Independent University, Bangladesh

Department of Computer Science & Engineering

Course Outline: CSE303 Database Management

Summer 2022

MWs at 9:40 (section-4) BC5014-S for class, 11:15 - 12:45 for consultation

Instructor's details:

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Course Description

Conventional and database approaches. Basic concepts of DBMS. Hierarchical, network and relational data models. Entity-relationship modeling. Relational database designing: decomposition and normalization; functional dependencies. Relational algebra and calculus. Structured query language (SQL). Query optimization. Database programming with SQL and PL/SQL. Database security and administration. Distributed databases. Object-oriented data modeling. Specific database systems: oracle, MS SQL server, access.

Course Objectives:

1. Introduce the concept of database and its usages.
2. Introduce the life cycle of a systems development project.
3. Introduction to ER Diagram and database model designing.
4. Introduce the ERD and Relation mapping.
5. Understanding the Normalization Technique to optimize the database model.
6. Introduction to SQL and Advanced SQL.
7. Introduction to Physical system design: Input forms, Output reports and Architecture.
8. Basic concepts of database administration.

Course Outcome(CO):

Course Outcome	**Domain & Level**	**PLO**
CO1 Understand the database applications starting from conceptual design using data models **diagram** (ERD), Process Model diagram (BPMN)	Psychomotor Level Analyze (4)	PLO2
CO2 Basic understanding of data access structures and **comparison** between those structures, Determine the normalization form of Database.	Cognitive Level Evaluate(5)	PLO3
CO3: Ability to analyze the ERD, Process diagram and normalization concept.	Psychomotor Level Create (6)	PLO4

CO4: Solid foundation on the database design using query language SQL and design of user interfaces.	Psychomotor Level Create (6)	PLO6

Program Learning Outcomes (PLOs) addressed by this course:

PLO2	Requirement Analysis: An ability to identify, analyze, and solve a problem by defining the computing requirements of the problem through effectively gathering of the actual requirements
PLO3	Problem Analysis: An ability to select and apply the knowledge of mathematics, science, engineering, and technology to computing problems that require the application of principles and applied procedures or methodologies
PLO4	Design: An ability to design computer based systems, components, or processes to meet the desire requirement
PLO6	Implementation: An ability to apply design and development principles in the construction of software systems of varying complexity

Assessment and Marks Distribution:

Students will be assessed on the basis of their overall performance in all the exams, quizzes, and class participation. Final numeric reward will be the compilation of:

- Two Class Tests (10%)
- One **mid-term** test (25%)
- One Project & Presentation (15%)
- One report & assignment (15%)
- A cumulative **final** exam (35%)

COs-Assessment Mapping							
Cos	Assessment Tools						
	Class Test 1	Class Test 2	Assignments	Mid Term Exam	Final Exam	Project	Report
CO1				√			
CO2				√	√		
CO3					√		√
CO4					√	√	

Grade Conversion Scheme:

The following chart will be followed for grading. This has been customized from the guideline provided by the School of Engineering and Computer Science.

A	A-	B+	B	B-	C+	C	C-	D+	D	F
90-100	85-89	80-84	75-79	70-74	65-69	60-64	55-59	50-54	45-49	0-44

Required Text:

The course will be based mostly on the following books [some other books and journals may be referred time to time]:

1. **Modern Database Management by Jeffrey A. Hoffer, Mary B. Prescott, Fred R. Mcfadden**
2. **Database Management Systems, by Raghu Ramakrishnan and Johannes Gehrke**

3. **Fundamentals of Database Systems, By RamezElmasri, Shamkant B. Navathe**
4. **Microsoft MSDN, W3 School**
5. **An Introduction to Database System by C. J. Date**

Link to Virtual Learning System: Google ClassRoom

Course Policy:

1. It is the student's responsibility to gather information about the assignments/project and covered topics during the lectures missed. Regular class attendance is mandatory. Points will be taken off for missing classes. Without **75%** of attendance, sitting for the final exam is NOT allowed. Students should come on time to get the attendance. In case of failing **75%** of attendance a student will receive W grade automatically.
2. Same project work is assigned to all sections. Students should work in groups for the project. They are required to prepare a final report on the project which will be incrementally developed through assignments.
3. The date and syllabus of class tests, midterm and final exam will be announced in the class. There is **NO** provision for make-up.
4. Both the Midterm and Final exam will be coordinated exams and will be held on a specific date for all the sections.
5. The reading materials for each class will be given prior to that class so that students may have a cursory look into the materials.
6. Class participation is vital for better understanding of the topics of this course. Students are invited to raise questions.
7. Students should take tutorials with the instructor during the office hours. Prior appointment is required.
8. Students must maintain the IUB code of conduct and ethical guidelines offered by the school of computer science and engineering.
9. No working mobile phones are allowed in class. Using one for any purpose will result in serious consequences.

Audit: Students who are willing to audit the course are welcome during the first two classes and are advised to contact the instructor after that.

Note:

In the event of a student being found to have plagiarized or cheated in some way in an exam, that student will be given a zero mark in that exam. Similarly a student who fails to submit the exam paper on time will also receive a zero mark. The student will also receive a zero mark on assignments in case of the following

- Deliberate copying or attempting to copy the work of other students with or without their consent
- Deceitful conduct by submitting the work of another student (as their own).
- Using or attempting to use information that has been prohibited to use in an exam/assignment or prohibited by law.
- Plagiarism (i.e., taking and using the thoughts and writings of another with the intent to claim the work as their own)

University Regulation and Code of Conduct:

Please see the Green Book for further information about academic regulation and policies, including withdrawal and grading, appeals and penalties for plagiarism and academic misconduct.

Class & Exam Schedule, Topics and Readings:

Sessions	Topics	Learning Outcome	Readings	Course Outcome
Session – 1	Introduction: concept of database, DBMS	1. Students will be able to know each other 2. Students will learn about the course policy 3. Students will be able to plan for the exams 4. Students will learn the basic concept of Database. 5. Students will learn about the reason for using databases. 6. Students will learn about different categories of applications that use databases.		CO1
Session – 2	Introduction: Database development process, Database architecture; Database languages and Interfaces	1. Students will learn about the life cycle of a systems development project. 3. Students will learn about the roles of individuals who design, implement, use, and administer Databases. 4. Students will learn about the differences among external, conceptual, and internal schema.		CO1
Lab – 1	Introduction to Report writing and Designing tools	1. Students will be introduced to report writing tools. 2. Students will be introduced to designing tools to draw different types of diagrams used in this course.		CO1
Session – 3	Analysis: Rich Picture	1. Introduction to a real-time problem. 2. Introduction to understand a real-time issue and draw that using Rich Picture.		CO1
Session – 4	Analysis: Six Elements analysis	1. Understand the concept of Six elements Analysis. 2. Perform six elements analysis to map the existing system.		CO1
Lab – 2	Using the designing tools create Rich Picture	1. Students will be able to create diagrams using the tools and model them using the techniques taught in the theory.		CO2
Session – 5	Analysis: Process Diagram using BPMN 2.0	1. Identification of details of the processes involved in the system. 2. Introduction to the business process diagram 3. Introduction to BPMN 2.0. 4. Perform process drawing using BPMN 2.0		CO1
Session – 6	Analysis: Process Diagram and Improvement Process	1. Students will be introduced to advanced features of BPMN 2.0. 2. Students will be introduced to BPR and KPI to find the issues and perform analysis		CO1
Lab – 3	Using the designing tools create BPMN	1. Students will learn how the Process diagram works. 2. Students will learn where the data comes from and where it goes and where it will be stored. 3. Students will learn how to deal with the data in the model of the system. 4. Students will learn about one of the three essential perspectives of the structured-systems analysis and design method		CO2

Sessions	Topics	Learning Outcome	Readings	Course Outcome
		5. Students will learn how the process diagrams can be used in both Analysis and Design phases. 6. Students will be able to create ERD using the tools taught in the theory.		
Session – 7	Entity relationship diagram Model	1. Students will learn about entities, relationships, and attributes. 2. Students will be able to learn about the degree of relationship. 3. Students will be able to model E-R diagrams considering different types of attributes, entities, relationship, and cardinality constraints.		CO1
Session – 8	Entity relationship diagram Model	1. Students will be able to differentiate different relationship types. 2. Students will be able to identify the reason for different types of attributes. 3. Students will be able to realize the need for relationship constraints.		CO1
Lab – 4	Using the designing tools create EERD	1. Students will be able to create EERD using the tools. 2. Students will be able to model business cases using the techniques taught in the theory.		CO2
Session – 9	Design: Enhanced ERD model	1. Students will learn about subtype supertype relations. 2. Students will learn completeness and disjoint type relations.		CO2
Session 10	Design: ERD to Relations	1. Students will learn to convert the entity to relations. 2. Students will learn to map attributes in the relations. 3. Students will be able to design the relationship in terms of relations.		CO2
Session – 11	Design: Normalization 01	1. Students will be able to list five properties of relations. 2. Students will be able to state two essential properties of a candidate key. 3. Students will be introduced with the concept of normalization: first normal form, second normal form, and third normal form. 4. Students will learn briefly about four problems that may arise when merging relations.		CO2
Lab – 5	Introduction to database using GUI interface	1. Students will be able to create and use databases using any GUI based database.		CO3
Session – 12	Design: Normalization02, Data dictionary	1. Students will be able to realize the need for normalization. 2. Students will be able to perform normalization on any case study. 3. Students will learn about Boyce-Codd normal form. 4. Students will learn the physical database design process, its objectives, and its deliverables. 5. Students will learn about storage formats for attributes from a logical data model. 6. Students will learn how to select an appropriate file organization by balancing various important design factors.		CO2

Sessions	Topics	Learning Outcome	Readings	Course Outcome
		7. Students will be able to translate a relational data model into efficient database structures, including knowing when and how to de-normalize the logical data model.		
Lab – 06	Introduction to database using GUI interface.	1. Students will be able to manipulate data in the MS Access and MySQL.		CO3
Session 13	Midterm			
Session – 14	Relational Algebra	1. Students will learn about the formal notations. 2. Students will learn how to add constraints to the set union, set intersections. Set difference and Cartesian products. 3. Students will learn how to implement and use them in the database.		CO2
Lab – 07	Create Database and manipulate data with SQL.	1. Students will learn how to define the database and specify data types, structures and constraints on the data. 2. Students will learn how to manipulate those data in the database.		CO4
Session – 15	SQL: DDL, DML, DCL	1. Students will learn to interpret the history and role of SQL in database development. 2. Students will know how to define and use the data types and constraints in the database using DML.		CO4
Session – 16	SQL: Retrieve information	1. Students will learn how to fetch the data from the database using basic SQL commands.		CO4
Lab – 08	Writing Query in SQL	1. Students will be able to write single-table queries using SQL commands.		CO4
Session – 17	SQL: Retrieve information	1. Students will learn how to retrieve and manipulate that information from the database using SQL.		CO4
Session – 18	SQL: Retrieve information	1. Students will learn how to retrieve and manipulate that information from the database using SQL.		CO4
Lab – 9	Writing advance query in SQL	1. Students will be using different types of advanced SQL query to solve different types of problems.		CO4
Session – 19	Advance SQL	1. Students will learn how to use union, join etc. using SQL. 2. Students will be able to establish referential integrity using SQL.		CO4
Session – 20	Advance SQL	1. Students will learn how to use union, join etc. using SQL. 2. Students will be able to establish referential integrity using SQL.		CO4
Lab – 10	Writing advance query in SQL	1. Students will practice how to use union, join etc. using SQL. 2. Students will be able to establish referential integrity using SQL.		CO4
Session – 21	Advance SQL	1. Students will learn how to write subqueries using SQL query. 2. Students will learn how to establish referential integrity using SQL.		CO4
Session – 22	Advance SQL	1. Students will practice how to write subqueries using SQL query. 2. Students will practice how to establish referential integrity using SQL.		CO4
Lab – 11	Input & Output design principle	1. Students will learn how to define the appropriate format and media for a computer Input.		CO3

Sessions	Topics	Learning Outcome	Readings	Course Outcome
		2. Students will learn to identify and describe several automatic data collection technologies. 3. Students will learn how to develop their own input form based on their own systems. 4. Students will learn to distinguish between internal, external and turnaround outputs. 5. Students will learn about the difference between detailed, summary, and exception reports. 6. Students will be able to identify several output implementation methods.		
Session – 23	Input form and Output reports Database architecture, Database administrations	1. Students will be able to explain the three components of client/server systems: data presentation services, processing services, and storage services. 2. Students will be able to distinguish between two-tier and three-tier architectures. 3. Students will be able to describe the key components of a web application and the information flow between the various components. 4. Students will learn why organizations need data administration for. 5. Students will be able to describe the three levels of data warehouse architecture from a database administrator point of view. 6. Students will be able to develop the requirement for a data bank.		CO2
Session – 24	Review			
Lab – 12	Interface with SQL and Front-End software.	1. Students will be able to design and prototype computer inputs and outputs. 2. Students will be able to connect and display the data from their database into web forms.		CO2
Session 25	**Final Exam**			