

Course Title	Fundamentals of Database Systems
Course Code	CoSc2212
Credit Hours	3
ECTS	5 ECTS

Contact hrs.	2
Lab hrs.	3

Tutorial hrs.	2
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Course Category	CoSc2011
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Prerequisite(s)

Year	II	Semester	I
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Course Description	This course introduces the students to the overview, design and implementation of database systems. Topics covered in this course include introduction to database systems, Architecture for database systems, Overview of Hierarchical and Network data models, Relational data model, ER-model, functional dependencies, normalization, Mapping ER models to relational tables basics of relational algebra and
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Course Objective	<p>At the end of the Course students should be able:</p> <ul style="list-style-type: none"> • To understand the basic concepts of database systems. • Differentiate database system from file system • Identify the pros and cons of manual approach, file based approach and database approach • To be aware of the different types of database model. • To have a good understanding of the issues involved in designing relational databases • To be able to design a database using ER modeling. • Understand database normalization and functional dependency • To Map ER diagram in to relational tables • To demonstrate queries in the relational algebra. • To know how to write simple database queries in SQL. • Distinguish and use relational model and relational algebra • To have had practical experience of developing and implementing a small relational database project.
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Course outline	<p>1. Chapter 1. Introduction to Databases</p> <p>1.1.Traditional File-Based Systems</p> <p>1.2.Database Approach</p> <p>1.3.Characteristics of the Database Approach</p>
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- 1.4. Advantages of Using the database Approach
- 1.5. Roles in the Database Environment
- 1.6. History of Database Management Systems
- 1.7. Advantages and Disadvantages of DBMSs
- 2. Chapter 2. Database System Concepts and Architecture**
- 2.1. Data Models, Schemas and Instances
- 2.2. Three-Schema Architecture and Data Independence
- 2.3. Database Languages and Interfaces
- 2.4. The Database System Environment
- 2.5. Centralized and Client/Server Architectures for DBMSs
- 2.6. Classification of Database Management Systems
- 2.7. Functions of DBMS

3. Chapter 3. Database Modeling

- 3.1. Database System Development Lifecycle
- 3.2. The Relational Database Model
 - 3.2.1. The Relational Model Concepts
 - 3.2.2. The Relational Constraints and Relational Database Schemas
 - 3.2.3. The Relational Operations
 - 3.2.4. Views
- 3.3. The Entity Relationship (ER) Model
 - 3.3.1.1. The high-level conceptual model
 - 3.3.1.2. Entities, Attributes, and Keys
 - 3.3.2. Relationship types, Associations, and Constraints
 - 3.3.3. Relationship Types, Relationship Sets, Roles, and Structural Constraints
 - 3.3.4. Weak Entity Types
- 3.4. ER Diagrams, Naming Conventions, and Design Issues
- 3.5. Mapping ER-models to relational tables

4. Chapter 4: Functional Dependency and Normalization (4 hours)

- 4.1. Data Redundancy and Update Anomalies
- 4.2. Functional Dependency
- 4.3. Normal Forms
- 4.4. Process of Normalization

5. Chapter 5. Relational Algebra

- 5.1. The Relational Algebra
- 5.2. Unary Operations
- 5.3. Set Operations
- 5.4. Binary Relational Operations
- 5.5. Additional Relational Operations

6. Chapter 6. Structured Query Language(SQL)

- 4.5. Over view of SQL query language
- 4.6. Data types
- 4.7. Basic structure of SQL queries
- 4.8. DDL, DML, TCL and DCL
- 4.9. Basic Queries in SQL
- 4.10. Nested Queries in SQL

- 4.11. Views
- 4.12. Comments
- 4.13. Constraints and Triggers

Lab Contents

- Database modeling
- Introduction and Software Installation (Microsoft SQL Server or Oracle DB)
- Data Definition Language
 - Data definition and data types in SQL
- Data Manipulation Language
 - Specifying Constraints in SQL
 - Querying from tables (insert, select, delete, update)
- More Complex SQL Retrieval Queries
 - Sorting (ascending, descending) using ORDER BY, DESC and ASC group by, order by, having, wildcards, and regular expressions
 - Aggregate Functions in SQL
 - Null value & Keywords in SQL
 - Auto Increment, alter, drop, rename in SQL
 - Joins
 - Unions, intersections, differences
- Views
- SQL Functions
 - String Functions
 - Numeric/Math Functions
 - Date/Time Functions
 - Conversion Functions
 - Advanced Functions in SQL
- Complex SQL Queries

Teaching and Learning Method Attendance Requirements

- Lectures
 - Laboratory Exercise
- 75 %

Assessment Method

- Continuous Assessment -----40%
- Project -----20%
- Final Exam -----40%

Text books

Text books &References:

1. Ramez Elmasri, Shamkant B. Navathe , Fundamentals of Database Systems, 7th edition , USA Addison-Wesley, 2004,

References

2. Abraham Silberschatz, Henry F. Korth, S. Sudarshan ,

Database System Concepts, 7th edition, USA, McGraw Hill Inc. , 2002.

3. Ramakrishnan R. and Gehrke J., Database Management Systems, 3rd edition, USA, McGrawHill, 2003
4. Thomas M. Connolly, Carolyn E. Begg Database Systems , A Practical Approach to Design, Implementation, and Management 6th edition
5. Gerald V. Post , Database Management Systems – Design & Building Business Applications (2nd edition) McGraw-Hill Irwin, 2002
6. Michael V. Mannino , Database Application Development & Design , McGraw-Hill Irwin, 2001