COURSE DESCRIPTION FORM

INSTITUTION National University of Computer and Emerging Sciences (NUCES-FAST), Karachi

PROGRAM (S) TO BE EVALUATED BS (CS)

A. Course Description
(Fill out the following table for each course in your computer science curriculum. A filled out form should not be more than 2-3 pages.)

Course Code	CL-2005
Course Title	Database Systems Lab
Credit Hours	3+1
Prerequisites by Course(s) and Topics	CL-2001 (Data Structures)
Assessment Instruments with Weights (homework, quizzes, midterms, final, programming assignments, lab work, etc.)	Lab Work: 20 Project:5 Mid :25 Final: 50
Course Coordinator	Dr Anam Qureshi **Lab Coordinator** : Sohail Ahmed Malik
URL (if any)	
Current Catalog Description	Basic database concepts, Conceptual modelling, Relational data model, Relational theory and languages, Database design, SQL, Introduction to query processing and optimization, Introduction to concurrency and recovery with advance topics. This course provides Students with the essential concepts, principles, and techniques of modern database systems from a user perspective. This means that the lecture focuses on the functionalities that are offered by database systems and not on the methods to implement them. Specifically, the course teaches students the ability to develop a solution for a real- world data management problem that requires the application of the theories and Practices developed in class. From a theoretical point of view, this course covers the essential principles for the design, analysis, and use of computerized database systems. The design and techniques of conceptual modeling, database modeling, database system Architecture, and user/program interfaces are presented in a unified way.
Textbook (or **Laboratory Manual** for Laboratory Courses)	Ramez Elmasri & Shamkant B. Navathe, *Database Systems, Models, Languages, Design and Application Programming*, 7th Edition, 2016.
Reference Material	1) Thomas Connolly, Carolyn Begg, *Database Systems: A practical approach to design, implementation and Management*, 6th Edition, 2015. 2) C.J. Date, *An Introduction to Database Systems*, 8th Edition, 2004
Course Goals	**A. Course Learning Outcomes (CLOs)** 1. Differentiate database systems from file systems by enumerating the features provided by database systems and describe each in both function and benefit. 2. Define the terminology, features, classifications, and characteristics embodied in database systems. 3. Analyze an information storage problem and derive an information model expressed in the form of an entity relation diagram and other optional analysis forms, such as a data dictionary. 4. Transform an information model into a relational database schema and to use a data definition language and/or utility to implement the schema using a DBMS. 5. Formulate, using relational algebra, solutions to a broad range of query problems. 6. Formulate, using SQL, solutions to a broad range of query and data update problems. 7. Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database. 8. Demonstrate a rudimentary understanding of programmatic interfaces to a database and be able to use the basic functions of one such interface.

B. Program Learning Outcomes

For each attribute below, indicate whether this attribute is covered in this course or not. Leave the cel blank if the enablement is little or non-existent.

1. Academic Education:	To prepare graduates as computing professionals	
2. Knowledge for Solving Computing Problems:	Apply knowledge of computing fundamentals, knowledge of a computing specialization, and mathematics, science, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.	
3. Problem Analysis:	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.	✔
4. Design/ Development of Solutions:	Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.	✔
5. Modern Tool Usage:	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.	✔
6. Individual and Team Work:	Function effectively as an individual and as a member or leader in diverse teams and in multi-disciplinary settings.	
7. Communication:	Communicate effectively with the computing community and with society at large about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.	
8. Computing Professionalism and Society:	Understand and assess societal, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.	
9. Ethics:	Understand and commit to professional ethics, responsibilities, and norms of professional computing practice.	
10. Life-long Learning:	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.	

C. Relation between CLOs and PLOs
(CLO: Course Learning Outcome, PLOs: Program Learning Outcomes)

		PLOs									
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
CLOs	1	✓	✓	✓							
	2										
	3				✓	✓					
	4						✓	✓	✓	✓	
	5									✓	

Topics Covered in the Course, with Number of Lectures on Each Topic (assume 15-week instruction and one- hour lectures)	**1. Topics to be covered:**		
	List of Topics	No. of Weeks	Contact Hours
	Lab-01: Introduction & History of Database Systems, Introduction of SQL	01	03
	Lab-02: Basic SQL Schema and Statements, Arithmetic operators, Column Alias, Concatenation Operator, Where Clause, Comparison Operators & Conditions, Logical Conditions (AND, OR, NOT), Functions (count, max, min, Dates),Operators (Like, Rownum, In, Between), Order by clause	01	03
	Lab-03: DDL(create, alter, drop, truncate, rename), Defining constraints on table, types of constraints, deferred constraint checking(chicken egg problem) and DML (Create, insert, update, delete)	01	03
	Lab-04: Sub queries (Single Row, Multiple Rows and correlated),Groups of Data(Group by ,Having)	01	03
	Lab-05: Joins, Types of Joins (Equality Joins, Non Equality Joins, Outer Joins and Self Joins), Set Operators (union, union all, intersection, minus).	01	03
	Lab-06: Relational Modeling	01	03
	Lab-07: PL/SQL: Block Structure, Variable & types, Conditional Logic, Cursors, Views, Procedures &Functions)	01	03
	========== *MID Exam* ==========		
	Lab-08: Triggers	01	03
	Lab-09: Connectivity: PHP with MYSQL, JAVA with MYSQL, C# with SQL Server	01	03
	Lab-10: Transaction	01	03
	Lab-11: Mongo DB (Installation & Basics, Projections & Functions)	01	03
	========== *Revision* ==========		
	========== *Project Evaluation* ==========		
	========== *Final Exam* ==========		

Laboratory Projects/Experiments Done in the Course				
Programming Assignments Done in the Course	Assignments and Lab activities related to Normalization, Joins, and sub Queries.			
Class Time Spent on (in credit hours	**Theory**	**Problem Analysis**	**Solution Design**	**Social and Ethical Issues**
	30	10	5	0
Oral and Written Communications	Every student is required to submit at least__1__ written reports of typically _2___pages and to make _1_oral presentations of typically__10__minute's duration. Include only material that is graded for grammar, spelling, style, and so forth, as well as for technical content, completeness, and accuracy.			

Instructor Name: Sohail Ahmed
Instructor Signature: ***Sohail Ahmed***
Date 10th August, 2023