

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: **CPA/CET/AS**

AUTHOR: **Dennis Ochoski**

DATE: **Aug, 2006** **PREVIOUS OUTLINE DATED:** **Aug, 2005**

APPROVED:

	<u>DEAN</u>	<u>DATE</u>
TOTAL CREDITS:	<u>5</u>	
PREREQUISITE(S):	<u>CSA101</u>	
HOURS/WEEK:	<u>4</u>	

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I. COURSE DESCRIPTION:

This course will emphasize the importance of database design prior to implementation. The student will learn to capture and model the user's data environment through the analysis and design of relational databases using the Entity-Relationship Model and normalization techniques. Database models will be physically implemented using a relational DBMS and SQL (Structured Query Language). To understand the database development process, the following concepts will be discussed: conceptual model, logical model, entities, attributes, relationships, cardinalities, primary and foreign keys, normalization, and data integrity. database/data administration functions, client/server architecture, concurrent processing, backup and recovery, privacy and security, and design of data warehouses.

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.
5. Data Definition and Manipulation using SQL.
6. Data/Database Administration Functions.
7. Data Warehouse Design.

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)

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

Elements of the performance:

- define/describe the following terms:

i) database	iii) data redundancy
ii) database management system	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. Understand the Relational Database Model and apply the Entity-Relationship Model for modelling business data requirements. (chapters 5 and 6 – Kroenke)

This learning outcome will comprise approximately **45%** 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	vii) internal/physical model
ii) entity	viii) weak entity
iii) attribute	ix) category types
iv) relationship	x) domain
v) external/user view (subschemas)	xi) cardinality
vi) conceptual/logical model (schemas)	

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
- use Microsoft Visio to create E-R diagrams (data models)

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

This learning outcome will comprise approximately **20%** 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 and perform data manipulation.

(chapters 2, 7 and 8 – Kroenke)

This learning outcome will comprise approximately **15%** 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 secondary 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
- 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 queries involving two or more tables using both “joins” and “subqueries”
- insert data into a table (INSERT)
- update data in a table (UPDATE)
- delete data from a table (DELETE)

5. Understand the role of data/database management with respect to multi-user database processing and learn techniques for controlling the consequences of concurrent data access. (chapters 9 and 12 – Kroenke)

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

Elements of the performance(cont'd):

- understand client/server computing
 - understand the advantages of client/server systems
 - describe the components of a client/server system
 - understand standard interfaces for accessing database servers
6. Understand how a data warehouse is used to provide decision-support personnel with historical data needed for trend analysis. (chapter 15 – Kroenke)

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 an operational database and 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. REQUIRED RESOURCES/TEXTS/MATERIALS

Texts: Database Processing: Fundamentals, Design, and Implementation
10th edition, by David M. Kroenke
Pearson Publishing
ISBN: 0-13-167267-3

Software: MySQL Server 5.0, and Query Browser,
free download from www.mysql.com

V. EVALUATION PROCESS/GRADING SYSTEM:

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

DATABASE DESIGN AND IMPLEMENTATION I
COURSE NAME

CSD204
COURSE CODE

Outcome	Assignments	Quizzes	Total
outcomes #1 & #2:	5%	15%	
	5%	15%	40%
outcome #3:	2%		
	3%	10%	15%
outcome #4:	2%		
	3%	10%	15%
outcomes #5 & #6:	<u>0%</u>	<u>15%</u>	<u>15%</u>
	20%	65%	85%
Project			<u>15%</u>
			100%

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

Grade	Definition	Grade Point Equivalent
A+	90 – 100%	4.00
A	80 – 89%	4.00
B	70 – 79%	3.00
C	60 -- 69%	2.00
D	50 – 59%	1.00
F (Fail)	below 50%	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.

VI. SPECIAL NOTES:

Special Needs:

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 E1101 or call Extension 2493 so that support services can be arranged for you.

Retention of Course Outlines:

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

Plagiarism:

Students should refer to the definition of “academic dishonesty” in *Student Rights and Responsibilities*. Students who engage in “academic dishonesty” will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course/program, as may be decided by the professor/dean. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

Course Outline Amendments:

The professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Other Pertinent Information

1. In order to pass this course the student must obtain an overall quiz average of **50%** or better, as well as, an overall assignment/project average of **50%** 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 in this course.
3. Assignments/projects must be submitted by the due date according to the specifications of the professor. Late assignments/projects will normally be given a mark of zero. Late assignments/projects will only be marked at the discretion of the professor in cases where there were extenuating circumstances.
4. Any assignment/projects 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.

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.