

Concordia University
Dept. of Computer Science and Software Engineering
COMP 353 – Databases
Winter 2023

Instructors:	K. Jababo	N. Shiri (+Course Coordinator)
Sections:	Y	X
Lectures:	MW 10:15–11:30 @ H-937	MW 13:15–14:30 @ MB-S2.210
Office Hours.:	Wed. 11:30–12:30 @ ER-1175	Mon. 15:00–16:00 @ ER-1047
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Prerequisite: COMP 352 (Data Structures and Algorithms) or COEN 352

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

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 methodology and notation. We will introduce functional dependencies (FD's) and normalization theory for relational database design. We will also present other types of database query languages: Relational Algebra, Datalog, and ODL. More advanced features of SQL will be presented at the end. They include nested queries, views, and integrity constraints such as checks, assertions, and triggers.

Lecture notes, assignments, projects, and announcements will be posted through the course Moodle. Refer to the document "Important Dates" in moodle for a tentative course schedule.

Grading Scheme: The course components and associated grades are as follows:

Course Components	Grade %
Assignments (4)	12
Projects (2)	18
Quizzes (5)	5
Midterm (Saturday, Feb. 25th @ 10:00 AM)	25
Final Exam	40

Important Note: Missing any course work such as quiz, assignment, exam, and project will get 0. *To pass the course, you need to obtain a passing grade in the project, final exam, and in the total percentage.* A passing grade is normally 50%. Note that there is no a priori, fixed relationship between the total percentage and the final letter grade assigned, except that a higher percentage is not 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 5 moodle quizzes of equal weights. You will have about 15 minutes to attempt each quiz over a period of 24 hours, starting at 18:00 on a Wednesday.
3. **Exams:** The midterm exam will be on **Saturday, February 25th** from 10:00 to 11:30. The **final** exam will be 3 hours, scheduled and administrated by the Exam Office.
4. **Projects:** There will be two group projects: the *Warm-up* (6%) and the *Main* (12%), with details as follows.
 - (a) The Warm-up Project: For this, you will be provided the design of a database for an application, which each group has to implement using the *MySQL* database management system (DBMS) maintained by the faculty AITS team. You will also need to formulate a number of queries and transactions in *SQL*, process, and report the results. Your project report (one per group) should include the implementation details including the *SQL* statements of creating the database schema and instance, and also the query results.
 - (b) The Main Project: For this, we will provide a description of an application for which you need to design a suitable database schema and develop the application system using *MySQL*. Your Main project report should include details of your database design, from the E/R diagram to refined and normalized relations. You also need to develop a suitable user interface to facilitate expressing queries and transactions against the database and display the results. Your system will be a two-tier, web-based application which uses a standard web browser at the client side to communicate through PHP parser and an http server with the database server. The database application system developed is expected to support “representative” queries and transactions. In addition to details of your database design and normalization process, your project report should also include SQL statements to formulate the queries and transactions scripts (codes) and the results produced. The report should also include the test data and the scripts used for populating your database with representative input tuples.
 - (c) Groups: The warm-up and main projects are group projects. Each group shall consist of exactly 4 students from the same section. Groups with members from different sections are not allowed. While each member of a group will take 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 **Wed. January 26th**, 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 alpha-numeric characters. The password is used to restrict access to your database to your group members only. Upon receiving the information, a Group ID and DB account will be created on *MySQL* and communicated to you together with the required access information and guidelines.

- (d) **Project reports and demos due dates:** Each group should submit their project report through moodle by Feb. 22nd for the warm-up and by April 11th for the main project. Late submission will not be accepted. There will be a demo for the MAIN projects on April 11, 12, 13, and 17th. Each group will have 15 minutes to demonstrate their working application system. A schedule of time slots will be posted in early April and assigned.

Graduate Attributes: As part of the curriculum for our Computer Science and Software Engineering programs, COMP 353 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; relational data model: functional dependencies and normalization, relational algebra; SQL: the database language to express queries, transactions, 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 with elaborate database components.

Additional Notes:

- (a) **Academic Integrity:** It is important to be aware and observe the *academic integrity* and code of conduct. Please read details at the link provided in the course moodle.
- (b) **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.

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

Jababo and Shiri
January 2023