Riphah International Colleges

A Project of Riphah International University

Course Outline

Course Information	Course Title	**Database Systems**		
	Course ID	CS-2144	Course Type	Core
	Credit hours	4(3+1)	Hours per week (C-L)	(3+3)
	Program(s)	ADP-CS	Preferred Semester	2nd
	Date		Version	1.0

Course Description

Database System is an important course in the computer science field and it is required to understand the information requirement of an organization and to build a database for that organization. It provides a basic theoretical level of understanding databases and creating a computerized database application for a business. The purpose of this course is to understand the real information requirements of a business and to implement that in computerized database applications. This course is designed to give a thorough understanding of databases. It enables students to practically deal with database-related issues based on solid concepts and theory.

Course Objectives (CO)

The objective of this course is to enable students to understand;

No.	Objective	Relation with PEO
CO1.	Understand Database Systems & its role in different ICT systems.	PEO1
CO2.	Analyze the database requirements of any Organization. Provide conceptual design for it.	PEO1
CO3.	Implement a physical database for different organization datasets.	PEO1,2
CO4.	Construct Sophisticated queries for database development & Manipulation	PEO2
CO5.	Understand the latest technology used for a robust & efficient DBMS.	PEO1,6

Course Learning Outcomes (CLO)

At the end of this course students will be able to;

No.	Outcome	Relation with PLO	BT Level	PLO Level
CLO1.	**Understand** the basic database structure, database administrator roles & duties.	PLO 1,2		
CLO2.	**Analyze** an information storage problem and derive an information model expressed in the form of an entity relation diagram	PLO3		
CLO3.	**Demonstrate** an understanding of the relational data & Normalize the tables to 3rd normal form	PLO2,3		
CLO4.	**Transform** an information model into a relational database schema and use a data definition language to implement the schema using a DBMS.	PLO2		
CLO5.	**Formulate**, using relational algebra and SQL, solutions to a broad range of query problems.	PLO2,5		
CLO6.	**Apply** knowledge to Analyze Data Requirements & Construct databases & Maintain them.	PLO5,10		
CLO7.	**Build** a database and apply Concurrency Control on datasets & fault tolerance concepts to recovery systems.	PLO5,6,12		

Lecture type	**Class room Lectures, Lab Sessions, Project Presentation**					
Prerequisites						
Follow up Courses	Advance Database Management System					
Textbook	Title	Edition	Authors	Publisher	Year	ISBN
	Database Systems A Practical Approach to Design, Implementation, and Management	7th	Thomas Connolly and Carolyn Begg,	Prentice Hall	2010	978-0-13-294326-0
Reference Books	Modern Database Management	11th	Fred McFadden, Jeffrey Hoofer, Mary Prescott,	Prentice Hall	2012	10: 0132662256
	introduction to oracle 9i SQL		Nancy GreenBerg Priya Nathan	Oracle Corporation	2001	
Reference Material	A Fundamental Study of Database Management System	3rd	Imran Saeed, Tasleem Mustafa, Tariq Mahmood	IT Series Publications		
Course Software or Tool	SQL Server, Xampp Server (My SQL), Oracle 10g Express					

Assessment Criteria (100%)	Assessment	Weight	Used to attain CLO
	Assignments & Presentations	10%	1,3,4
	Quiz & Project	10%	1,2,3
	Lab	15%	4,5,6,7
	Mid Term	25%	1,2,3
	Final-Term	40%	1,2,3,4,5

Methods of Evaluation	Quizzes, Assignments, Mid/Final exam, Lab, Project
Notes	Labs are managed and evaluated separately

COURSE CONTENTS							
Week No.	Topic	Lecture No.	Lecture Contents	Relation with CLO	Lecture Material	Class Activity	Tasks
W1.		L1.	• Introduction to databases, Comparison to File system.	L01 Chapters 1, 2 & 3	1		
		L2.	• Using High-Level Conceptual Data Models for Database Design, Entity Types, Entity Sets, Attributes, and Keys, Relationship Types, Relationship Sets, Roles	L01 Chapter 7	CLO1		
W2.		L3.	• Structural Constraints, Weak Entity Types, ER Diagrams, Naming Conventions, Introduction to keys (unique attributes)	L01 Chapter 7	2		
		L4.	• Enhanced ER With Examples	L01 Chapter 8	CLO2		
W3.		L5.	• ER Practice		3		
		L6.	• Relational Database Design Using ER-to-Relational Mapping	L01 Chapter 9	PLO 1,2		
W4.		L7.	• Relational Database Design Using ER-to-Relational Mapping	L01 Chapter 9	4		
		L8.	• Introduction to Relational model, Relational Model constraints. Update operations and Dealing with constraint violation. Concept of keys (super key, candidate key, primary key, foreign key)	L01 Chapter 3	CLO3,4		
W5.		L9.	• 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)	L02 Chapter 4	5		
		L10.	• Drop database • Desc table (description) • Drop table	L02 Chapter 4	PLO2		
W6.		L11.	• Alter table (add, modify, drop) • Insert Statement and variations (all attribute, row with null attribute, Optional attribute)	L02 Chapter 4	6		
		L12.	• Update Statement, Delete Statement	L02 Chapter 4	CLO5,6		
W7.		L13.	• Introduction to SQL (DML) • Select statement without conditions • Wild card (*) vs <attribute list>	L02 Chapter 5	7		
		L14.	• Select statement with conditions & Where Clause with comparison	L02 Chapter 5	CLO5,6		

			operator (<, >, <=, >=, < >, = =) • Where clause, IS NULL, IS NOT NULL				
W8.		L15.	• Multi-table Select(Cross Product), • Joins(Inner, Natural)	L02 Chapter 5	8		
		L16.	• Multi-table Select(Cross Product), • Joins(Inner, Natural)		CLO3,4		
W9.		L17 & L18	MID TERM EXAMINATIONS				
W10.		L19.	• Outer Joins(Left, Right, Full)	L02 Chapter 5	9		
		L20.	• Aggregate functions (sql) • (count, max, min, sum, avg) Group by • Having	L02 Chapter 5	CLO5,6		
W11.		L21.	• Simple Nested Query using where attribute IN/NOT IN (Query) clause, Any and All.	L02 Chapter 5	10		
		L22.	• Simple Nested Query using where attribute IN/NOT IN (Query) clause, Any and All.	L02 Chapter 5	CLO5,6		
W12.		L23.	• Co-related Nested Query using Exists and Not Exists	L02 Chapter 5	11		
		L24.	• Co-related Nested Query using Exists and Not Exists.		CLO6,7		
W13.		L25.	• SQL Practice	L02 Chapter 6	12		
		L26.	• Binary Relational Operations Join, natural join, cross product, Examples of queries	L02 Chapter 6	CLO4,5		
W14.		L27.	• Functional Dependencies, Inference Rules, Closure of Attributes	L03 Chapter 15 & 16	13		
		L28.	• Identifying Keys from Functional Dependencies	L03 Chapter 16	CLO4,5		
W15.		L29.	• Equivalent Sets of Fds, Minimal Cover	L03 Chapter 16	14		
		L30.	• Normalization: 1nf 2nf, 3nf	L03 Chapter 15	CLO6		
W16.		L31.	• Normalization with Examples.	L03 Chapter 15	15		
		L32.	• Transactions / Indexing	L04			
W17.		L33.	• Practice questions		16		
		L34.	• Project viva				
W18.		L35 & L36	FINAL TERM EXAMINATIONS				

LAB CONTENTS				
Week No.	**Topic**	**Lab Contents**	**Activity**	**Relation with CLO**
W1.	Introduction	• Introduction to Database • Different DBMS • Oracle installation		CLO
W2.	Understanding of DDL, DML	• Create Table • Alter Table • Truncate Table • Drop Table • Insert Table • Update Table • Delete Table		CLO
W3.	Arithmetic Expression, Column Aliases, Concatenation	• Selecting all columns of all rows • Selecting specific columns of all rows • Arithmetic Expressions • Null values • Column Aliases • Concatenation Operator • Literal Character Strings • Eliminating Duplicate Rows	Assignment 1 Quiz 1	CLO
W4.	WHERE Clause, Comparison Conditions (Between IN Like),	• Limiting Rows Using a Selection • Using the WHERE Clause • Character Strings and Dates • Comparison Conditions		CLO
W5.	Logical Conditions, Rules of Precedence, Descending and ascending order	• Logical conditions • Rules of Precedence using Parentheses • The ORDER BY Clause • Default Ordering of Data • Reverse the Default Order • Sorting by Column Aliases • Sorting by Multiple Columns	Assignment 2	CLO
W6.	Constraints, Unique, not null, primary key, foreign key	• Constraints • NOT NULL Constraint • UNIQUE Constraint	Quiz 2	CLO
W7.	Primary key, foreign key	• PRIMARY Key • FOREIGN Key • CHECK Constraint • DEFAULT Constraint		CLO
W8.	Understanding of Joins. Cartesian Product, Equijoin, non-Equijoin, Self joins, outer joins	• Joins • Cartesian product • Equijoin		CLO
W9.	Mid Term Exam Week	• Mid Term Examination		CLO
W10.	Understanding of Joins. Cartesian Product, Equijoin, non-Equijoin, Self joins, outer joins	• Non-Equijoin • Outer joins • Self joins		CLO
W11.	Functions	• Functions • Built in functions in oracle • Character Function • Number Functions		CLO
W12.	Functions	• Date Functions • Conversion Function	Assignment 3	CLO

		• General Functions • Elements of Date Format		
W13.	Sub Query uses	• Sub Query • Sub query uses • Types of subquery • Single row sub query • Multiple row sub query	Quiz 3	CLO
W14.	Understanding of Views, Stored Procedures	• Create View • Check the oracle view • Drop View • Create Stored Procedures • Execute stored procedure • Drop Stored Procedures	Assignment 4	CLO
W15.	Triggers	• Create Triggers (DDL, DML) • Disabling or Enabling a Single Trigger • Drop Stored Procedures	Quiz 4	CLO
W16.	Normalization	• First normal Form (1NF) • Second normal Form (2NF) • Third normal Form (3NF).		CLO
W17.	Forms and Reports	• Forms • Reports		CLO
W18.	Final Term Exam	• Final Examination		CLO