Course Title: ITAP 4311: Database Management

Semester Credit Hours: 3 (3,0)

I. Course Overview

The objective of this course is to give students an understanding of key issues involved in the management of data resources in organizations. The course is designed so as to cover topics that are relevant from a data center management perspective; particularly one that involves the provision of online access to data resources to a variety of physically distributed organizational users. It includes a mix of lectures (some of which are conducted in the laboratory) and discussions on contemporary articles from industry publications.

II. PMU Competencies and Learning Outcomes

This course helps students develop the ability to become conversant on database management issues and understand the related terms and issues that are important for database management professionals around the world. Additionally, the course provides the students with the communication, leadership and teamwork skills necessary to effectively work as professionals in teams, or in charge of teams, responsible for operating complex database environments. Finally, the course imparts on the students an understanding of databases as more than data repositories, that is, as resources that support the core and mission-critical business processes of an organization.

III. Detailed Course Description

The course begins with a discussion of ethical issues, legal issues, and aspects conducive to effective teamwork, in the context of database management. It then proceeds with a review of major types of databases. This covers traditional types such as unstructured and relational databases, as well as more contemporary types such as object-oriented, temporal, and large-scale databases. Next the course covers key concepts and methods. These include the various native database formats available (for example, Access, DB2, Oracle, Sybase), with a discussion of relative advantages and disadvantages of each format, as well as development-oriented elements such as database manipulation languages (with special emphasis on SQL) and client/server database development issues. The course concludes with a discussion of advanced issues in connection with setting up data centers and allowing secure and balanced online access to databases by various organizational stakeholders. The emphasis in this course is more on data center set up and management than on database design issues, whose coverage here is minimal.

IV. Requirements Fulfilled

This course is an elective for students in the College of Information Technology. It can be taken to satisfy the three-credit IT elective requirement of the B.S. in Information Technology.

V. Required Prerequisites

GEIT 1411: Computer Science I
GEIT 1412: Computer Science II
GEIT 1311: Computer Organization I
GEIT 3341: Database Design

VI. Learning Outcomes

In this course, students learn:

- To become conversant on database management issues and understand the related terms and issues relevant to database management professionals around the world.
- To acquire the communication, leadership and teamwork skills necessary for effectively work as professionals in teams, or in charge of teams, responsible for operating complex database environments.
- To understand the role of databases as resources that support the core and mission-critical business process of an organization.

VII. Assessment Strategy

Students are assessed based on: their performance in two exams (midterm and final); their class participation, which includes the discussion of recent articles taken from online industry publications; and the quality of a final team project and related oral presentation. The relative weights of each of these items on the final grade are as follows:

- The midterm and final exams each account for 25% of the grade. Combined, they account for 50% of the grade.
- Class participation accounts for 10% of the grade, and is evaluated based on the ability of students to add to the material already provided by the instructor to them.
- The final team project accounts for 40% of the grade. It is evaluated based on a project document, oral presentation, and client perceptions of the team project. The project must be conducted in collaboration with a client organization (for example, a department at a large company or non-profit organization). A letter from the main contact person at the client organization, discussing and evaluating the project and its outcomes, must be provided to the instructor. The letter should contain the contact information of the person writing so the instructor can call him/her up and inquire about the project.

The exams encourage the students to review all of the concepts and methods discussed in class, which are primarily based on textbook material. This is complemented by the class discussions on recent articles taken from online industry publications, which allow the students to become conversant with the industry-specific lingo related to database

management issues. The final project provides an experience where concepts, methods, and industry-relevant issues are all brought together in a very applied manner to solve a real problem faced by a real organization. While this project is not as extensive as a program capstone project, it gives the students the necessary exposure to industry-relevant issues to prepare them for the future challenge of conducting a final program capstone project, and subsequently pursuing a successful career as IT professionals.

VIII. Course Format

Four of the course's class meetings are used for laboratory demonstrations and activities geared at helping the students learn the several steps involved in setting up a database server and controlling user access to it. The other class meetings are split into two main components: lectures, and class discussions. The lectures cover topics outlined in this syllabus. The class discussions are based on recent articles taken from online industry publications such as *Computerworld* and *CIO Magazine*, which are freely available from the Web. The instructor provides the links to the articles, which are then downloaded by the students and read prior to class. In class, the students discuss the articles in small teams for about 20 minutes, developing three provocative questions per team. This is followed by a discussion involving the whole class, where each team asks one of the questions they developed, and other teams answer them, until all teams asked at least one of their questions. This discussion format is likely to lead to lively debate on topics that are directly addressed by the article, as well as on topics that are indirectly related to the article.

Classroom Hours (3 hours per week) **Class/lab: 3**

IX. Topics to be Covered

A. Ethical issues, legal issues, and effective teamwork
   1. Ethical and legal issues in database management
   2. Typical database management team composition
   3. Conflict resolution in database management teams
   4. Effective teamwork in database management teams

B. Types of databases
   1. Unstructured databases
   2. Relational databases
   3. Object-oriented databases
   4. Temporal databases
   5. Large-scale databases

C. Concepts and methods
   1. Native database formats
   2. Database indexing
   3. Database manipulation languages
   4. Structured query language (SQL)
   5. Client/server database development

D. Advanced issues
   1. Web-based database management
   2. Database security methods and tools
   3. Data warehousing
   4. Database performance
   5. Database servers and clusters
   6. Database management outsourcing
   7. Database access priority setting and QoS

X. Laboratory Exercises

This course has four laboratory sessions, which are scheduled using time from standard class meetings. In the laboratory sessions, students learn the several steps involved in setting up a database server and controlling user access to it. The database server is set up separately from a Web server, whereby data is accessed by users by means of Web browsers (simulating what usually happens in organizational settings). Access to the database server is controlled by the creation of two main database user groups, and setting the database server up in such a way as to provide higher access priority to one of those user groups.

XI. Technology Component

A. In class, the instructor makes use of state-of-the art multimedia projection equipment and software. These are used to project slides and Web-based content, as well as play freely available Web-based video clips from Web sites covering topics relevant to the class (for example, CNN.com Technology).

B. Outside class, the instructor uses Web-based course management software to interact with students, provide feedback on their performance, make available links to online articles, as well as receive documents (for example, draft versions of project reports) and provide feedback on them.

C. Outside class, in the laboratory setting, the instructor makes use of industry-strength commercial Web and database server software to create a simulated data center environment.

XII. Special Projects/Activities

The team project consists of meeting with members of a client organization (for example, a department at a large company or non-profit organization), gathering relevant information from them, and developing a document containing the following elements:

- A set of organizational problems that could potentially be solved through the implementation of a technology related to one or more of the topics covered in this course. For example, a team may study a manufacturing organization that posts extensive product information online, and find out that the deployment of a particular database management technology could solve key problems facing the organization.

- A detailed description of a technology solution to the problems above. This description should include hardware and software details, as well as details in connection with how the technology is integrated with existing technologies in the client organization.
- A detailed description of the costs and potential benefits, from an organizational perspective, associated with the technology solution.

Oral presentation. Teams summarize and explain the information contained in their project document in an oral presentation in class at the end of the semester.

XIII. Textbooks and Teaching Aids

A. Required Textbook

Jeffrey A. Hoffer, Mary B. Prescott and Fred R. McFadden; *Modern Database Management*, 6th edition (January 15, 2002), Prentice Hall ISBN: 0130339695.

B. Alternative Textbooks

Philip J. Pratt and Joseph J. Adamski; *Concepts of Database Management*, 4 edition (June 20, 2002); Course Technology ISBN: 0619064625.

C. Supplemental Print Materials

None

D. Supplemental Online Materials

Recent articles taken from online industry publications such as Computerworld and CIO Magazine. The instructor provides the links to the articles, which are freely available from the Web.