



University of Sargodha Lahore

Computer Science & IT Department

Program: *BSCS*

Semester: *3rd*

Course Code: *CMP 370*

Course Title: *Database Systems*

Course Prerequisites: *Data Structure & Algorithms*

Instructor: *Muhammad Imran khalil*

Office: OH-01, CS & IT department, UOS, Lahore Campus

Office Hours: 08:30am to 04:00 pm

Email: imrankhalil3@gmail.com

Course Outline

Course Objectives:

The course aims to introduce basic database concepts, different data models, data storage and retrieval techniques and database design techniques. The course primary focuses on relational data model and Database Management Systems. The following topics will be covered in the course: Basic database concepts; Logical database modeling and design: Entity relationship diagram (E-R diagram), Enhanced E-R diagram, Relational data model, mapping E-R diagram to relational model, Functional dependencies and Normalization (First – Boyce Codd normal form), Relational Algebra; Structured query language (SQL). Fundamental knowledge of Transaction processing, concurrency control, recovery techniques and query optimization concepts.

Major Topics:

- Introduction to Database Management
- Database System Architecture
- Database Models
- Entity Relationship Model

- Entity Relationship Diagrams and Extended Entity Relationship Diagrams
- Relational Data Model
- Functional Dependencies
- Normalization
- Relational Algebra
- Structured Query Language
- Transaction Management
- Concurrency Control
- Recovery Techniques
- Query Optimization Techniques

Course Grading

Grades shall be based on the following configuration

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|---------------|-----|
| Mid Term Exam | 20% |
| Final Term | 60% |
| Sessional | 20% |

| Assessment Mode | Marks / Points |
|---|-----------------------|
| Quizzes / Assignment | 10% |
| Class Participation/Behavior/Attendance | 10% |
| Mid Term(paper) | 20% |
| Final term(paper) | 60% |
| Total | 100% |

Recommended Text Book(s)

An Introduction to Database Systems by C. J. Date

Additional Text Book(s)

1. Database Management Systems by Catherine Ricardo
2. Database System Concepts by Silberschatz
3. Database Systems - Design, Implementation and Management by Carlos Coronel, et al.

CALENDAR ACTIVITIES

| Week | Contents | | Activity |
|-------------|--|--|------------------|
| 1, 2 | Introduction: <ul style="list-style-type: none"> ✓ Introduction to DB ✓ Advantages of DBMS and its User ✓ Disadvantages of file system | Chapter 1 from book by C.J. Date and Catherine Ricardo | Class Discussion |

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|--------|---|---|------------------|
| 3, 4 | DB Architecture: <ul style="list-style-type: none"> ✓ Database Architecture ✓ Detailed Diagrams and Database Design | Chapter 2 from book by C.J. Date, Chapter 4 from book by Catherine Ricardo | Assignment |
| 5,6 | Entity Relationship Model <ul style="list-style-type: none"> ✓ Entity-Relationship Data Model ✓ Practice Session of ER Data Model ✓ Relationships | Chapter 2 from book by C.J. Date, Chapter 5 from book by Catherine Ricardo | Assignment Quiz |
| 7 | ER Model Continued <ul style="list-style-type: none"> ✓ Cardinality and Roles in Relationships ✓ Extended Entity Relationship Diagram ✓ E-R Diagram <p style="text-align: center;">Mid Term Examination</p> | Chapter 2 from book by C.J. Date, Chapter 5 from book by Catherine Ricardo | Class Discussion |
| 8, 9 | Relational Model, Keys and Relational Algebra <ul style="list-style-type: none"> ✓ Relational Model, Advantages, Data Structure ✓ E-R to Relation Conversion ✓ Integrity Constraints ✓ Key and its different types ✓ Relations Keys (PK and FK) ✓ Relational Algebra ✓ Relational Calculus ✓ Logical Database Design ✓ Practice Session | Chapter 3, 5, 7, 8 from book by C.J. Date, Chapter 6 from book by Catherine Ricardo | Assignment |
| 10, 11 | Normalization <ul style="list-style-type: none"> ✓ Functional Dependency & Normalization ✓ Normalization (1NF, 2NF, 3NF, BCNF) ✓ Normalization Summary ✓ Practice Session | Chapter 11, 12 from book by C.J. Date, Chapter 7 from book by Catherine Ricardo | Assignment Quiz |
| 12 | SQL <ul style="list-style-type: none"> ✓ Partitioning, Replication and Structured Query Language (SQL) ✓ Data Types and Rules of the Format ✓ Lab Practice | Chapter 4 from book by C.J. Date, Chapter 8 from book by Catherine Ricardo, Handouts | Assignment |
| 13 | DDL and DML <ul style="list-style-type: none"> ✓ Data Definition Language (DDL) ✓ Create/Drop Table/Database, Alter Table ✓ Data Manipulation Language ✓ Insert and Select Statements ✓ Lab Practice | Chapter 4, 5, 6, 7 from book by C.J. Date, Chapter 8 from book by Catherine Ricardo, Handouts | Assignment |
| 14 | DML Continued <ul style="list-style-type: none"> ✓ Update and Delete Statements ✓ Where Clause and Operators (Not, Between, IN, Like) ✓ Order By Clause, Having Clause, Functions ✓ Joins ✓ Views ✓ Lab Practice | Chapter 4, 5, 6, 7 from book by C.J. Date, Chapter 8 from book by Catherine Ricardo, Handouts | Quiz |

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| 15, 16 | Transaction Management & Optimization Techniques <ul style="list-style-type: none"> ✓ Transactions ✓ Recovery ✓ Concurrency Control ✓ Locking ✓ Query Optimization ✓ Lab practice | Chapter 15, 16, 18 from book by C.J. Date, Chapter 12, 14 from book by Catherine Ricardo, Handouts | |
| 16 | Final Term Examination | | |