement and moderate level of expertise in SQL. Students should be able to design the database schema for at least a small sized real-life application.



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Course Learning Outcomes (CLOs):

At the end of this course, the students should be able to:

- CLO1: Explain fundamental database concepts. [C – L2]
- CLO2: Design conceptual, logical and physical database schemas using different data models [C – L3]
- CLO3: Identify functional dependencies and resolve database anomalies by normalizing database tables [C – L4]
- CLO4: Acquire advance concepts of database management system [C – L3]

CLOs – PLOs Mapping:

	CLO:1	CLO:2	CLO:3	CLO:4
PLO:1 (Academic Education)				
PLO:2 (Knowledge for Solving Computing Problems)	√			√
PLO:3 (Problem Analysis)			√	
PLO:4 (Design/ Development of Solutions)		√		
PLO:5 (Modern Tool Usage)				

Course Contents:

Week	Content
1	Introduction to Basic Database Concepts The Course Outline and Objective, Database Definition, Importance of Databases, Shortcomings of Traditional File Processing System, Levels of Data, Different Types of Database Users, History of DBMSs, Advantages and Disadvantages of DBMSs



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2	Database Architecture Three Level Schema Architecture, Data Independence, Database Languages Database, Data Model and DBMS, Functions and Components of a DBMS Multi-user DBMS Architectures
3	Database Planning, Design, and Administration The Information System Life Cycle, DBS Development Life Cycle, DB Planning System Definition, Requirements Collection and Analysis, DB Design, DBMS Selection Application Design, Prototyping, Implementation, Data Conversion and Loading Testing, Operational Maintenance, CASE Tools, Data Administration and Database Administration
4	Fact-Finding Techniques What facts are collected, Techniques, A worked example
5	Entity-Relationship Modeling Semantic Data Models, Introduction to Entity-Relationship Data Model Different Constructs of E-R Data Model, Abstraction Process Modeling different types of Entities and Attributes
6	Entity-Relationship Modeling Cardinality and Degree of a Relationship, Unary, Binary and n-array Relationships
7	Entity-Relationship Modeling Case Studies
8	Relational Model and Languages Introduction to Relational Data Model, Brief History Advantages, Relational Model Terminology, Mathematical Relations, Database Relations Characteristics of Relations, Understanding tables, The Concept of Key, Different Types of Keys, Integrity Constraints Over Relations, Key Constraints, Foreign Key Constraints General Constraints, Data dictionaries, Views



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9	ER to RDM transformation
10	Normalization Objectives, Functional Dependency, Inference Rules, First Normal Form, Full Functional Dependency, Second Normal Form, Transitive Dependency, Third Normal Form, Boyce-Codd Normal Form
11	Data Manipulation Languages Relational Algebra: Unary and Binary operations, Selection, Projection, Cartesian Product Different types of Joins, Union, Intersection, Division
12	Advanced SQL Queries Nested queries, Aggregate queries
13	Transaction Processing 1
14	Transaction Processing 2
15	NoSQL Databases 1
16	NoSQL Databases 2

Grading Policy

S.No	Grading	% of Total Marks
1	Assignments	15
2	Quizzes	15
3	Project	10
4	Mid-term Exam	20
5	Final Exam	40
	Total	100