**Database Systems I (CMPT 354)**

**Simon Fraser University**

**Instructor: Oliver Schulte**

For course details such as scheduling, contact information, office hours, exam dates etc., please see the course website at https://courses.cs.sfu.ca and the SFU student information system go.sfu.ca.

**Text.** *Database Management Systems*, Raghu Ramakrishnan and Johannes Gehrke, McGraw Hill, 3rd edition. The website for the book is http://www.cs.wisc.edu/~dbbook/ . The website contains solutions to odd-numbered exercises and other resources. Used copies are available.

**Overview.** Organizations need to store information about facilities, employees, products, customers/clients etc. The information should be stored so that it can be used to quickly answer questions (queries). Database systems provide the technology for solving many information storage and retrieval problems.

An important insight in database design is that most of the information that we need to store and query can be thought of as information about *entities*, their *properties*, and their *relationships* to each other. The reason why this insight is important is that it allows us to store information in a *standard format* (database tables). The first and main part of the course introduces the *entity-relationship model*, illustrates how to represent real-world information in a relational form, and discusses standard operations for querying information in relational form. These standard operations form various *query languages*. We will cover the fundamental constructs of SQL (Structured Query Language), the main query language used in commercial database management systems. Alternative query languages are based on the XML data format, such as Xpath.

The second part addresses various *applications issues*, such as developing applications that interact with databases, including interaction via the internet.

The *systems part* provides an overview of the issues involved in building an efficient database system. System topics include:

- Storage and memory management.
- Query evaluation.

Techniques for *database design and tuning* organize relational information so that we can quickly find the answer to frequent queries. This includes indexing and normalization. (Likely we will not have time to cover normalization.)

**Class Format.** The classes are basically lecture classes. There won't be much time to discuss the assignments in detail, but we will distribute solutions. I will vary the lecture format for in-class exercises and discussions. Distracting fellow students with cellular phones, ipods, tablets, and similar is not allowed during lecture times. I plan in-class quizzes using mobile Canvas; **you must be equipped to take part in these quizzes.**

**Studying For This Class.** You should read the relevant chapter for each week at least *twice*. It's a good idea to form study groups (or pairs) for discussing the readings, your ideas for the short paper and other parts of the class.

**Useful Skills.**

Know how to

- Use a drawing program
- How to make an executable file from source code
- How to document application code

**Useful Background.**

- B+-tree index.
- Hash index.
- Binary search.

**Workload Model.**

Weekly Work

| | |
|---|---|
| 4 | Assumed Number of Semester Courses<br>http://www.cs.sfu.ca/undergrad/Advising/programs/majors.html |
| 40/4=10 hrs | Total Number of hours per week per course |
| -3 hrs | Class Attendance |
| -3 hrs | Reading |
| -3 hrs | Assignment average per week |
| +1 hrs | Balance |

Assignment Workload

| | |
|---|---|
| 13 | Weeks per semester |
| 13 * 3 = 39 hrs | Total Available Number of Hours for Assignments per term |
| 39/4 = 9.75 hrs | Number of Hours per Assignment |

Actually, I aim to make the assignments so that they take less than 6 hours on average. This assumes that you work on the assignments efficiently:

- Read and understand the course readings and lecture notes before doing the assignment.
- Form a study group or duo.
- Get started early and ask questions in office hour before you get stuck.

**Getting in Touch; Email**

*Face-to-face*. The best occasion for discussing aspects of the course content is in my *office hour*. If you can't make it in person, feel free to *call me during my office hour*. If you leave a message, state your name and number clearly so I can get back to you. A brief description of your issue helps.

There will be some time *after class*. You can make an individual appointment with me or with the TA, as well.

*Email*. I process email only once a week, so if you want a faster reply than that, please use the in-person avenues. Email is an inefficient way to carry on a discussion, and I won't have time to send you back more than a couple of sentences. If a reply takes more than two lines, we should carry on the conversation after class or during my office hour. You should first look at the course web page, course syllabus and the textbook for information.

*When to send email*.

- For practical or organizational problems.
- To make a special appointment.
- If you send me or the TAs email, please **enter "354"** somewhere in the subject line.

My response to other appropriate email is to look for you in class.

*When <u>not</u> to send email.*

There are various types of information that you can get from the syllabus, the posted course schedule, or in class, or from me during my office hour, or from your fellow students. These are not appropriate for email queries and I may not reply by email but only in class. Examples include:

- When is my assignment/midterm/due date?
- What did we cover in class last week?
- Do I need to buy the textbook?
- What are you looking for in this assignment?

On-line support for assignments will be via the public discussion forum. **There will be no private email support for assignments.**

**Marking.** Your term grade is calculated as (Quizzes 10%, Assignments 30%, Exams 60%).

*Assignments*. There will be two types of problems: "paper-and-pencil" exercises and programming exercises.

Notes on Assignments:

- Assignments are given out roughly every 3 weeks. Thus there will be a total of 4 assignments.
- I encourage you to work in groups. However, each student must write each assignment on their own. You cannot submit as a group or on behalf of other students.
- I urge you to start working on the assignment as soon as it is given out. You will then get more out of the class that deals with the material on the assignment. Also, you can check your understanding against what we discuss in class: you will very likely catch mistakes that way.

Penalty for Late Submissions

- The exact date and time of your submission will be recorded in the assignment submission web site.
- Students submitting their assignments late will have 20% of the total marks deducted for each day thereafter, up to a maximum of five days, at which point the mark is zero.

*Quizzes*. We will have regular in-class quizzes to give you immediate feedback on how well you have followed the course material. The quizzes will cover both material from the lectures and from the text. I will run them as on-line quizzes using the Canvas system. The exact number of quizzes will depend on the class dynamics; roughly I'm planning for around 10 quizzes. I will discard the worst three quizzes for each student, to allow for absences, technical problems, etc. The average of the remaining quiz marks is your overall quiz mark.

*Exams*. There is no final exam. There will be 3 in-class exams. The tentative exam dates are posted on the lecture schedule. Students must attain an overall passing grade on the average of exams in the course in order to get a C or higher. In other words, if you score less than 50% exam average, you get at most a D regardless of your score on the assignments. *This is the most common way for students to be assigned a D.*

**Excuses and Extensions**

My main goal in considering special circumstances is to ensure *fair treatment* for all students. While you will understand the material better the more time you put into studying, I cannot evaluate your effort, only the results.

- *Valid reasons for an extension*. The standard excuse for missing any part of the course requirements (assignment deadlines, midterm exam, final exam, etc.) is a *certified medical problem*. You should discuss other reasons with me, preferably in advance. I will require documentation of your problem, in the case of medical problems the standard SFU medical excuse form to be filled out by a physician. **If you have a valid excuse for missing part of the class work, I will transfer the weight of what you have missed to the weight of the *exams*.**

- *Invalid reasons for an extension*.
  - Unforeseen circumstances such as breakdown of your car, printer, computer.
  - Outside commitments like work and travel plans.

  I sympathize with these issues but they are not reasons for special treatment. If this worries you, I suggest you do your work ahead of the deadline and put in place alternative ways of getting it to class (email, friends).

**Grade Challenges**

My main goal in considering special circumstances is to ensure *fair treatment* for all students. Remember that if you want a good mark, you should visit my office hour regularly. If the first time you come to my office hour is to discuss your grade, you are coming too late.

**All requests for reconsidering a grade must be made in writing.** If you wish to have a grade reconsidered, *write a brief note* stating your reasons. Typically, the note will outline what you take to be the requirements of a good answer, and point out where you believe that you met these requirements. Your note will show me that you have understood the issues involved, and in a large class, will help me keep track of our discussions and special circumstances.

- *Valid reasons for making a grade change.*
  - There was a mistake adding up your points.
  - The instructor/TA said the right answer was x. I put down x but got marked wrong.

- *Invalid reasons for making a grade change.*

  - I disagree with your solution.
  - I didn't know this would be on the exam.
  - I spent a lot of time on this assignment/exam.
  - I need a better grade to (stay in the program, stay in the university, get into business school…).
  - My term mark is close to a cut-off.
  - I don't think this material is important and I shouldn't have to learn it.
  - I believe that the question was unclear.
  - Some of the questions required exercising judgement.

  I sympathize with these issues but they are not sufficient reasons to consider a grade change. If you are not satisfied with your grade on a course component, or in the course, there is a procedure for appealing, starting with the Undergraduate Chair of Computing Science.

**Students With Special Needs**

I advise students who require accommodations in this course due to a disability affecting mobility, vision, hearing, learning, or mental or physical health to discuss their needs with The Centre for Students with Disabilities, 291-3112 (Phone) or www.sfu.ca/student-services/disabilities.html .

## Plagiarism

Plagiarism is a serious academic offence, and will not be tolerated in this course. SFU's Code of Academic Policy (http://www.sfu.ca/policies/teaching/t10-02.htm) states:

"Plagiarism is a form of academic dishonesty in which an individual submits or presents the work of another person as his or her own. Scholarship quite properly rests upon examining and referring to the thoughts and writings of others. However, when excerpts are used in paragraphs or essays, the author must be acknowledged using an accepted format for the underlying discipline. Footnotes, endnotes, references and bibliographies must be complete…

Plagiarism exists when all or part of an essay is copied from an author, or composed by another person, and presented as original work. Plagiarism also exists when there is inadequate recognition given to the author for phrases, sentences, or ideas of the author incorporated into an essay.

A draft paper, proposal, thesis or other assignment may be subject to penalty for academic dishonesty provided the instructor/supervisor has informed the student(s) before the work is submitted…

Penalties imposed by the University for academic dishonesty may include but are not limited to one or more of the following: a warning, a verbal or written reprimand, reassessment of work, failure on a particular assignment, failure in a course, denial of admission or readmission to the University, deregistration, forfeiture of University awards or financial assistance, suspension or permanent suspension from the University or revocation of a degree."