

**SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY**

**SAULT STE. MARIE, ONTARIO**



Sault College

**COURSE OUTLINE**

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

**CODE NO. :** **CSD204** **SEMESTER:** 3

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

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**DATE:** **Aug, 2003** **PREVIOUS OUTLINE DATED:** **Aug, 2002**

**APPROVED:**

	<u>DEAN</u>	<u>DATE</u>
<b>TOTAL CREDITS:</b>	<u>6</u>	
<b>PREREQUISITE(S):</b>	<u><b>CSA101</b></u>	
<b>HOURS/WEEK:</b>	<u>4</u>	

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**I. COURSE DESCRIPTION:**

This course focuses on the data modelling skills required to effectively design and implement database oriented systems.

The course begins with a study of the necessary terminology and concepts to gain an appreciation of databases/database management systems. Data modelling and design skills are developed through methods used to properly identify entities in the user's environment, define logical relationships among those entities, and to properly assign attributes to those entities.

Practical modelling skills are developed through the study and use of the Entity-Relationship Model. In order to understand the transition from the conceptual design to the physical design, the student will implement their conceptual design using MySQL as the DBMS platform and SQL as the implementation language. A case study will be used to illustrate the analysis, design, and implementation of a database system

**II. TOPICS TO BE COVERED:**

1. Database Processing vs Spreadsheet/Traditional File Processing.
2. Data Modelling and Design with the Entity-Relationship Model.
3. The Relational Model and Normalization.
4. Transforming E-R Model Designs into a Physical Implementation using MySQL Server to Define a Database, and, SQL as the Data Manipulation Language.

### III. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1. Understand the problems with spreadsheet/file processing systems and how database oriented systems provide solutions to those problems.  
(chapter 1- Kroenke; handouts)

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

#### ***Elements of the performance:***

- define/describe the following terms:
  - i) database
  - ii) database management system
  - iii) data redundancy
  - iv) data integrity
- compare database processing with spreadsheet/file processing
- understand the disadvantages of spreadsheet/ file processing
- understand the advantages and disadvantages of database processing
- identify and describe the functions of a database management system
- identify the role of various components of a database system

2. Apply the Entity-Relationship Model for modelling business data requirements.  
(chapters 2 and 3 – Kroenke; handouts)

This learning outcome will comprise approximately **40%** of the course.

#### ***Elements of the performance:***

- relate this course to systems analysis and design
- define and apply the concepts of the following terms:
  - i) Entity-Relationship Model
  - ii) entity
  - iii) attribute
  - iv) relationship
  - v) external/user view (subschemata)
  - vi) conceptual/logical model (schema)
  - vii) internal/physical model
  - viii) weak entity
  - ix) subtype/supertype
  - x) category types
  - xi) domain
  - xii) cardinality

***Elements of the performance(cont'd):***

- understand the importance for data modelling and design tools and techniques
- identify and name entities in a user's environment
- differentiate between an entity type and entity occurrence
- allocate attributes to their respective entities
- differentiate entity occurrences by assigning primary/unique identifiers to those occurrences
- understand how entities and relationships are represented
- understand and apply connectivities and cardinalities
- understand and apply the following types of relationships
  - i) one-to-one    ii) one-to-many    iii) many-to-many
- understand how "user views" are related and combined to form an overall database design
- demonstrate the use of E-R diagrams to build a data model

3. Understand anomalies and the need for normalization through application of the Relational Model.  
(chapter 4 - Kroenke)

This learning outcome will comprise approximately **30%** of the course.

***Elements of the performance:***

- define and apply the concepts of the following terms:
  - i) relation/row/column                      v) functional dependency
  - ii) attribute                                      vi) determinant
  - iii) normal forms                              vii) primary key/foreign key/candidate key
  - iv) modification anomalies                  viii) referential integrity
- understand anomalies and the need for normalization
- understand how to assign primary keys to tables
- determine the functional dependencies among attributes
- understand the goal of domain key normal form
- compose relations applying the concepts of normalization and functional dependencies

4. Transform E-R data models into a physical relational design.  
(chapters 5 and 6 – Kroenke)

This learning outcome will comprise approximately **25%** of the course.

***Elements of the performance:***

- create tables from the entities defined in the E-R Model and the list of attributes assigned to those entities
- define primary and surrogate keys for each table
- implement one-to-one, one-to-many, and many-to-many relationships ,and, explain how these relationships facilitate the retrieval of information
- enforce referential integrity constraints
- enforce minimum cardinalities for child and parent
- represent weak, id-dependent and weak, non-id-dependent relationships
- represent subtype and category relationships
- represent recursive relationships

To accomplish the above, MySQL server will be used as the DBMS platform and SQL will be used as data manipulation language. Therefore, the student must be able to:

- define and create a database
- define and implement constraints
- query a database retrieving row and column data (SELECT...)
- query a database using conditions to restrict the data retrieved (SELECT....WHERE...)
- rename column headings in the retrieved data
- use aggregate functions such as AVG, COUNT, MIN, MAX, and SUM
- organize data into groups (GROUP BY)
- set conditions on groups (HAVING)
- create a join between two tables
- insert data into a table (INSERT)
- update data in a table (UPDATE)
- delete data from a table (DELETE)

**IV. EVALUATION METHODS:**

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

<b>Quizzes:</b>		<b>Assignments:</b>		<b>Project:</b>		<b>Total:</b>	
outcome #1	5%	outcome #1	0%	outcome #1	0%	outcome #1	5%
outcome #2	20%	outcome #2	10%	outcome #2	10%	outcome #2	40%
outcome #3	20%	outcome #3	5%	outcome #3	5%	outcome #3	30%
outcome #4	<u>15%</u>	outcome #4	<u>5%</u>	outcome #4	<u>5%</u>	outcome #4	<u>25%</u>
	60%		20%		20%		100%

The following semester grades will be assigned to students in postsecondary courses:

<u>Grade</u>	<u>Definition</u>	<u>Grade Point Equivalent</u>
A+	90 - 100%	4.00
A	80 - 89%	3.75
B	70 - 79%	3.00
C	60 - 69%	2.00
F (Fail)	59% and below	0.00

CR (Credit)	Credit for diploma requirements has been awarded.
S	Satisfactory achievement in field /clinical placement or non-graded subject area.
U	Unsatisfactory achievement in field/clinical placement or non-graded subject area.
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.
NR	Grade not reported to Registrar's office.
W	Student has withdrawn from the course without academic penalty.

### **ELIGIBILITY FOR XGRADES/UPGRADING OF INCOMPLETES**

When a student's course work is incomplete or final grade is below 60%, there is the possibility of upgrading to a pass when a student meets all of the following criteria:

1. The student's attendance has been satisfactory.
2. An overall average of at least 55% has been achieved.
3. The student has not had a failing grade in all of the theory tests taken.
4. The student has made reasonable efforts to participate in class and complete assignments.

**NOTE: The opportunity for an X grade is usually reserved for those with extenuating circumstances.** The nature of the upgrading requirements will be determined by the professor and may involve one or more of the following: completion of existing labs and assignments, completion of additional assignments, re-testing on individual parts of the course or a comprehensive test on the entire course.

### **ASSIGNMENTS**

Required format for lab assignments will be detailed by the professor before labs are assigned.

### **ATTENDANCE:**

Absenteeism will affect a student's ability to succeed in this course. Absences due to medical or other unavoidable circumstances should be discussed with the professor. There will be an attendance factor included in the lab evaluation.

**V. ASSIGNMENT/PROJECT SPECIFIC INFORMATION**

1. Assignments/Projects will be assigned to student "assignment/project teams", each consisting of one, two, three or four students.
2. It is the responsibility of the project team to ask the professor to clarify any system requirements.
3. At various intervals, the professor will require each assignment/project team to report on the progress made on their respective assignment/project. At that time, each team member may be required to complete a Peer Evaluation Form used to "grade" each team member's contribution to the assignment/project.
4. At the completion of an assignment/project, the respective assignment/project team may be asked to present and demonstrate the functionality of their system to the user/professor.
5. The grade assigned to the overall assignment/project and to each team member will be determined using three sources:
  - a) Peer Evaluation Form
  - b) Presentation of project to professor(s)
  - c) Professor observation of classroom work

**\*\* Note:** When an assignment/project is presented to the professor, each team member may be required to demonstrate his/her assigned task(s). The assignment/project will receive an overall grade and each team member will receive an individual grade that may or may not be equivalent to the overall assignment/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 professor 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 professor. Late assignments will normally be given a mark of zero. Late assignments will only be marked at the discretion of the professor 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. The professor reserves the right to modify the assessment process to meet any changing needs of the class.
6. If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your professor and/or the Special Needs office. Visit Room E1204 or call Extension 493 so that support services can be arranged for you.
7. It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.
8. Your professor reserves the right to modify the course outcomes and/or the assessment process to meet the needs of the course.

## VII. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced credit in the course should consult the professor. Credit for prior learning will be given upon successful completion of a challenge exam or portfolio.

**VIII. DIRECT CREDIT TRANSFERS:**

Students who wish to apply for direct credit transfer (advanced standing) should obtain a direct credit transfer form from the Dean's secretary. Students will be required to provide a transcript and course outline related to the course in question.

**IX. REQUIRED RESOURCES/TEXTS/MATERIALS**

Text: DATABASE PROCESSING: Fundamentals - Design - Implementation, 9th edition,  
by David M. Kroenke Prentice Hall Publishing  
ISBN: 0-13-101514-1

Reference Text: Last year's text used in CSA101