

Concordia University
Dept. of Computer Science & Software Engineering
Comp 353 – Databases
Fall 2021

Instructor: Khaled Jababo

Section: F
Lectures: TuTh 1:15 - 2:30PM
Location: FG C070 SGW
Office Hours: Th 2:30 - 3:30 PM
Email: jababo@encs.concordia.ca

Prerequisite: COMP 352 (Data Structures and Algorithms) or COEN 352.

Follow-Ups: COMP 451 (DB Design) and SOEN 387 (Web-Based Enterprise Applications Design).

Introduction: Database management is more essential today in numerous scientific, engineering, commercial, and business applications. As such, it has evolved from a specialized computer application to a central component of a modern computing environment. In this course, we study fundamental concepts and techniques of database management, focusing more on database design and programming aspects in particular for relational data.

Textbook: J.D. Ullman and J. Widom. A First Course in Database Systems, Prentice Hall, 3rd edition, 2008.

Reference: A. Silberschatz, H.F. Korth, and S. Sudershan, *Database System Concepts*, 6th Edition, McGraw-Hill, 2011.

Lecture notes, assignments, projects, and other related materials are (or will be made) available on Moodle.

Course Description: In this course, we study concepts and techniques of database design and programming. We begin with basics of the SQL DB language followed by the entity-relationship (E/R) design notation and methodology. We will then introduce functional dependencies (FD's) and

normalization theory for relational database design. We study database query languages and focus on relational algebra, Datalog, and ODL. We return to SQL and learn how to express transactions, views, and various types of integrity constraints, including checks, assertions, and triggers.

Lecture notes, assignments, projects, and important announcements will be posted on Moodle. Also please check out the link "Important Dates" for the course schedule of activities and the dates.

Grading Scheme: The course components and associated grade distributions are as follows.

Course Components	Grade %
Assignments (4)	16
Projects (2)	18
Quizzes (6)	6
Midterm	20
Final	40

Important note: *Any missing course work such as quiz, assignment, exam, or project will get 0. To pass the course, you need to obtain a passing grade in the project, the final exam, and in the total percentage. A passing grade is normally 50%. Also note that there is no a priori, fixed relationship between the total percentage and the final letter grade assigned, except that a higher percentage will not be assigned a lower letter grade.*

Course Components (Details):

1. **Assignments:** There will be 4 assignments of equal weights. While we encourage discussion and collaboration among students on course materials and activities including the assignments, each student should write his/her solutions individually and independently. Note that every course related work, including solutions to assignments and project reports and artifacts, should be submitted by due date/time through Moodle only. There will be 20% penalty per day for late submission until the solution is posted.

2. **Quizzes:** There will be 6 moodle quizzes, each worth 1 point. You will have about 15 to 20 minutes to attempt each quiz. For flexibility and convenience, each quiz will be made available within a period of 16 hours, starting from 8:00PM on a Thursday until the next day at noon.
3. **Exams:** There will be a midterm and a final exam. The midterm exam will be in class during the lecture on November 2nd, and the final exam will be 3 hours and scheduled by the Exam office.
4. **Projects:** There will be two group projects: The Warm-up (6 points) and the Main (12 points), with details as follows.
 - a) **The Warm-up Project:** We will provide a database schema for an application with each group has to implement using the MySQL database management system (DBMS) maintained by the faculty AITS. You will also need to express a list of queries and transactions in SQL, evaluate them against the database instance, and report the results in the project report document.
 - b) **The Main Project:** In the main project, you will be provided a description of a realistic application for which you need to design the database schema and develop a database application system using MYSQL. Your main project report should include details of your database design, from the E/R diagram to the refined and normalized relations. You also need to develop a suitable user interface to facilitate expressing queries and transactions against the database and the results returned. Your system will be a two-layer, web-based application which uses a standard web browser at the client side which uses an http server with PHP parser to communicate with the database server. The database application system developed is expected to support “representative” queries and transactions efficiently. In addition to details of your database design and the steps of normalization process, your project report should also include the statements of the queries and transactions’ scripts (codes) expressed in SQL together with the results produced. The report should also include the test data and the scripts used for populating your database.
 - c) **Groups:** The warm-up and main projects are group projects. Each group shall consist of exactly 4 students. While each member of a group takes part in a well-defined portion of the

project, the entire group is responsible for their project. A member of each group shall act as the representative of the group to coordinate project-related activities and communications. By September 14th, the representative of each group should send an email to stan@encs.concordia.ca with the following information about the members: Official First name and Last name, student ID, and the ENCS email account. The email should also include a "password" consisting of 8 alphanumeric characters. The password is used to restrict access to your database to your group members only. Upon receiving the information, Stan will create a group account on the MySQL database server, managed and maintained by the faculty AITS, and communicates the access information and guidelines to each group.

- d) **Projects reports and demos due date:** The warm-up and main project reports must be submitted through Moodle by the corresponding due dates. Late submission will not be accepted. The online project demos will be in the last week of the semester. Each group will have 15 minutes to demonstrate their working database system. A schedule of time slots will be posted for project demos. The time slots are decided and assigned by requests by group representatives, based on a first-come-first-served policy.

Graduate Attributes: As part of the curriculum for Computer Science and Software Engineering programs, COMP353 includes materials and exercises related to a number of graduate attributes, which include knowledge and skills identified by the Canadian Engineering Accreditation Board (CEAB) and the Canadian Information Processing Society (CIPS) as being central to the formation of engineers, computer scientists, and information technology professionals. In this regard, the learning objectives of this course are as follows.

Learning Objectives:

(1) Knowledge base. Conceptual database design: the entity-relationship model; the relational data model and relational algebra: functional dependencies and normalization; the SQL database language for formulating

queries and transactions against databases; integrity constraints and triggers; other data models and languages: Datalog and ODL.

(2) Design: Develop applications that require elaborated database components.

(3) Use of tools: Use of DBMS, database adapters, and use of the PHP scripting language to develop web-based database application systems.

(4) Group projects: Each group shall develop a web-based database application that requires an elaborated database component.

Additional Notes:

a) **Backups:** It is highly recommended to make proper backups of all your individual and group works during the semester until the final grades are published.

b) **Academic Integrity:** It is important to be aware and observe the academic integrity and code of conduct. See details in the link provided in the introductory section of the course Moodle. Please fill out the Originality form available also in the course Moodle and use as the cover page when you submit your solution to Assignment 1 only.

c) **Final Advice:** We encourage a collaborative learning in this course, as together we learn more and better. As a closing remark, we recommend to start working on the course materials, assignments, and projects as early as possible!

Together with my assistants in this course, we wish you all a successful semester ahead.

Khaled Jababo

September 2021