Course Description and Outcome Form
Department of Computer Science and Engineering
School of Engineering and Computer Science
Brac University

A. Course General Information:

Course Code:	CSE370
Course Title:	Database Systems
Credit Hours (Theory+Lab):	3+0
Contact Hours (Theory+Lab):	3+3
Category:	Program Core
Type:	Required, Engineering, Lecture + Laboratory
Prerequisites:	CSE221 Algorithms
Co-requisites:	None

B. Course Catalog Description (Content):

This course is designed as an introduction to relational database management systems (RDBMS) focusing on the efficient design, implementation and optimization of an RDBMS. Topics covered will include the advantages and disadvantages of DBMS, database architecture, data modeling using ER and EER models, relational integrity constraints, relational schema mapping from ER/EER, indexing, hashing and normalization. SQL Query formulation will be extensively practiced in both the theoretical and laboratory components of the course. The course includes a compulsory 3 hour laboratory work each week as CSE370L. Students must complete several hands-on SQL assignments and a group project for the laboratory work. The group project will involve the design and implementation of a complete database system including a user interface.

C. Course Objective: The objectives of this course are to:

a. explain the advantages and disadvantages of using a DBMS over a file-based system
b. explain the process of data modeling using ER and EER models
c. discuss the relational integrity constraints and how they are enforced in a database system
d. teach the process of mapping an ER/EER model to a relational schema
e. introduce indexing and hashing and discuss their role in efficient data retrieval
f. explain the concepts of functional dependencies (FD) and normalization, and how they are used to optimize database design
g. teach students the methods for storing, manipulating and retrieving data using structured query language (SQL)
h. expose students to the process of implementing a complete database system project in a team using software tools, programming languages and SQL

D. Course Outcomes (COs):

Upon successful completion of this course, students will be able to

Sl.	CO Description	Weightage (%)
CO1	**Explain** fundamental concepts related to database management and **Identify** different database concepts discussed in a given scenario.	5
CO2	**Construct** appropriate ER/EER models to represent complex data requirements of an organization or system.	20
CO3	**Apply** schema design principles for mapping ER/EER models to relational schemas.	20
CO4	**Apply** normalization techniques to reduce data redundancy and optimize database schema design.	15
CO5	**Prepare** and **Implement** standard queries using Structured Query Languages (SQL) to store, retrieve and manipulate data	15
CO6	**Apply** appropriate indexing and hashing techniques to optimize database performance.	10
CO7	**Develop** a database application using SQL and other effective programming languages as a group project to solve a complex data management problem.	15

E. Mapping of CO-PO-Taxonomy Domain & Level- Delivery-Assessment Tool:

Sl.	CO Description	PLOs	Bloom's taxonomy domain/level	Delivery methods and activities	Assessment tools
CO1	**Explain** fundamental concepts related to database management and **Identify** different database concepts discussed in a given scenario.	**PLO1 (a)**	Cognitive/Understand	Lectures, Notes, Classwork	Exam
CO2	**Construct** appropriate ER/EER models to represent complex data requirements of an organization or system.	**PLO1 (a)**	Cognitive/Apply	Lectures, Notes, Practice Sheets, group activity for project	Exam, Project
CO3	**Apply** schema design principles for mapping ER/EER models to relational schemas.	**PLO1 (a)**	Cognitive/Apply	Lectures, Notes, Practice Sheets, group activity for project	Exam, Project

CO4	**Apply** normalization techniques to reduce data redundancy and optimize database schema design.	**PLO1 (a)**	Cognitive/Apply	Lectures, Notes, Practice Sheets	Exam
CO5	**Prepare** and **Implement** standard queries using Structured Query Languages (SQL) to store, retrieve and manipulate data	**PLO5 (e)**	Cognitive/Apply Psychomotor/Manipulation	Lab Work, Lectures, Practice Sheets	Exam, Assignment/Quiz
CO6	**Apply** appropriate indexing and hashing techniques to optimize database performance.	**PLO1 (a)**	Cognitive/Apply	Lectures, Notes, Practice Sheets	Exam
CO7	**Develop** a database application using SQL and other appropriate programming languages as a group project to solve a complex data management problem.	**PLO3 (c)**	Cognitive/Create Psychomotor/Manipulation	Lab Class	Project

F. Course Materials:

i. Text and Reference Books:

SI.	Title	Author(s)	Publication Year	Edition	Publisher	ISBN
1	Fundamentals of Database Systems	Ramez Elmasri, Shamkant B. Navathe	2015	7th ed.	Pearson	**ISBN-13:** 978-0133970777
2	Database systems : a practical approach to design, implementation, and management	Thomas M. Connolly, Carolyn E. Begg	2014	6th ed.	Pearson	**ISBN-13:** 978-0132943260
3	Database Systems Concept	Silberschatz, Korth, Sudarshan	2011	6th ed.	McGraw-Hill	**ISBN:** 978-0-07-352332-3

ii. Other materials:

    a. Lecture slides
    b. Lab handouts
    c. Command Line tool (MySQL Mini Server)

G. Lesson Plan (Theory):

No	Topic	Week/Lecture#	Related CO (if any)
1	Introduction - Fundamental Database System Concepts	Week 1/ Lecture 1-2	CO1
2	Data Modeling using the Entity-Relationship (ER) Model	Week 2/ Lecture 3-4	CO2
3	The Enhanced Entity-Relationship (EER) Model	Week 3/ Lecture 5-6	CO2
4	The Relational Data Model and Relational Database Constraints	Week 4/ Lecture 7-8	CO1
5	Review	Week 5	
MIDTERM - Week 6			
8	ER/EER to Relational Database Schema Mapping	Week 7-8/ Lecture 11 - 13	CO3
6	Indexing and Hashing	Week 8-9/ Lecture 14-16	CO6
7	Functional Dependencies and Normalization	Week 10/ Lecture 17-18	CO4
9	SQL Queries	Week 11/Lecture 19-20	CO5
10	Review	Week 12	
FINAL			

Lesson Plan (Laboratory):

No	Topic	Week/Lecture#	Related CO (if any)
	Introduction to MySQL: Environment setup, database and table creation, data insertion, alter table	Week 1	CO5
	Update and Delete queries, basic select queries: retrieve and sorting	Week 2	CO5
	Aggregate Functions, Nested and Sub queries, Grouping	Week 3	CO5
	Lab Assessment/Review	Week 4	
	Primary and Foreign keys, basic join queries	Week 5	CO5
	Advanced Join Queries	Week 6	CO5
	Lab Assessment/Review	Week 7	
	ER/EER Diagram and schema for group project	Week 8-9	CO2,CO3

User Interface for group project and connection with MySQL using suitable programming language such as php/java/python	Week 10-11	CO5, CO7
Project Demonstration	Week 12	CO7

H. Assessment Tools:

Assessment Tools	Weightage (%)
Class Performance and Attendance	5
Assignment	5
Quiz	10
Midterm	20
Final	30
Project	20
Lab work	10

I. CO Assessment Plan:

Assessment Tools	Course Outcomes						
	CO1	CO2	CO3	CO4	CO5	CO6	CO7
Assignment/Quiz					M		
Midterm	M	H					
Final			H	H	H	H	
Project		M	M				H
Lab work					M		

J. CO Attainment Policy:

As per Department of CSE Course Outcome Attainment Policy

K. Grading policy:

As per Brac University grading policy

L. Course Coordinator: Najeefa Nikhat Choudhury