SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO

Sault College

COURSE OUTLINE

COURSE TITLE: **DATABASE DESIGN AND IMPLEMENTATION II**

CODE NO. : **CSD3030** **SEMESTER: 4**

PROGRAM: **PROGRAMMER (2090)/PROGRAMMER ANALYST (2091)**

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DATE: **January, 2003** **PREVIOUS OUTLINE DATED:** **Jan. 2002**

APPROVED:

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DEAN **DATE**

TOTAL CREDITS: **4**

PREREQUISITE(S): **CSD2040**

HOURS/WEEK: **4**

DATABASE DESIGN AND IMPLEMENTATION II | CSD3030

COURSE NAME | COURSE CODE

I. COURSE DESCRIPTION:

This course is a continuation of Database Design and Implementation I where more advanced design and implementation of systems will be completed. A major focus of the course is on the physical implementation of databases. The database processing language, SQL (Structured Query Language), will be used for creating and processing relational databases. The DBMS product that will be used to implement databases and learn SQL this semester will be MySQL. The course will also extend the concepts of database management to include such topics as managing multi-user databases, standard interfaces for accessing database servers, and data warehouses. The course will begin with a review of data modelling and design techniques learned in CSD2040.

II. TOPICS TO BE COVERED:

1. Review of data modelling techniques.
2. Transforming E-R Model designs and Semantic Object Model designs into a physical implementation using MySQL.
3. Structured Query Language (SQL) with MySQL.
4. Standard Interfaces for accessing databases.
5. Managing Multi-User Databases.
6. Data Warehouses.

III. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

Upon successful completion of this course the student will demonstrate the ability to:

1. Recall and apply data modelling and design techniques learned in CSD2040.

   This learning outcome will comprise approximately **5%** of the course.

   Elements of the performance:

   - apply design techniques learned previously to model a case situation that will be used as a foundation to learn material covered in this course.

2. Transform E-R data models and Semantic Object data models into a physical relational design using MySQL. (Kroenke - chapters 6, 7, and 8)

   This learning outcome will comprise approximately **20%** of the course.

   Elements of the performance:

   - define and apply the concepts of the following terms:

     i) tree structure ii) simple network iii) complex network

   - describe and implement one-to-many relationships in MySQL, and, explain how these relationships facilitate the retrieval of information
   - describe and implement many-to-many relationships in MySQL, and, explain how these relationships facilitate the retrieval of information
   - transform entire E-R models into physical relational designs
   - transform entire Semantic Object models into physical relational designs
   - describe the relationship of database structure and application program design

3. Discuss and apply the concepts related to Structured Query Language (SQL) using MySQL.

(Kroenke: chapters 9 and 10, and, lecture notes)

This learning outcome will comprise approximately **55%** of the course.

Elements of the performance:

A) apply the concepts of database creation by being able to:

- define and create databases
- create tables
- understand and select datatypes
- define the meaning of a *null* value and *not null* value
- create and use constraints

B) apply the concepts of data retrieval by being able to:

- list the tables in a database
- query the database retrieving column and row data
- query the database using conditions to restrict data retrieved
- use boolean expressions in the condition of a query
- rename column headings in the retrieved data
- use the numeric functions in data retrieval

C) apply the concepts of organizing data and summarizing results by being able to:

- use aggregate functions such as *AVG*, *COUNT*, *MIN*, *MAX*, and *SUM*
- organize data into groups by using the *GROUP BY* clause
- set conditions on groups by using the *HAVING* clause

D) apply the concepts of joins and subqueries by being able to:

- create a join based upon conditions
- create a join which joins a table to itself (self-join)
- create a join that includes non-matching rows (outer join)
- create a join of more than two tables

Elements of the performance(cont'd):

- create a query with multiple levels
- create a sub-query with comparison operators
- create a sub-query for an existence test

E) apply the concepts of data definition and manipulation by being able to:

- create a table from an existing table
- insert data into a table
- update data in a table
- delete data from a table

F) apply the concepts of data control by being able to:

- control access to the server, a database, commands, and objects
- create and use views to control access
- update tables via views
- create rules and defaults
- apply *triggers* to control updates

G) apply the more advanced concepts of SQL Server by being able to:

- describe and use *batches*
- describe and use *stored procedures*
- explain and write transactions
- explain and use backup and restore procedures on a database

4. Understand the emerging technology that is relevant to database processing. (Kroenke: chapter 15 and lecture notes)

This learning outcome will comprise approximately **5%** of the course.

Elements of the performance:

- understand the nature and characteristics of the data environment that surrounds Internet technology database applications
- learn the purpose, features, and facilities of ODBC and OLE DB

5. Understand the special needs of multi-user database processing and learn techniques for controlling the consequences of concurrent data access.
(Kroenke: chapter 11 pgs. 295 - 304, 311 - 324, and lecture notes)

This learning outcome will comprise approximately **10%** of the course.

Elements of the performance:

- identify problems caused by concurrent processing
- explain methods to prevent loss of updates and the "deadly embrace"
- define the terms; logical transaction, before image, after image, rollback, and rollforward
- describe the problems related to database recovery
- explain methods for recovery after certain types of system failures
- describe the problems associated with database security and how database management software handles security implementation
- explain object-oriented and subject-oriented security.
- understand client-server database architecture and know the components of client-server systems and the role of each component
- describe the characteristics of other various multi-user processing architectures such as centralized, shared, and file-server
- understand why client-server systems have advantages over other architectures

6. Understand how a data warehouse is used to provide decision-support personnel with historical data needed for trend analysis.
(Kroenke: chapter 17)

This learning outcome will comprise approximately **5%** of the course.

Elements of the performance:

- describe the purpose and structure of a data warehouse
- differentiate between "snapshot" data and "ongoing" data with respect to the operational environment vs the data warehouse environment
- understand how data is transferred from the operational environment to the data warehouse
- understand the design and implementation of a data warehouse
- differentiate between a "data warehouse" and a "data mart"

IV. EVALUATION METHODS:

The mark for this course will be arrived at as follows:

Quizzes:		
	outcomes #2, #3 (2 @ 15%)	30%
	outcome #4	5%
	outcome #5	10%
	outcome #6	5%
Assignments:		
	outcome #1	5%
	outcome #2 (4 @ 5%)	20%
Projects		20%
Attendance		5%
	Total	100%

The grading scheme used will be as follows:

A+	90 - 100%	Outstanding achievement
A	80 - 89%	Excellent achievement
B	70 - 79%	Average achievement
C	60 - 69%	Satisfactory achievement
R	< 60%`Repeat the course	
X	Incomplete	A temporary grade limited to special circumstances that have prevented the student from completing the objectives by the end of the semester. An X grade reverts to an R grade if not upgraded within a specified time period.

V. ASSIGNMENT/PROJECT SPECIFIC INFORMATION

1. Projects will be assigned to student "project teams", each consisting of two or three students.

2. It is the responsibility of the project team to clarify any system requirements with the instructor.

3. At various intervals, the instructor will require each project team to report on the progress made on their respective project. At that time, each team member will be required to complete a Peer Evaluation Form used to "grade" each team member's contribution to the project.

4. At the completion of a project, the respective project team will present and demonstrate the functionality of their system to the instructor.

5. The grade assigned to the overall project and to each team member will be determined using these sources:

    a) Peer Evaluation Form
    b) Presentation of project to instructor(s)

** Note: When a project is presented to the instructor, each team member will be required to demonstrate his/her assigned task(s). The project will receive an overall grade and each team member will receive an individual grade which may or may not be equivalent to the overall project grade or to the grades of other team members.

VI. SPECIAL NOTES

1. In order to pass this course the student must obtain an overall **quiz** average of 60% or better, as well as, an overall **assignment** average of 60% or better. A student who is not present to write a particular quiz, and does not notify the instructor beforehand of their intended absence, may be subject to a zero grade on that quiz.

2. There will be **no** supplemental or make-up quizzes/tests at the end of the semester.

3. Assignments must be submitted by the due date according to the specifications of the instructor. Late assignments will normally be given a mark of zero. Late assignments will only be marked at the discretion of the instructor in cases where there were extenuating circumstances.

4. Any assignment submissions deemed to be copied will result in a **zero** grade being assigned to **all** students involved in that particular incident.

5. Students with special needs (eg. physical limitations, visual impairments, hearing impairments, learning disabilities) are encouraged to discuss required accommodations confidentially with the instructor.

6. The instructor reserves the right to modify the course outcomes and/or the assessment process to meet any changing needs of the class.

VII. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced credit in the course should consult the instructor.

VIII. REQUIRED STUDENT RESOURCES

Texts: DATABASE PROCESSING: Fundamentals - Design - Implementation, 8th edition,
by David Kroenke
Prentice Hall Publishing

Beginning Databases with MySQL
by Neil Matthew and Richard Stones
Wrox Press Ltd.