

Course Title: COSC 3343: Database Theory**Semester Credit Hours: 3 (3,0)****I. Course Overview**

This course is the study of the principles of database systems. The goal is to prepare students an understanding of the theory as well as practices of database management systems.

II. PMU Competencies and Learning Outcomes

Students of COSC 3343: Database Theory develop conceptual, quantitative, and programming skills necessary for continued success in computer science. The skills enhance their abilities to appreciate the theory and practices of database management systems common to computer science as a discipline and to effectively communicate their solutions to fellow professionals. This course makes extensive use of the PMU technology infrastructure to provide communication between faculty and students. The course includes individual as well as group projects, establishes both conceptual reasoning skills and technical communication skills, and provides opportunities for the presentation and defense of designed solutions.

III. Detailed Course Description

This course is concerned with the study of the principles of database systems, including conceptual modeling and data models, logical and physical database design, query languages and query processing, and database services such as concurrency control, crash recovery, security, and integrity.

IV. Requirements Fulfilled

COSC 3343: Database Theory satisfies three hours of the requirements for the degree in computer science. It is required of all students pursuing a degree program in computer science within the College of Information Technology. It should be taken in the first semester of the junior year.

V. Required Prerequisites

GEIT 1412: Computer Science II
MATH 1313: Statistical Methods

VI. Learning Outcomes

In this course, students learn:

- To understand the underlying design principles of database systems.
- To understand and apply the conceptual modeling and data models for database design.
- To understand the concepts on logical and physical database design.
- To understand and apply query languages and query processing.
- To understand the theory behind the database services.
- To develop improved communication and collaborative skills.

VII. Assessment Strategy

This course is designed with three primary goals in mind: to introduce students to the conceptual basis and practical issues associated with the database design, to lead students to connect the quantitative techniques to its application in computer science, and to provide students with the opportunity to communicate their designs and implementations to their peers in a professional setting. With this in mind, the course grade involves an assessment of their performance on examinations that focus on the application of programming paradigms to the solutions of problems, the performance analysis of the designed solutions, and the communication of designed solutions to those problems to an audience. Course grades are based on:

- Weekly assigned homework to motivate students to do the work and earn credit accordingly.
- Weekly, in-class presentations by students of solutions to real world problems related to the course material and classroom discussion and critique of the presentation.
- Two in-class examinations to assess the student's accumulative mastery of content covered prior to the time of the examination.
- Three programming assignments testing students understanding of the major concepts introduced during the course.
- A comprehensive final examination to assess the student's accumulative mastery of course material.

The final grades is based on 10% credit for the homework, 10% for the presentations and participation in classroom discussion, 30% on in-class examinations, 30% on programming assignments and 20% for the final examination.

Students are required to maintain a journal of thoughts and commentaries during the course. The journal contains daily entries including the identification of areas of interest and concern, notes on the preparation of presentation and comments and analysis of classmate's presentations. The journal is reviewed weekly by the instructor to provide feedback to the students.

Final grades and the student and instructor observations from reflective notebooks are included in the student's portfolio for use in the final assessment capstone course. The intent is to document the student's maturation as he proceeds through the curriculum.

VIII. Course Format

A. Instruction

This course utilizes both lecture/discussion and laboratory exercises. Students are expected to attend three hours of lecture per week. At least once per week students should be prepared to make presentation on the design and implementation of a solution to a problem selected by the instructor and to take part in a discussion based on that presentation. Once a week students should have at least 30 minutes of collaborative problem solving activity.

B. Web supplement

Course home page (the university's Web tool, WebCT or Blackboard) should contain the following:

- Course syllabus
- Course assignments
- Sample solutions to examinations (after being graded and returned)
- Sample solutions to programming assignments (after being graded and returned)
- Course calendar (an active utility)
- Course e-mail (an active utility)
- Course discussion list (an active utility)
- Student course performance (an active utility)

Classroom Hours (3 hours per week)

Class: 3

Lab: 0

IX. Topics to Be Covered

- A. Database system components
- B. Entry-Relationship (ER) model
- C. Relational model and relational algebra
- D. Structured Query Language (SQL)
- E. Relationship database design
- F. ER to relationship mapping
- G. Network model
- H. Hierarchical model
- I. Object-oriented model
- J. Object-relational model
- K. File organization
- L. Index structures for files

- M. Query processing and optimization
- N. Transactions
- O. Concurrency control
- P. Crash recovery
- Q. Security

X. Laboratory Exercises

This course does not offer a separate laboratory to students.

XI. Technology Component

This course makes use of the university's wireless access infrastructure. The course relies on the university and the students having access to professional grade application development environments for the students to use.

XII. Special Projects / Activities

Students are required to keep a "reflective notebook" in which, after each class, they enter their own assessments of what they learned, and what questions remain from the class. From each exercise set, each student selects one problem, which the student thinks best reflects the way the topic is used in a technical context. A detailed solution to the problem is included in the student's reflective notebook.

XIII. Textbooks and Teaching Aids

A. Required Textbook

Silberschatz, H. F. Korth, and S. Sudarshan. *Database System Concepts*. _____: McGraw-Hill, 2001.
ISBN 0-07-255481-9

B. Alternative Textbooks

Elmasri, R., and S. B. Navathe. *Fundamentals of Database Systems*. _____: Addison-Wesley, 2003.
ISBN 0-201-74153-9

C. Supplemental Print Materials

None.

D. Supplemental Online Materials

As available from the publishers.