

# COSC 304 - Introduction to Databases

## Winter 2018 Term 1

**Instructor:** Dr. Ramon Lawrence  
**Class Schedule:** 2:00 p.m. – 3:30 p.m. Monday/Wednesday  
**Location:** ART 103  
**Lab time/location:** L01 - 3:30 p.m. to 5:30 p.m. Wednesday in ART 215  
L02 - 1:30 p.m. to 3:30 p.m. Thursday in SCI 234  
L03 - 1:30 p.m. to 3:30 p.m. Friday in ASC 165  
L04 - 9:30 a.m. to 11:30 a.m. Friday in SCI 234  
**Office Hours:** 2 to 4 p.m. Thursday or by appointment  
**Office Location:** ASC 349  
**Phone:** 250-807-9390  
**E-mail:** [ramon.lawrence@ubc.ca](mailto: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 (b) COSC 123 or (c) 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       | 15 %                           |
| Project           | 15 %                           |
| Two Midterm Exams | 30 % (in class, 15% each)      |
| Final Exam        | 35 % (cumulative, three hours) |

- A student must receive a combined grade of at least 50% on the exams (midterms and final) to pass the course. Otherwise, the student receives a maximum overall grade of 45.

### Textbook and Reference Material:

- A *clicker is required*. All notes are released as a course pack available at the bookstore and online.
- 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](mailto:equity.ubco@ubc.ca)**

**Web:** <http://equity.ok.ubc.ca>

## 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 5 (W)  | <b>First day of classes. Introduction to course/databases</b>   |
| September 10 (M) | Relational Model - Schemas, Keys, Constraints, Integrity  |
| September 12 (W) | Relational Algebra - Select, Project, Set Operations, Cartesian Product   |
| September 17 (M) | Relational Algebra – Outer Joins, Practice Questions  |
| September 19 (W) | SQL DDL – Create table, constraints, create indexes, Insert/Delete/Update   |
| September 24 (M) | SQL - Simple Queries, LIKE operator, Set Operations, Order By   |
| September 26 (W) | SQL - Group By, Aggregate Functions   |
| October 1 (M)    | SQL - Subqueries, Outer joins   |
| October 3 (W)    | Database Design – General Approach ; ER and UML Modeling  |
| October 8 (M)    | <b>Thanksgiving Day. No class.</b>  |
| October 10 (W)   | ER and UML Modeling examples and questions  |
| October 15 (M)   | <b>Midterm Exam #1 In-Class</b>   |
| October 17 (W)   | EER Design - Specialization, Generalization, Aggregation<br>ER/EER Mapping to Relational model                    |
| October 22 (M)   | Database and Web Programming using Java/JDBC  |
| October 24 (W)   | Database and Web Programming – Web servers/databases, JSP/servlets  |
| October 29 (M)   | Relational Design - Functional Dependencies and Normalization   |
| October 31 (W)   | Relational Design (cont.) – 1NF, 2NF, 3NF, BCNF   |
| November 5 (M)   | <b>Midterm Exam #2 In-Class</b>   |
| November 7 (W)   | JSON, NoSQL Databases   |
| November 12 (M)  | <b>No class. Holiday in lieu of Remembrance Day.</b>  |
| November 14 (W)  | Advanced SQL DDL – Triggers, Views, and Security  |
| November 19 (M)  | Advanced SQL – recursion, object-relational databases, transactions   |
| November 21 (W)  | Introduction to XML, XPath, and XQuery  |
| November 26 (M)  | Data warehousing and Data Mining<br>Database System Implementation – Storage, Transactions, Concurrency, Recovery |
| November 28 (W)  | <b>Final Project Demonstrations.</b><br><b>Final Exam Review.</b>   |

**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   |
|-----------|-------------------|--|
| <b>1</b>  | September 3 – 7   | <b>No Lab during First Week of Class</b>   |
| <b>2</b>  | September 10 – 14 | Lab 1: Querying using Relational Algebra   |
| <b>3</b>  | September 17 – 21 | Lab 2: Creating tables using SQL and MySQL   |
| <b>4</b>  | September 24 – 28 | Lab 3: Writing SQL queries on a MySQL database   |
| <b>5</b>  | October 1 – 5     | Lab 4: Database Design using UML Modeling  |
| <b>6</b>  | October 8 – 12    | Lab 4: Database Design using UML Modeling (cont.)  |
| <b>7</b>  | October 15 – 19   | Lab 5: Converting UML Diagrams into the Relational Model   |
| <b>8</b>  | October 22 – 26   | Lab 6: Using Java/JDBC with MySQL and Microsoft SQL Server   |
| <b>9</b>  | Oct. 29 – Nov. 2  | Lab 7: Building a Database-enabled Web Site using JSP/PHP  |
| <b>10</b> | November 5 – 9    | Lab 8: Database Normalization<br><b>Note: No lab time on Friday, November 9 due to mid-term break.</b> |
| <b>11</b> | November 12 – 16  | Lab 9: Using SQL Transactions and Triggers   |
| <b>12</b> | November 19 – 23  | Lab 10: XML and Cloud Databases  |
| <b>13</b> | November 26 – 30  | <b>Final Project Demonstrations</b>  |