INSTITUTE OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY (ICS/IT) (FMCS) THE UNIVERSITY OF AGRICULTURE PESHAWAR

Program: BS (IT) - IV
Course Title   Database Systems
Course Code: IT-411
Credit Hours: 03
Course Week: 16
Total Credit Hours: 48

Course Objectives

Welcome to the course of Database Systems

At the end of the course the students will be able to:

1.   **Explain** fundamental database concepts.

2.   **Design** conceptual, logical and physical database schemas using different data models.

3.   **Know** about Relational Data Model (RDM)

4.   **Know** Entity Relation Model (ERM)

5.   **Identify** functional dependencies and resolve database anomalies by normalizing database tables.

6.   **Know** about Data integrity, security, concurrency and recovery and recovery techniques.

7.   **Use** Structured Query Language (SQL) for database definition and manipulation in any DBMS

Week-1-2:   Introduction to Databases
- Data & its types
- Data Vs Information
- Field, Record, File
- Database
- Data Base Management System (DBMS)
- Entity & its types
- Entity Type, Entity Instance, Entity Set
- Attributes & its types
- Relation, Relational Database
- Manual system and its merits & demerits

Week-3:   Traditional File Approach
- Traditional file approach
- Advantages & Disadvantages of TFA
- Database Approach
- Advantages of Database Approach

Week-4:   Component of DBMS and Database Environment
- Component of DBMS
    - Hardware
    - Software
    - Data
    - Procedures
    - Database Access Language
    -User
- Component of Database Environment
    - Data Base Management System (DBMS)
    - Database
    - Repository
    - CASE tools
    - Database Administrator
    - Application Programs
    - Database Designers
    - User Interface
    - Application Programmers
    - End users
-Data Dictionary and its types

Week-5:   Keys
- Keys and its types
    - Super Key
    - Candidate keys
    - Primary Key
    - Foreign Key
    - Secondary Key
    - Simple Key
    - Compound Key
    - Composite Key

- Relationship/Association and its Types/Degree
- Relationship/Association Basic Cardinalities
- Types of Relationship Cardinality
- Cardinality Constraints

Week-6: **Relational Data Model**
- Introduction to Relational Data Model
- Relational Data Model Basic Terminologies
- Advantages of a Relational Data Model
- Types of Relation
- Basic Characteristics/Properties of Relational Data Model

Week-7: **Entity Relationship Model**
- Introduction to Entity Relationship Model
- Constructs/Elements in ER – Data Model
  ● Entity
  ● Attribute
  ● Relationship
- Entity Relation Diagram (ERD)

Week-8-9: **Normalization**
- Normalization concept
- 1NF, 2NF, 3NF, BCNF
- Transforming of ER-Diagram to Relations

Week-10-11: **Concurrency, Recovery and Integrity**
- Concurrency, its Problems & Solutions
- Recovery and Recovery Techniques
- Integrity Control System, Constraints
- Database Security and its Types

Week-12: **Relational Algebra**
- Basic concepts of Relational Algebra
- Basic operations of Relational Algebra
  - Unary Operations
    - Selection
    - Projection
  - Binary Operations
    - Union
    - Set Difference
    - Intersection
    - Cartesian

Week-13: **SQL using Oracle**
- Introduction to SQL using Oracle
- Basic SQL Statements
    - SELECT FROM Clause
    - SELECT WHERE Clause
    - SELECT ORDER BY Clause

Week-14:   Built in Functions
- Functions
- Aggregate Functions
    - COUNT
    - AVG
    - SUM
    - MAX
    - MIN

Week-15:   GROUP BY clause and Joining
- GROUP BY Clause
- Introduction to Joining
- Types of Joining
    - Simple Join
        - Equi-Join
        - Non-Equi-Join
    - Self Join
    - Outer Join

Week-16:   Data Definition Language and Data Manipulation Language
- Introduction to Data Definition Language
- Data Definition Language Commands
    - CREATE
    - ALTER
    - DROP
    - TRUNCATE
- Introduction to Data Manipulation Language
- Data Manipulation Language Commands
    - INSERT
    - UPDATE
    - DELETE

Total Marks: 100

Recommended Books:

1. Database Management Systems by Imran Saeed, Tasleem Mustafa, Tariq Mahmood, Ahsan Raza Sattar
2. Modern Data Base Management by Jeffery A Hoffer
3. Data Base System by Connolly
4. Student's Guide to SQL 8.0