Pokhara University
Faculty of Management Studies

Course Code: CMP 271
Course title: **Database Management Systems**
Nature of the course: Theory + Practical
Year: Second
Level: Bachelor
Semester: III

Full marks: 100
Pass marks: 45
Credit Hrs: 3
Total periods: 48 hours
Program: BCSIT

1. Course Description:

This course covers the core principles and techniques required in the design and implementation of database systems. It consists of relational database systems RDBMS - the predominant system for business, scientific and engineering applications at present, Entity-Relational model, Normalization, Relational model, and data access queries as well as an introduction to SQL. It also covers essential DBMS concepts such as Query Processing, File organization and indexing, security, Transaction Processing, Concurrency Control, Backup and Recovery.

2. General Objectives:

1. Explain the concepts of database and database management system.
2. Provide knowledge of database design using entity relationship diagram.
3. Perform on SQL statements, normalization, transaction processing, and database recovery.

3. Methods of Instructions:

Lecture, Tutorial, Discussion, Readings and Practical works

4. Course Contents

Specific Objective	**Contents**
• To offer students a comprehensive understanding of the database management system, including its historical context, definition, features and advantages and limitations. • These objectives collectively contribute to building a solid foundation in database management system.	Unit 1. Introduction [5 Hrs.] 1.1. History, database system and its applications 1.2. Characteristics of DBMS 1.3. Application architecture (one tier, two tier, n-tier) 1.4. Data abstraction and Independence 1.5. Schemas and Instances 1.6. Database Manager and users
• To provide student with a strong foundation in data models. • To student will gain proficiency in E-R model and constructing E-R diagram.	Unit 2. Data Models [8 Hrs.] 2.1. Conceptual, Logical and Physical Model 2.2. Introduction to Entity Relationship Model 2.3. Entities type 2.4. Entities set 2.5. Attributes and keys 2.6. Relationship types and sets

	2.7. E-R diagrams
• To equip learners with the skills necessary to effectively database design. • To learners will be able to normalize database in different normal forms.	Unit 3. Normalization [7 Hrs.] 3.1. Importance of Normalization 3.2. Functional Dependencies-– definition, trivial and non-trivial FD, closure of FD set, closure of attributes 3.3. Integrity and Domain constraints 3.4. Normal forms (1NF, 2NF, 3NF, BCNF)
• To learns with a deep understanding of SQL and their type. • To learners will be able to create, manipulate and other different operations in database.	Unit 4. Relational Language [10 Hrs.] 4.1. Introduction to SQL 4.2. concepts of DDL, DML, DCL 4.3. SQL –Data type, operators 4.4. structure – creation, alteration, drop, defining constraints – Primary key, foreign key, unique, not null, check, default etc. 4.4. Manipulation commands (INSERT, UPDATE, DELETE, SELECT queries) 4.5. Functions - aggregate functions, Built-in functions – numeric, date, string functions, set operations, sub-queries, Use of group by, having, order by, LIKE Pattern, Exist, Any, All, BETWEEN, join and its types, view and its types.
• To provide learners with the skills to query processing. • To learners will be able to query cost estimation and query optimization	Unit 5. Query Processing [3 Hrs.] 5.1. Introduction to Query Processing 5.2. Query Cost estimation 5.3. Query Operations 5.4. Evaluation of Expressions 5.5. Query Optimization
• To provide learners with a solid understanding of file organization and indexing • Define the concept of file organization type, B+ tree index and hash index	Unit 6. File organization and indexing (3 Hrs) 6.1 Disks and storage 6.2 Organization of records into blocks 6.3 File organizations - The sequential and the indexed sequential file organizations 6.4 B+ Tree index 6.5 Hash index
• To equip learners with the skills to need of security, integrity violations, and efficient use of access control. • To provide knowledge about authorization and cryptography.	Unit 7. Security (3 Hrs) 7.1 Needs of security 7.2 Security and integrity violations 7.3 Access control 7.4 Authorization 7.5 Security and Views 7.6 Encryption and decryption
• Define transaction and their properties	Unit 8. Transaction and Concurrency Control [4 Hrs.]

• Acknowledge the concept of serializability, concurrency control	8.1. Introduction to Transaction 8.2. Concept of Serializability 8.3. Concurrent execution 8.4. Lock based Concurrency Control 8.5. 2PL and Strict 2PL 8.6. Timestamp concept
• To provide learners with a deeper understanding of backup and recovery • Different technique to backup database	Unit 9. Backup and Recovery [3 Hrs.] 9.1. Failure Classifications 9.2. Recovery and Atomicity 9.4. Log based Recovery 9.5. Shadow Paging 9.6. Local Recovery Manager 9.7. Backup system
• Define the concept of Object oriented database.	Unit 10. Object oriented Database [2 Hrs.] 10.1. Introduction of OODMS 10.2. Use, benefit, role of OODMS 10.3. Object oriented data model

5. Evaluation System and Students' Responsibilities

Evaluation System

The internal evaluation of a student may consist of assignments, attendance, term-exams, lab reports and projects etc. The tabular presentation of the internal evaluation is as follows:

Internal Evaluation	**Weight**	**Marks**	**External Evaluation**	**Marks**
Theory		**30**	**Semester End**	**50**
Attendance & Class Participation	10%			
Assignments	20%			
Presentations/Quizzes	10%			
Internal Assessment	60%			
Practical		**20**		
Attendance & Class Participation	10%			
Lab Report/Project Report	20%			
Practical Exam/Project Work	40%			
Viva	30%			
Total Internal		**50**		
Full Marks: 50 + 50 = 100				

Students' Responsibilities

Each student must secure at least 45% marks separately in internal assessment and practical evaluation with a minimum of 80% attendance in the class in order to appear in the Semester End Examination. Failing to get such score will be given NOT QUALIFIED (NQ) to appear the Semester-End Examinations. Students are advised to attend all the classes, formal exam, test, etc. and complete all the assignments within the specified time period. Students are required to complete all the requirements defined for the completion of the course.

6. List of Practicals	
SN	Practicals
1.	Construct E-R Diagram for different database system.
2.	Demonstrate 1NF,2NF, 3NF.
3.	Write SQL query for DDL commands.
4.	Write SQL query for DML commands.
5	Write SQL query for operators(arithmetic, logical, assignment).
6.	Write SQL query using aggregate function.
7.	Apply SQL for specifying constraints.
8.	Write SQL for join(inner joins, outer joins).
9.	Write SQL for set operations.
10.	Apply SQL for Group by, having, like pattern etc.
11.	Students will take a database project and design complete database structure and present in class.

7. Prescribed Books and Reference Book

Text Books:

1. H. F. Korth and A. Silberschatz, Database System Concepts, McGraw Hill

2. K. Majumdar and P. Bhattacharaya, Database Management Systems, Tata McGraw Hill, India.

References:

1. Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems, Pearson Addison Wesley
2. Raghu Ramakrishnan, and Johannes Gehrke, Database Management Systems, McGraw-Hill
3. Jaffrey D. Ullman, Jennifer Widom; A First Course in Database Systems, Pearson Education Limited