Data Modeling and Database Design

(Text in red may/will change)

Tuesday: 9:00am - 12:00pm, Room BL313

Instructor:	Periklis Andritsos
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Office Hours:	Tuesday 12:00pm - 1:00 pm
	(also by appointment)
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NOTE: Text items in blue are clickable hyperlinks.

Course Description

The course introduces the area of database systems. It discusses and motivates their application in real life scenarios. At the gist of the course, we will tackle modeling issues and the translation of models into relational tables. We will introduce the basics of querying databases and, in particular we will see the syntax and composition of SQL queries. The course will include the design and implementation of a real database system.

Prerequisites

Courses INF1003H, INF1340 or INF1341H. Although it is not strictly necessary, students can benefit if they have a basic mathematical foundation and are familiar with some basic, data structures and algorithms.

Course Structure

The course is intended to give you skills for designing, implementing and querying a database

Three (3) in-class hours per week will be divided into lectures and tutorials, in which we discuss and further probe topics covered in the lectures and readings. Note that for every one (1) hour of class time, students can expect to do 2.5 hours of reading and preparation work on their own, outside class. **It is highly recommended that you practice the discussed exercises on your own**.

Deliverables and Evaluation

Course evaluation	Due Date	Worth
Midterm test: This is an in-class individual test covering material from the first 5 weeks of the course. It will be an closed-book exam.	February 14 (week 6)	30%
Project Part 1: In this part, students will develop proposal and design of a database application.	February 28 (week 7)	20%
Project Part 2: In this part, students will implement a database application.	April 4 (week 12)	20%
Final exam: This will be an in-class final exam. It will be a closed-book exam.	April 4 (week 12)	30%

Every effort will be given to respect the above deadlines. If necessary changes need to be made, they will always affect students in a positive manner, e.g., extension to a deadline. There can be no change in the final exam data and no extensions given after week 12 of classes.

Notes about coursework:

Groups: Students will be assigned to groups of 3 in the first couple of weeks of the course. These groups will work on the completion of Assignments 1 and 2 together.

Self and peer assessment: Assignment submission will include self and peer assessment forms that must be completed by each group member separately. When students upload their assignments (on Blackboard) they will be asked to upload a special form discussing the teamwork. These forms are strictly confidential and will be provided during the course (on Blackboard).

Exercises: After each lecture we will solve small tasks in-class. We will also devote full length lectures to solve different exercises.

All coursework will be available on Blackboard with detailed instructions and submission deadlines (date/time). There will also be an announcement section, which students should be responsible for checking regularly.

Readings

NOTE: The following schedule and reading material is tentative and may change during the semester. Readings may be removed or merged and new ones may be added. In all cases, the readings will be assigned and posted prior to each class.

Textbook:

- Database Management Systems.
  Raghu Ramakrishnana and Johannes Gehrke, Mc Graw Hill, 3rd Edition.

Every effort will be made to get some copies on-reserve in the IFORUM and the University of Toronto bookstore.

Weekly Schedule

The course material is broken down per week.

1. **[Week 1] Introduction to Database Systems.**

   Chapter 1.

2. **[Week 2] Introduction to Database Design.**

   Chapter 2.

3. **[Week 3] The Relational Model.**

   Chapter 3 up to 3.4

4. **[Week 4] Logical Database Design**.

   Chapter 3 from 3.4 up to the end

5. **[Week 5] Schema Refinement and Normal Forms**.

   Chapter 19 up to 19.6.2

6. **[Week 6]** *** In-class midterm*

7. **[Week 7] SQL Part 1**.

   Chapter 5 up to 5.2

8. **[Week 8] Hands-on tutorial on a real database system (MySQL)**.

   There will be hand-outs posted on Blackboard.

9. **[Week 9] SQL Part 2**.

   Chapter 5, sections 5.3 and 5.4

10. **[Week 10] SQL Part 3**.

    Chapter 5, sections 5.5 and 5.6.

11. **[Week 11] Revisions/Exercises**.

12. **[Week 12]** *** In-class final test*

Learning Outcomes

By the end of this course, students will be familiar with the following:

1. Collecting basic requirements for designing a database.

2. Using ER diagrams to design a real database.

3. Learning the rules for converting ER diagrams into a relational database.

4. Creating a database in MySQL using SQL.

5. Querying a database using SQL.

6. Understanding what makes one database design better than another.

Relationship to Masters of Information (MI) Program-Level Student Learning Outcomes

Master of Information Program-Level Student Learning Outcomes can be found here.

Database systems form an integral part of Information Systems. Designers, system analysts and programmers need to have a good understanding of the internals, in order to take more accurate and knowledgeable decisions. To achieve this, INF1343H is a fundamental course that defines Databases, teaches how to desing and practically implement them. This course will help students to become conversant with database system fundamentals and theories (**Outcome 1**). Given the case studies and practical assignment in this course, the students will develop an understanding of the development of theory concerning data, where it is found, and how it is used (**Outcome 4**). Through the use of a the SQL query language, students will develop an understanding of the application of new technological developments to the preservation and communication of information, and in the identification of the impact of such developments on society (**Outcome 5**). Finally, the course will allow students to develop their own goals and continue in life-long intellectual growth beyond graduation (**Outcome 6**).

General Expectations

1. **Communication Policy:** Please do not email questions to the instructor. If you have a question, there is a pretty good chance that other people in the course have the same question or, at least, will benefit from the answer. Please post all the questions to Blackboard (forum threads to be announced) so everyone in the course can benefit from your questions and

our answers. Questions posted to Blackboard will be answered within two (2) business days. Students are encouraged to post answers to the questions of other students where appropriate.

IMPORTANT: Please prefix the subject of your emails to the instructor and TA with "INF1343H" and include some more details, e.g., "INF1343H: book appointment January 15".

2. **Readings:** It is important to complete the required readings before the lecture in order to fully benefit from the class activities.

3. **Late policy:** Late submission of an assignment carries a penalty of one grade (e.g. from B+ to B) for each week, to a maximum of two weeks; submissions will not be accepted after two weeks. Exceptions will be made only when supported by appropriate documentation.

4. **Academic Integrity:** The essence of academic life revolves around respect not only for the ideas of others, but also their rights to those ideas and their promulgation. It is therefore essential that all of us engaged in the life of the mind take the utmost care that the ideas and expressions of ideas of other people always be appropriately handled, and, where necessary, cited. For writing assignments, when ideas or materials of others are used, they must be cited. You may use any formal citation format, as long as it is used consistently in your paper, the source material can be located and the citation verified. What is most important is that the material be cited. In any situation, if you have a question, please post it to Blackboard. Such attention to ideas and acknowledgment of their sources is central not only to academic life, but life in general. Please acquaint yourself with UofT's Code of Behaviour on Academic Matters.

5. **Participation and Attendance:** Discussion and interaction in the classes are important ways to learn. Sharing your experiences and ideas with your classmates is central to your learning experience in this course. As such, you should attend and participate in every class. There will also be exercises and discussions that you will participate in within your groups in your class. Some of the activities will be very helpful in completing your assignments.

6. **Students with Special Needs or Health Considerations:** All students are welcome in this course and we will make every effort to ensure a meaningful, respectful, and positive learning experience for everyone. If there are special considerations that you require to help you successfully fulfill the requirements of the course, please feel free to see one of the instructors, the Faculty of Information Student Services, and/or contact the Accessibility Student Office as soon as possible so we can ensure you are able to successfully meet the learning objectives for this course.

7. **Writing Resources:** Please review the material you covered in Cite it Right, familiarize yourself with the How Not to Plagiarize site and UofT's policy, and consult the Office of English Language and Writing Support as necessary.