**Course Profile**

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| **Course Title** | **Database System** |
| **Course Code** | CCE-223 |
| **Department** | Computer and Communication Engineering |
| **Faculty/Program** | Computer Science and Engineering |
| **Credit Hours** | 3 |
| **Course Teacher** | 1. Prof. Dr. Md. Samsuzzaman 2. Prof. Golam Mohammad Muradul Bashir |
| **Level** | Level- 2 Semester-II |
| **Course Description** | A computer engineer needs to know the fundamentals of database architecture, database management systems, and database systems, principles and methodologies of database design, and techniques for database application development. The course focuses on the fundamentals of knowledgebase and relational database management systems, and the current developments in database theory and their practice. |
| **Objectives** | Upon successful completion of this course, students should be able to:   * Describe the fundamental elements of relational database management systems. * Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL. * Design ER-models to represent simple database application scenarios * Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data. * Improve the database design by normalization. |

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| **Course Learning Outcomes**  **By the end of the course, the students will be able to:** | |
| **No** | **Description** |
| CLO1 | apply analytical skills to map out the conceptual design for a real-life problems and write database documentation, including data standards, procedures and definitions for the data dictionary. |
| CLO2 | draw the model of Relational Database using Entity Relationship (ER) model and explain the fundamental elements of Database management System. |
| CLO3 | evaluate the logical design to translate into a specific data model and physical design to meet system storage requirements. |
| CLO4 | evaluate MSSQL/MySQL/Oracle features and MSSQL/MySQL/Oracle related products for maintaining the integrity and performance of enterprise databases. |

**Mapping Matrices**

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| **CLOs** | **PLOs** | **Assessment Strategy** |
| CLO1 | PLO2 | Short Question, Report Writing, Small Project Work |
| CLO 2 | PLO1,PLO4 | Presentation, Report Writing,  Quiz Test |
| CLO 3 | PLO9 | Short Question , Report Writing, Small Project Work |
| CLO 4 | PLO3 | Short Question, Presentation,  Quiz Test, Report Writing |

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| No. | **Topic/Course content** | **Teaching Strategy** | **Assessment Strategy** |
| 1 | **Introduction:**  Database-System Applications, Purpose of Database Systems, View of Data, Database Languages, Database Design, Database Engine, Database and Application Architecture ,Database Users and Administrators, History of Database Systems | Lecture  Exercise  Assignment  Group Discussion | Short answer, Viva voce, Practical Exam. Report Writing |
| 2 | **Introduction to the Relational Model:**  Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, The Relational Algebra | Lecture  Exercise  Assignment  Group Discussion | Short answer, Viva voce, Practical Exam. Report Writing |
| 3. | **SQL**  Overview of the SQL Query Language, SQL Data Deﬁnition , Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Subqueries, Modiﬁcation of the Database, Join Expressions, Views ,Transactions Integrity Constraints ,SQL Data Types and Schemas, Index Deﬁnition in SQL Authorization, Accessing SQL from a Programming Language, Functions and Procedures Triggers, Recursive Queries, SQL injection | Lecture  Exercise  Assignment  Group Discussion | Short answer, Viva voce, Practical Exam. Report Writing |
|  | **Database Design Using the E-R Model**  Features of Good Relational Designs, Decomposition Using Functional Dependencies, Normal Forms, Functional-Dependency Theory, Algorithms for Decomposition Using Functional Dependencies, Decomposition Using Multivalued Dependencies, More Normal Forms, Atomic Domains and First Normal Form  Database-Design Process, Modeling Temporal Data | Lecture  Exercise  Assignment  Group Discussion | Short answer, Viva voce, Practical Exam. Report Writing |
|  | **Query Processing**  Overview, Measures of Query Cost, Selection Operation, Sorting, Join Operation, Evaluation of Expressions, Query Processing in Memory | Lecture  Exercise  Assignment  Group Discussion | Short answer, Viva voce, Practical Exam. Report Writing |
|  | **Transactions**  Transaction Concept, A Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Transaction Isolation and Atomicity, Transaction Isolation Levels, Implementation of Isolation Levels,Transactions as SQL Statements | Lecture  Exercise  Assignment  Group Discussion | Short answer, Viva voce, Practical Exam. Report Writing |

**Text Book:**

1. Database Management Systems, by Raghu Ramakrishnan and Johannes Gehrke
2. Database System Concept, Silbertz, Korth and Sudarshan (Lastest Ed. Or higher)
3. Oracle Database 10g: The Complete Reference, Author: KavinLoney
4. Fundamentals of Relational Database Management Systems, Author: S. Sumathi and S. Esakkirajan.