University of Computer Studies, Yangon
Faculty of Information Science
2019-2020 Academic Year
Diploma in Computer Science

Subject Code	IS-205	Subject Name	Database Management System
Credit point	3	Course Coordinator	Faculty of Information Science
Online Lecture Hour	60 hours	Semester	First
Practical hour	24 hours		
Tutorial Test hour	4.5 hours		

Course Description

This module provides students with theoretical knowledge and practical skills in the use of databases and database management systems in information technology applications. The logical design, physical design and implementation of relational databases are covered. And then, this course also provides the query processing knowledge, transaction management, and recovery management and indexing methods of Database management system. It exposes the student to the fundamental concepts and techniques in database use. The course uses a problem-based approach to learning.

Course Objectives

- To understand the role of a database management system in an organization
- To understand basic database concepts, including the structure and operation of the relational data model
- To construct simple and moderately advanced database queries using Structured Query Language (SQL)
- To Understand and successfully apply logical database design principles, including E-R diagrams and database normalization.
- To understand the indexing and query processing and query optimization
- To understand the concept of a database transaction and related database facilities, including concurrency control, journaling, backup and recovery, and data object locking and protocols
- To understand the role of the database administrator
- To design and implement a small database project using Database tool

Learning Outcomes

At the end of this module, the successful student will:

- Have a broad understanding of database concepts and database management system software
- have a high-level understanding of major DBMS components and their function
- Be able to model an application's data requirements using conceptual modeling tools like ER diagrams and design database schemas based on the conceptual model.
- Be able to write SQL commands to create tables and indexes, insert/update/delete data, and query data in a relational DBMS.
- Be able to explain the database transaction, concurrency control and recovery protocols
- Be able to understand the storage and indexing of data
- Be able to program a data-intensive application using DBMS APIs.

Course Outlines

- Understand what is a database system
- Understand the relational model of data
- Understand query languages for databases
- Be proficient in SQL
- Structure Data using Data Models
- Understand Data Normalization
- Understand constraints, views, triggers, and indexes in Databases

- Understand basic transaction processing concepts
- Understand query processing in DBMSs
- Understand how data is stored and indexed in a DBMS

Prerequisites

None

Main course website

http://www.ucsy.edu.mm

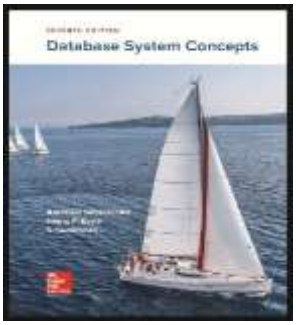
The assignments will be posted here, as will the lecture materials.

Learning Assessment

Exam	:	50%
Assignment	:	10%
Project	:	15%
Tutorial Test	:	10%
Online Quiz	:	5%
Practical Participation	:	10%

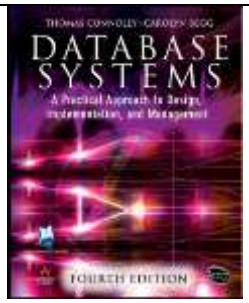
Textbook

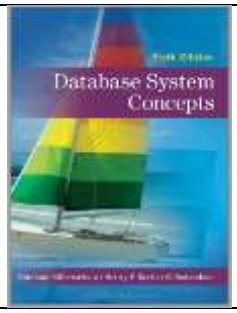
- Database System Concepts, AviSilberschatz, HenryF.Korth, and S.Sudarshan, seventh Edition, McGraw-Hill.

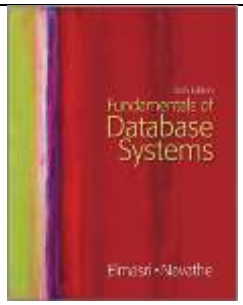


References Book

1. Database System, A practical Approach to Design ,4th Edition
2. Database System Concepts, AviSilberschatz, HenryF.Korth, and S.Sudarshan.0-07-295886 3. sixth Edition. McGraw-Hill.
3. Modern Database Management System, Jeffery A. Hoffer, V.Ramesh,Heikki Topi , 12th edition, 2016
4. Fundamantals of Database Systems, Ramez Elmasri and Shamkant B.Navathe, , sixth edition,2008
5. An Introduction to Database Management System, C.J.Date, 7th edition ,2000







Course Policy

Assigned Readings: The student is expected to read Lectures and assignments to prepare for scheduled discussions of the material.

Attendance: The student is expected to attend orientation classes, online Lecture and Practical Class, the exam meetings, and scheduled project presentations. Regular class and/or online participation should ensure that expectations are understood, and provide feedback to monitor and assess progress. The student is responsible for accessing the course website to obtain assignments and related materials.

Participation: The student is expected to take part in class or online discussions, implement and test software and program examples, and assist class members with technical issues.

Lab projects: It is expected that the student will begin each project when assigned or as topics are approved, then present system components by the scheduled progress reporting dates. The Lab project schedule and book format are going to be confirmed during the lecture course.

Exams and Tutorial test: The student is expected to complete each exam and tutorial test at the scheduled time. All exams and tutorial are based upon all learning objectives to be reached before the scheduled date. Final Exam date is declared at the time table of course schedule and the tutorial test schedule are going to be confirmed during the lecture course.

Intellectual Honesty: By departmental policy, the discovery of plagiarism (i.e. copying from another's exam paper or lab project) will result in a reduction of grade result.

Unit	Course Title	Learning (min)	Learning Strategy	Assessment
1	Chapter 1 Introduction 1.1 Database-System Applications 1.2 Purpose of Database Systems 1.3 View of Data 1.4 Database Languages 1.5 Database Design 1.6 Database Engine 1.7 Database and Application Architecture 1.8 Database Users and Administrators 1.9 History of Database Systems 1.10 Summary Exercises	180	Lecture	Test(Quiz) Assignment
2	Chapter 2 Introduction to the Relational Model 2.1 Structure of Relational Databases 2.2 Database Schema 2.3 Keys 2.4 Schema Diagrams 2.5 Relational Query Languages 2.6 The Relational Algebra 2.7 Summary Exercises Assignment	180	Lecture + Practical	Test(Quiz) Assignment
3	Chapter 3 Introduction to SQL 3.1 Overview of the SQL Query Language 3.2 SQL Data Definition 3.3 Basic Structure of SQL Queries 3.4 Additional Basic Operations 3.5 Set Operations 3.6 Null Values Exercises Assignment	180	Lecture + Practical	Test(Quiz) Assignment
4	3.7 Aggregate Functions 3.8 Nested Subqueries 3.9 Modification of the Database 3.10 Summary Exercises Assignment	240	Lecture + Practical	Test(Quiz) Assignment
5	Chapter 4 Intermediate SQL 4.1 Join Expressions 125 4.2 Views 137 4.3 Transactions 143 4.4 Integrity Constraints 145 4.5 SQL Data Types and Schemas 153 4.6 Index Definition in SQL 164 4.7 Authorization 165 4.8 Summary 173	240	Lecture + Practical	Test(Quiz) Assignment
6	4.5 SQL Data Types and Schemas 153 4.6 Index Definition in SQL 164 4.7 Authorization 165 4.8 Summary 173 Exercises Assignment	180	Lecture + Practical	Test(Quiz) Assignment
7	Chapter 6 Database Design Using the E-R Model 6.1 Overview of the Design Process	180	Lecture + Practical	Test(Quiz) Assignment

	6.2 The Entity-Relationship Model 6.3 Complex Attributes 6.4 Mapping Cardinalities 6.5 Primary Key 6.6 Removing Redundant Attributes in Entity Sets 6.7 Reducing E-R Diagrams to Relational Schemas 6.8 Extended E-R Features 6.9 Entity-Relationship Design Issues 6.10 Alternative Notations for Modeling Data 6.11 Other Aspects of Database Design 6.12 Summary			
8	6.7 Reducing E-R Diagrams to Relational Schemas 6.8 Extended E-R Features 6.9 Entity-Relationship Design Issues 6.10 Alternative Notations for Modeling Data 6.11 Other Aspects of Database Design 6.12 Summary Exercises Assignment	180	Lecture + Practical	Test(Quiz) Assignment
9	Chapter 7 Relational Database Design 7.1 Features of Good Relational Designs 7.2 Decomposition Using Functional Dependencies 7.3 Normal Forms 7.4 Functional-Dependency Theory 7.5 Algorithms for Decomposition Using Functional Dependencies 7.6 Decomposition Using Multivalued Dependencies 7.7 More Normal Forms 7.8 Atomic Domains and First Normal Form 7.9 Database-Design Process 7.10 Modeling Temporal Data 7.11 Summary Exercises Assignment	240	Lecture + Practical	Test(Quiz) Assignment
10	Chapter 13 Data Storage Structures 13.1 Database Storage Architecture 13.2 File Organization 13.3 Organization of Records in Files 13.4 Data-Dictionary Storage 13.5 Database Buffer 13.6 Column-Oriented Storage 13.7 Storage Organization in Main-Memory Databases 13.8 Summary Exercises Assignment	180	Lecture + Practical	Test(Quiz) Assignment
11	Chapter 14 Indexing 14.1 Basic Concepts 14.2 Ordered Indices 14.3 B+-Tree Index Files 14.4 B+-Tree Extensions 14.5 Hash Indices 14.6 Multiple-Key Access 14.7 Creation of Indices	180	Lecture + Practical	Test(Quiz) Assignment

	14.8 Write-Optimized Index Structures 14.9 Bitmap Indices 14.10 Indexing of Spatial and Temporal Data Exercises Assignment			
12	Chapter 15 Query Processing 15.1 Overview 15.2 Measures of Query Cost 15.3 Selection Operation 15.4 Sorting 15.5 Join Operation 15.6 Other Operations 15.7 Evaluation of Expressions 15.8 Query Processing in Memory 15.9 Summary Exercises Assignment	180	Lecture + Practical	Test(Quiz) Assignment
13	Chapter 16 Query Optimization 16.1 Overview 16.2 Transformation of Relational Expressions 16.3 Estimating Statistics of Expression Results 16.4 Choice of Evaluation Plans 16.5 Materialized Views 16.6 Advanced Topics in Query Optimization 16.7 Summary Exercises Assignment	180	Lecture + Practical	Test(Quiz) Assignment
14	Chapter 17 Transactions 17.1 Transaction Concept 17.2 A Simple Transaction Model 17.3 Storage Structure 17.4 Transaction Atomicity and Durability 17.5 Transaction Isolation Exercises Assignment	180	Lecture + Practical	Test(Quiz) Assignment
15	17.6 Serializability 17.7 Transaction Isolation and Atomicity 17.8 Transaction Isolation Levels 17.9 Implementation of Isolation Levels 17.10 Transactions as SQL Statements 17.11 Summary Exercises Assignment	180	Lecture + Practical	Test(Quiz) Assignment
16	Chapter 18 Concurrency Control 18.1 Lock-Based Protocols 18.2 Deadlock Handling 18.3 Multiple Granularity 18.4 Insert Operations, Delete Operations, and Predicate Reads Exercises Assignment	180	Lecture + Practical	Test(Quiz) Assignment
17	18.5 Timestamp-Based Protocols 18.6 Validation-Based Protocols	180	Lecture + Practical	Test(Quiz) Assignment

	18.7 Multiversion Schemes 18.8 Snapshot Isolation 18.9 Weak Levels of Consistency in Practice 18.10 Advanced Topics in Concurrency Control 18.11 Summary Exercises Assignment			
18	Chapter 19 Recovery System 19.1 Failure Classification 19.2 Storage 19.3 Recovery and Atomicity 19.4 Recovery Algorithm 19.5 Buffer Management 19.9 ARIES 19.10 Recovery in Main-Memory Databases 19.11 Summary Exercises Assignment	180	Lecture + Practical	Test(Quiz) Assignment
19	Revision and Review Exercises	180		
	Total	3600 mins (60 hrs)		