Course Introduction

COSC 304 – Introduction to Database Systems

Introductions – Dr. Youry Khmelevsky

Professor, Computer Science —UBC Instructor, Director of SW Engineering and Database Research group at Okanagan College

Research areas: database systems, software engineering, data mining, data warehousing, data science, large information systems (system of systems)

Teaching experience:

- 2021 Teaching Excellence Award (top teaching award – two per year)
- 2018 OC Scholarly & Creative Activity Award Winner (two per year)
- 8 NSERC industrial research project awards (SW Engineering and DBMS, Big Data)

Experience: Oracle, IBM, Open Society Institute, Institute of Experimental Radiology, MIT, Harvard, Sorbonne and South Pacific University

Note: May address me as “Dr. Khmelevsky”, “Professor”, or “Your” (pronounced Yu-riy Hme-lev-skii).

Introductions – Dr. Ramon Lawrence (Course Mentor)

Professor, Computer Science, MDS Program Director - Okanagan

Research area: database systems, Internet of Things, software development

Teaching experience:

- 2020 Killam Teaching Prize (top teaching award at UBCO – one per year)
- 2017 UBCO Teaching Excellence Award Winner (two per year)
- 9-time member of teaching honour roll (top 10% instructors)

Industry experience: GE Big Data, UnityJDBC company/consulting

Note: May address me as "Dr. Lawrence", "Professor", or "Ramon" (pronounced RAY-MUN).

The Essence of the Course

The overall goal of this course is for you to:

Create, query, and program with databases to develop applications, web sites, and perform data analysis.

Course covers database techniques and software including relational and NoSQL databases, SQL, JSON, and XML.

This is an important, ***required*** course as almost all systems require a database. Developers and data analysts must have fluency in SQL to process data, and the ability to integrate databases into their development.

My Course Goals

1) Provide the information in an effective way for learning.
2) Inspire and motivate students to learn and appreciate benefits of the course.
3) Strive for ***all*** students to understand the material and excel.
4) Be available for questions during scheduled times, office hours, and at other times as needed.
5) Teach students how to be a sophisticated database user (by understanding SQL), a database application programmer, and a database designer.

Course Objectives

1) Understand the use case for databases and the relational model for data storage.
2) Fluency in SQL including SQL DDL (`CREATE`, `DROP`, `INSERT`, `UPDATE`, `DELETE`) and SQL queries using `SELECT`.
3) Read existing database designs, design new databases using ER/UML modeling, and convert to the relational model.
4) Construct programs that access a database to read data, perform analysis, and output results.
5) Exposure to database technologies like NoSQL, JSON, XML, and cloud databases.

Academic Dishonesty

Cheating is strictly prohibited and is taken very seriously by UBC.

A guideline to what constitutes cheating:

- Labs
  - Submitting code produced by others.
  - Working in groups to solve questions and/or comparing answers to questions once they have been solved (except for group assignments).
  - Discussing HOW to solve a particular question instead of WHAT the question involves.
- Exams
  - Only materials permitted by instructor should be used in an exam.

Academic dishonesty may result in a "F" for the course and further actions by the Dean's office.

How to Excel in This Course

Attend ***every*** class:

- Read notes ***before*** class as preparation and complete the questions.
- Participate in class exercises and questions.

Attend and complete all lab assignments:

- Labs practice the fundamental employable skills as well as being for marks.

Practice on your own. Practice makes perfect.

- Do more questions than in the labs.
- Read the additional reference material and perform practice questions.

The Database Implementation Project

The course project uses a database to build an e-commerce web site.

- Database and web development skills are very valuable to employers.
- The project is integrated in the assignments and is a significant part of the mark.

During the project you will:

- Design a database using ER/UML diagrams.
- Write SQL to query and update the database.
- Develop a web user interface to your database.
  - In the process you will learn HTML and JSP/PHP.
  - Note that limited background will be given on web programming.

The project assignments will be done in groups of **four**.

The Lab Assignments

The lab assignments are critical to learning the material and are designed to build up your skills and prepare you for the exams.

The weekly lab assignments are worth ***25%*** of your overall grade.

You have until the week after the lab is assigned to complete it.

- No late assignments will be accepted.
- An assignment may be handed in any time before the due date and may be marked immediately by the TA.
- Lab assignments may take between 2 and 10 hours depending on the lab.

Lab assignments are done in ***pairs***. Project assignments are done in groups of ***four***.

There is no scheduled lab time. TA help desk hours will be posted.

The Online Questions

To promote understanding, 10% of your overall grade is allocated to answering questions online and during class.

These questions may be multiple choice, short answer, or programming questions.

- All questions will be able to be answered both asynchronously (outside of class time) and synchronously (during class time).
- **No make-ups for forgetting to answer questions. Questions will have posted deadline for when they must be completed.**
- Canvas quizzes will be used as well as real-time polling questions.

A student must only get 80% of questions right to get full 10%.

- That is, if there was a total of 100 marks of online questions, 80 out of 100 will give you 10%. 40 out of 100 would give you 5%.

Systems and Tools

Course material, online quizzes, discussion forums and feedback, and marks are on Canvas.

Access to both MySQL and SQL Server will be provided as well as access to a web server for web development. These systems will have separate user ids and passwords.

All software used will be open source or free to install on your computer. You do not need to access hardware/software at UBCO, but can if you wish.

My Expectations

My goal is for you to learn the material and walk out of this course confident in your abilities:

- To query and update an existing database
- Write code interfacing with a database to build standalone and web-based applications
- To design and model a database using UML

I have high standards on the amount and difficulty of material that we cover. I expect a strong, continual effort in keeping up with readings, doing assignments, and working on projects.

The course will be very straightforward – if you do the work, you will do well.

Your mark is 80% perspiration and 20% inspiration.

Why are you here?

A) It is a required course for the COSC/DATA major.

B) This is an optional elective for my program.

C) Engineering Major taking a minor in Computer Science.

D) Taking a minor in Data Science.

E) Other

What Topic are You Most Interested In?

A) What is a database and how do you use them?

B) Querying using SQL

C) Designing databases

D) Using databases with programs (stand-alone, web, mobile)

E) None of the above

Database Survey Question

Question: Have you used any of these database systems?

A) MySQL

B) Microsoft Access or SQL Server

C) PostgreSQL

D) Used more than two different databases

E) Used no databases

What Grade are You Expecting to Get?

A) A

B) B

C) C

D) D

F) F

The Essence of the Course

Essence of the course is to appreciate that:

Databases are the best way for storing and manipulating *persistent* information. You will learn the skills to exploit the full power of database systems.

The skills you will acquire are in high demand for many software development jobs. Database skills make you more marketable and allow you to construct more sophisticated systems.

- Note: This is a course on how to use/program with databases. It is a very applied course with specific skills.
- If you want to learn how to build database systems and what is "inside the box", that is the subject of COSC 404!


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