

**Course Outline**

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Department of Computing Science  
Faculty of Science

**COMP 3610**  
**Database Systems (3,1,0)**  
**Winter 2015**

Instructor: Phone/Voice Mail:  
Office: E-Mail:

**Course Description**

Students are introduced to the database concepts. Students review the underlying data structures that make up databases. Students learn database design techniques using both the Entity Relationship model as well as an object oriented approach to designing database systems. Students study the relational database model and data normalization as they design and implement a case study project. Students also learn data description language, data manipulation language (updates, queries, reports), and data integrity. Students complete a case study work using a relevant and current relational database management system, database management system, software product.

**Educational Objectives/Outcomes**

**Objectives:**

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

1. Identify major Data Base Management System functions and describe their role in a database system.
2. Explain the concept of data independence and its importance in a database system.
3. Use a declarative query language to elicit information from a database.
4. Describe concepts in modeling notation (e.g., Entity-Relation Diagrams or Unified Modeling Language) and how they would be used.
5. Describe the basic concepts, principles, and notation of the relational data model.
6. Describe several technical solutions to the problems related to information privacy, integrity, security, and preservation.
7. Describe the main concepts of the Object Oriented model such as object identity, type constructors, encapsulation, inheritance, polymorphism, and versioning.

## Prerequisites

N/A

## Corequisites

COMP 2230 (previously COMP 223)

## Required Texts/Materials

1. Connolly T. and Begg C. (2010). *Database Systems: A Practical Approach to Design, Implementation, and Management, 5th Edition*. Boston: Addison Wesley. **Note:** This is an essential textbook on database systems; used copies should be available; also available as an e-book. **(Required)**
2. Casteel J. (2009). *Oracle 11g SQL*, Course Technology/Cengage Learning. This is a practical book (tutorial-style) for Oracle 11g SQL. **(Recommended)**

## Syllabus - Lecture Topics:

Unit	Topic	Chapter	Duration (week)
1	Introduction to the concepts and principles of database systems	1, 2, & 3	1
2	The Relational Database Model	4 & App A	1
3	Relational Algebra and Relational Calculus	5	½
4	Oracle SQL; ISO SQL	6 & 7 (SQL: 1-6, 8-13)	1
5	Advan. SQL: Intro. to PL/SQL (triggers, functions, simple procedure)	8	1
6	Database modeling using CASE tool (PowerDesigner)	Online documentation	1
7	Database analysis and design	10, 11, & App B	1
8	Entity-Relationship (ER) Model & Enhanced Entity-Relationship (EER) Model	13	1
9	Normalization	14 & App D	1
10	DBMS systems: MS Access, MySQL, Oracle, and SQL server	9 & App	1
11	Conceptual Database design	16	½
12	Logical Database Design	17	½
13	Physical Database Design	18 & 19	1

14	Data Privacy	Online documentation	½
15	Object Oriented Concepts, Design and Object Oriented Databases (UML)	27 & 28	1
16	Object Relational Database Management Systems (ORDBMS)	29	½

**Syllabus - Lab Topics :**

Lab Topic	Tool	Duration
SQL Basic 1	Oracle database system	2 weeks
SQL Basic 2	Oracle database system	2 weeks
Creating a Conceptual Model	PowerDesigner	2 weeks
Creating a Physical Data Model	PowerDesigner	2 weeks
Advanced SQL PL/SQL	Oracle database system	2 weeks
Case Study	Oracle database system	2 weeks

**ACM / IEEE Knowledge Area Coverage**

**Knowledge Areas that contain topics and learning outcomes covered in the course**

Knowledge Area	Total Hours of Coverage
IM/Information Management Concepts	6
IM/Database Systems	15
IM/Data Modeling	15
IAS/Fundamental Concepts	3
IM/Information management applications	3

## Body of Knowledge coverage

KA	Knowledge Unit	Topics Covered	T1 hours	T2 hours	Elective hours
IM	Information Management Concepts	<p>[Core-Tier1]</p> <ul style="list-style-type: none"> <li>• Information systems as socio-technical system</li> <li>• Basic information storage and retrieval (IS&amp;R) concepts</li> <li>• Information capture and representation</li> <li>• Supporting human needs: searching, retrieving, linking, browsing, navigating</li> </ul> <p>[Core-Tier2]</p> <ul style="list-style-type: none"> <li>• Information management applications</li> <li>• Declarative and navigational queries, use of links</li> <li>• Analysis and indexing</li> <li>• Quality issues: reliability, scalability, efficiency, and effectiveness</li> </ul>	3	3	0
IM	Database Systems	<p>[Core-Tier2]</p> <ul style="list-style-type: none"> <li>• Approaches to and evolution of database systems</li> <li>• Components of database systems</li> <li>• Design of core DBMS functions (e.g., query mechanisms, transaction management, buffer management, access methods)</li> <li>• Database architecture and data independence</li> <li>• Use of a declarative query language</li> <li>• Systems supporting structured and/or stream content</li> </ul>	0	15	0
IM	Data Modeling	<p>[Core-Tier2]</p> <ul style="list-style-type: none"> <li>• Data modeling</li> <li>• Conceptual models (e.g., entity-relationship, UML diagrams)</li> <li>• Spreadsheet models</li> <li>• Relational data models</li> </ul>	0	15	0

		<ul style="list-style-type: none"> <li>• Object-oriented models (cross-reference PL/Object-Oriented Programming)</li> <li>• Semi-structured data model (expressed using DTD or XML Schema, for example)</li> </ul>			
IAS	Fundamental Concepts	<p>[Core-Tier1]</p> <ul style="list-style-type: none"> <li>• Information systems as socio-technical systems</li> <li>• Basic information storage and retrieval (IS&amp;R) concepts</li> <li>• Information capture and representation</li> <li>• Supporting human needs: searching, retrieving, linking, browsing, navigating</li> </ul>	3	0	0
IM	Information management applications	<p>[Core-Tier2]</p> <ul style="list-style-type: none"> <li>• Declarative and navigational queries, use of links</li> <li>• Analysis and indexing</li> <li>• Quality issues: reliability, scalability, efficiency, and effectiveness</li> </ul>	0	3	0