

COSC 304 - Introduction to Databases

Winter 2016 Term 1

Instructor: Dr. Ramon Lawrence
Class Schedule: 2:00 p.m. – 3:30 p.m. Monday/Wednesday
Location: ART 376
Lab time/location: L01 - 12:30 p.m. to 2:30 p.m. Friday in SCI 234
L02 - 5:00 p.m. to 7:00 p.m. Friday in ART 215
L03 - 3:30 p.m. to 5:30 p.m. Wednesday in EME 2205
Office Hours: 2 to 3 p.m. Tuesday/Thursday or by appointment
Office Location: ASC 349
Phone: 807-9390
E-mail: ramon.lawrence@ubc.ca (preferred contact method)
Course URL: <https://people.ok.ubc.ca/rlawrenc/teaching/304/>

Course Description

Official Calendar: Databases from a user's perspective: querying with SQL, designing with UML, and using programs to analyze data. Construction of database-driven applications and websites and experience with current database technologies. [3-2-0]

Prerequisite: Either (a) COSC 111 or (b) APSC 177 and third-year standing.

Specific description: This course provides an introduction to database systems including database querying, design, and programming. The course consists of three major components. The first component explains databases from a user perspective including how to query using SQL and relational algebra. The second component involves designing relational databases using Entity-Relationship (ER) diagrams and UML. The last part involves database and web programming with PHP, Java, JDBC, and JSP. Students completing the course have experience with current database technologies, and the ability to use and develop databases and associated applications.

Course Objectives

Course Format: Interactive classes consisting of topic introduction, understanding evaluation using clickers, and concept mastery with in-class exercises. Practical skills and applications of topics are covered in computer labs as well as practice using industrial database systems and software.

Learning Outcomes:

- Ability to query and develop programs to interact with existing databases.
- Understanding of database design techniques and experience creating database applications.

Course Objectives:

- Ability to query relational databases using relational algebra and SQL.
- Application of ER/UML design for building database applications.

Marking and Evaluation

Clickers	5 %
Assignments	20 %
Project	15 %
Two Midterm Exams	30 % (in class, 15% each)
Final Exam	30 % (cumulative, three hours)

Textbook and Reference Material:

- A *clicker is required*. All notes are distributed as a course pack available at the book store.
- A text book is *not required*. Students can get supplemental material from any database textbook.

Expectations

- Attend **all** classes and prepare before attending class.
- Read the notes **before** the lecture.
- Learn the material in the course by completing all assignments.
- Enjoy attending class and feel free to participate according to your own personalities. Feel free to ask questions by raising your hand or speaking out at appropriate times.
- Please actively participate in class discussions, questions, and problem solving exercises.
- **I want all students to pass the course, receive a good grade, and feel the course was beneficial.**

Homework Expectation

For this course, it is expected that you will spend *at least six hours per week in out-of-class preparation*.

Grievances and Complaints Procedures

A student who has a complaint related to this course should follow the procedures summarized below.

- The student should attempt to resolve the matter with the instructor first. Students may talk first to someone other than the instructor if they do not feel, for whatever reason, that they can directly approach the instructor.
- If the complaint is not resolved to the student's satisfaction, the student should go to the departmental chair John Braun at SCI 388, 807-8032.

Your Responsibilities

Your responsibilities to this class and to your education as a whole include attendance and participation. You have a responsibility to help create a classroom environment where all may learn. At the most basic level, this means you will respect the other members of the class and the instructor and treat them with the courtesy you hope to receive in return. Inappropriate classroom behavior may include: disruption of the classroom atmosphere, engaging in non-class activities, talking on a cell-phone, inappropriate use of profanity in classroom discussion, use of abusive or disrespectful language toward the instructor, a student in the class, or about other individuals or groups.

Academic Integrity

The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand, and follow the codes of conduct regarding academic integrity. At the most basic level, this means submitting only original work done by you and acknowledging all sources of information or ideas and attributing them to others as required. This also means you should not cheat, copy, or mislead others about what is your work. Violations of academic integrity (i.e., misconduct) lead to the breakdown of the academic enterprise, and therefore serious consequences arise and harsh sanctions are imposed. For example, incidences of plagiarism or cheating usually result in a failing grade or mark of zero on the assignment or in the course. Careful records are kept to monitor and prevent recidivism. A more detailed description of academic integrity, including the policies and procedures, may be found at <http://www.calendar.ubc.ca/okanagan/index.cfm?tree=3,54,111,959>. If you have any questions about how academic integrity applies to this course, consult with the instructor.

Disability Assistance

If you require disability-related accommodations to meet the course objectives, please contact the Diversity Advisor of Disability Resources located in the University Centre, Room 227. For more information about Disability Resources or academic accommodations, please visit the website at: <http://students.ok.ubc.ca/drc/welcome.html>

Equity, Human Rights, Discrimination and Harassment

UBC Okanagan is a place where every student, staff and faculty member should be able to study and work in an environment that is free from human rights based discrimination and harassment. If you require assistance related to an issue of equity, discrimination or harassment, please contact the Equity Office, your administrative head of unit, and/or your unit's equity representative. **UBC Okanagan Equity Advisor: ph. 250-807-9291; email equity.ubco@ubc.ca**
Web: www.ubc.ca/okanagan/equity

Missing an Exam

Only students who miss the final exam for a reason that corresponds to the University of British Columbia Okanagan's policy on excused absences from examinations will be permitted to take the final exam at a later time. A make-up exam may have a question format different from the regular exam. **There will be no make-up midterm exams.** If the reason for absence is satisfactory, the student's final exam will be worth more of the final grade. Further information on Academic Concession can be found under Policies and Regulation in the Okanagan Academic Calendar <http://www.calendar.ubc.ca/okanagan/index.cfm?tree=3,48,0,0>.

Course Outline

The course has a substantial amount of material to be covered in a short time. This requires the student make a strong effort to prepare before class so that the material can be practiced in class. Below is an outline of the topics. The professor is not bound to these topics and timelines as they only serve as a general reference.

Date	Topics Covered and Description
September 7 (W)	First day of classes. Introduction to course/databases
September 12 (M)	Relational Model - Schemas, Keys, Constraints, Integrity
September 14 (W)	Relational Algebra - Select, Project, Set Operations, Cartesian Product
September 19 (M)	Relational Algebra – Outer Joins, Division, Practice Questions
September 21 (W)	SQL DDL – Create table, constraints, create indexes, Insert/Delete/Update
September 26 (M)	SQL - Simple Queries, LIKE operator, Set Operations, Order By
September 28 (W)	SQL - Group By, Aggregate Functions
October 3 (M)	SQL - Subqueries, Outer joins
October 5 (W)	Database Design – General Approach ; ER and UML Modeling
October 10 (M)	Thanksgiving Day. No class.
October 12 (W)	ER and UML Modeling examples and questions
October 17 (M)	Midterm Exam #1 In-Class
October 19 (W)	EER Design - Specialization, Generalization, Aggregation ER/EER Mapping to Relational model
October 24 (M)	Database and Web Programming using Java/JDBC
October 26 (W)	Database and Web Programming – Web servers/databases, JSP/servlets
October 31 (M)	Relational Design - Functional Dependencies and Normalization
November 2 (W)	Relational Design (cont.) – 1NF, 2NF, 3NF, BCNF
November 7 (M)	Midterm Exam #2 In-Class
November 9 (W)	JSON, NoSQL Databases
November 14 (M)	Advanced SQL DDL – Triggers, Views, and Security
November 16 (W)	Advanced SQL – recursion, object-relational databases, transactions
November 21 (M)	Introduction to XML, XPath, and XQuery
November 23 (W)	Data warehousing and Data Mining Database System Implementation – Storage, Transactions, Concurrency, Recovery
November 28 (M)	Final Project Demonstrations.
November 30 (W)	Final Project Demonstrations. Final Exam Review.

Laboratory times: The laboratory time will be primarily spent performing lab assignments and practice questions. The majority of labs involve hands-on use of a database system, programming language, or query tool.

Week	Dates	Topics Covered and Description
1	September 7 & 9	No Lab during First Week of Class
2	September 14 & 16	Lab 1: Querying using relational algebra
3	September 21 & 23	Lab 2: Creating tables using SQL and MySQL
4	September 28 & 30	Lab 3: Writing SQL queries on a MySQL database
5	October 5 & 7	Lab 4: Database Design using UML Modeling
6	October 12 & 14	Lab 4: Database Design using UML Modeling (cont.)
7	October 19 & 21	Lab 5: Converting UML Diagrams into the Relational Model
8	October 26 & 28	Lab 6: Using Java/JDBC with MySQL and Microsoft SQL Server
9	November 2 & 4	Lab 7: Building a Database-enabled Web Site using JSP/PHP
10	November 9	Lab 8: Database Normalization Note: No lab time on Friday, November 11 due to Remembrance Day.
11	November 16 & 18	Lab 9: Using SQL Transactions and Triggers
12	November 23 & 25	Lab 10: XML, XPath, and XQuery
13	Nov. 30 & Dec. 2	Final Project Demonstrations