

Course Outline

Introduction to Computer Science

COMP 250

Fall 2017

section 001: MWF 10:35-11:25

MCMED 522

section 002: MRF 14:35-15:25

MD-HAR 310

(The two sections will be considered together as one course. You can attend either.)

Instructor: Professor Michael Langer
Office: McConnell Engineering 329
Tel: 398-3740
Email: langer@cim.mcgill.ca
Course Web Page: <http://www.cim.mcgill.ca/~langer/250.html>
Office Hours: MWR 13:00-14:00 (or by appointment)

Teaching Assistants (T.A.)

T.A. office hours and contacts will be posted and updated on mycourses Announcements. Here is a breakdown of their responsibilities and links to their emails.

Assignments 1 and 3

Navin (email)

Ram (email)

Assignments 2, 4

Jack (email)

Tabish (email)

Tutorials; Lectures, Exercises, Quiz material

Caitrin (email)

Jeremy (email)

Roman (email)

Assignment automated grading

Xiru (email)

Introduction

This course introduces you to two core topics in computer science: data structures and algorithms. For the data structures, you will learn about various types of lists (arrays, linked lists, stacks, queues), trees, and graphs, and you will also learn the basic algorithms that use these data structures. You will also learn how to analyze such algorithms in terms of the amount of computation they use. These analysis tools will be used heavily in many subsequent courses, in particular, COMP 251.

The course will use Java which is a object oriented programming language. As such, the course will also teach you some of the basic ideas of object oriented design. You will learn how classes can be organized into hierarchies, and how variables and methods defined in the classes of the hierarchy are related to each other. These relationships will be developed more fully in subsequent software courses such as COMP 303.

Prerequisites

According to <https://www.mcgill.ca/study/2017-2018/courses/comp-250> the official prerequisite is “*Familiarity with a high level programming language and CEGEP level Math.*”

Programming Prerequisite

The first prerequisite that you need to know some basic computer programming. In particular you will need to know the basics of the Java language. All of the assignments will be in Java, and many of the examples in class will use Java. The first few lectures will not use Java. So if you don't know Java coming in, then you should use this time to catch up. To help you out, we will give a few lectures early on reviewing some of the key aspects of Java that you might find strange and new if you only know how to program in other high level languages (see below). *By the third week of the semester when Assignment 1 is posted, you will need to know roughly as much Java as the students who have taken COMP 202.*

Here are some frequently asked questions (FAQ) about the programming prerequisite:

Q: I took COMP 208 and so I know some C but not Java. What am I missing?

A: If you know some C, then you are in a strong position to learn Java because you are very familiar with *types* already. However, you don't yet know about objects and classes. You will need to learn about them, and how to use them in Java.

Q: I took a programming course prior to coming to McGill in which we used one of Python/Matlab/Javascript/R. What am I missing?

A: These are all languages are all powerful high level languages. However, if you have only programmed in these languages, then you are missing some important concepts. These languages do not require you to declare each variable to have a certain type before using the variable, and so you are not be used to thinking about *types*. Types are hugely important in Java (and C) so you will need to spend time even more time catching up than the folks above you have taken COMP 208.

But before you do attempt to learn about types and objects/classes and catchup to the others, you should be very sure that you are comfortable with the other basics elements of programming, in particular, variables, expressions, and assignments, conditional statements (if-then-else), loops (while, for), methods/functions, data structures such as arrays and strings, input/output from a keyboard and to a console and from/to a file. If you are not comfortable with these basics, then you should take COMP 202 instead of COMP 250.

Q: I have not taken a programming course. Instead I learned programming on my own (e.g. online course). How much programming experience do I need?

You also have at least 50 hours experience programming in whatever language you do know. That is roughly the minimum amount of experience that a student who has taken COMP 202/208/etc already has. If you don't have that level of experience, then you should not take COMP 250 this semester, and instead you should take COMP 202.

Q: How can I learn Java?

A: Here are some suggestions.

- Scan through the lecture slides from COMP 202 and make sure you are aware what topics were covered in that course, e.g.

<http://www.cs.mcgill.ca/~cs202/2016-01/web/sec2.html>

For that course, all the material from January to March is core COMP 202. The material from April is extra.

- Learn java online with codecademy, sololearn, udemy, or others.
- Download the free online Java book “How to think like a computer scientist”. You will need to go as far as chapters 10 and 11 give a brief introduction to Objects and Classes, respectively.
- If you are a Python programmer trying to learn Java, you might try:
<http://interactivepython.org/runestone/static/java4python/index.html>
- Buy or borrow a book on Java programming and go through the parts of it that are covered in COMP 202. Don't just read: code! Two very good introductory texts (any edition) for Java are:
 - D. Liang, “Introduction to Java Programming,” Brief Edition, Prentice Hall.
 - Lewis and Loftus, “Java software solutions,” Addison-Wesley.

Math Prerequisites

The prerequisite is CEGEP level math. This means specifically Calculus 1 and 2. Although COMP 250 will not use derivatives and integrals, some of the ideas from Calculus will be used. For example, we will use the limits of a sequence when we discuss the runtime of different algorithms and we compare one algorithm to another. We also will use sequences and series. In particular, you are expected to know the difference between an arithmetic versus geometric series. Another important concept from Calculus is the idea of logarithms. You need to know how logarithms are defined – namely a logarithm is the inverse of an exponential. You also need to know and understand the basic rules of logarithms. Finally, the course will require that you are able to think logically. Although most of you will not (yet) have studied formal logic, you will nonetheless be expected to understand at least intuitively what statements like “for all” and “for each” mean, and to understand intuitively how to negate such statements. Such mathematical thinking will come more naturally to those of you who are stronger in mathematics, but everyone is capable of such thinking to some extent – and it improves with practice. So if you haven't yet taken Calculus e.g. if you are doing a B.A., then you should at least do Cal 1 before taking this course.

Other recommended McGill courses

If you are registered for COMP 250 in Fall 2017 and you are thinking of pursuing a program in Computer Science, then I strongly recommend that you ...

- ... also take MATH 235 (if you do Math & CS program) or MATH 240 (for CS only programs). These courses will help you with the mathematical parts of COMP 250. Moreover, doing one of them now will be a huge help when you take COMP 251. You *must* take one of these two MATH courses either before or during COMP 251, and I strongly recommend that you do it *before* rather than *while* taking COMP 251.
- ... take Calculus 1, if you haven't done so already. See prerequisites above.
- ... do not attempt to take COMP 250, 206, 273 all in one semester, unless you have a lot of programming experience already. (Taking 250 and 206 is fine though, and indeed is recommended.)

Lecture Recordings

I will enable Lecture Recordings for the MWF 10:30 section, and make them available on mycourses to students in both sections. If the majority of students consistently choose to take advantage of these recordings rather than come to class, then I may decide to make better use of the MRF 2:30 lectures slot and instead offer tutorials during that slot.

Course Materials

There is no course textbook. Instead, I have made for you a complete set of Lecture Notes, Slides, and Exercises. These are available on the public course web page. I will modify these as the course goes along.

Course Announcements

Announcements will be made on mycourses. I strongly recommend that you subscribe.

MyCourses Discussion Board Rules

I strongly encourage you to participate in the mycourses Discussion board, or at least to subscribe to it. It is much more efficient for me to disseminate information that is of interest to many people by answering questions there, rather than answering individual emails.

When posting to the Discussion Board, please obey the following. *Posting that do not conform may be deleted.*

- Put you posting in the correct folder.
- Use the search feature to see if your question has been asked before.
- Choose a suitable subject line, so that readers know what the posting is about.
- If you have multiple questions that are unrelated, then *use multiple postings*.
- Proofread before posting. Take an extra minute to ensure your question makes sense.
- If you would like your posting to be deleted, just add a request within the thread.
- Be polite. Be professional.
- Although it is nice for you to post a “thank you” note on mycourses when I or another student answers your questions, I would prefer that you don’t. Let’s keep the number of postings down, please!

Instructor’s email policy

Please refrain from emailing me (Prof. Langer) with technical questions about the course material. Instead, please post the questions on the mycourses Discussion Board so that everyone can benefit. Feel free to answer each other’s questions on the Discussion Board. I will do my best to moderate the Discussion Board, and give timely answers if no one else steps in.

Only email me if you have questions that you are sure are individual to you. I will get back to you as soon as I can.

Evaluation

Your final grade will be calculated using the following percentage breakdown.

- **Four Assignments (40 % total, each worth 10 %)**
 - A1 to be posted around September 19
 - A2 to be posted around October 4
 - A3 to be posted around October 30
 - A4 to be posted around November 15

You will be given approximately two weeks to complete each assignment.
If you do not do an assignment, then you will receive a grade of 0 for it.

- **Online Quizzes (10 %)**

I plan to have six multiple choice quizzes throughout the semester. These quizzes will be done online with mycourses. *The quizzes must be done entirely on your own.* See Policy below about 'Collaboration versus cheating'. The quizzes will take less than one hour and you can do it anytime during the day from 8 AM to 8 PM.

It is possible that some students will not be available or prepared to write the quiz for various reasons. Therefore, I am making the quizzes optional. When I calculate your grade at the end of the course, if your final exam percentage grade is greater than your quiz grade, I will automatically make your final exam worth 60 % of your final grade and your quizzes will be worth 0 %.

The planned dates of the quizzes and topics covered are as follows. You will be informed well in advance if these dates change.

1. Mon Sept 25 lectures 1-2,4-6
2. Fri Oct 13 lectures 7-13
3. Fri Oct 27 lectures 14-18
4. Fri Nov 10 lectures 19-25
5. Mon Nov 20 lectures 26-29
6. Fri Dec 1 lectures 30-34

- **Final Exam (50 % – or 60 %, see above))**

The Final Exam will be held during Final Examination Period.

It will be a multiple choice exam.

It will be *closed book*. No crib sheet or electronic devices are permitted. (No calculators. No cell phones.)

I use Microsoft Excel to calculate your final grade, such the formula rounds off to the nearest integer. So if your grade is 84.4 then it rounds to 84 and you get an A-, whereas if it is 84.6 then it rounds to 85 and you get an A. If your grade is 84.5, Microsoft Excel rounds it up to 85.

For other issues related to my grading policies, please see below. At the end of the course, students often contact me with requests for a grade change. If these requests are handled by my policies below, I will simply respond with "Please see my policies in the Course Outline".

Other Miscellaneous Policies

Collaboration versus cheating on assignments:

I strongly encourage you to discuss the assignment problems with each other, and to help each other out with debugging problems (especially with the mechanics of debugging). There is no better way to learn than through discussion. However, this discussion should not go so far that you are revealing the solutions to each other or sharing code (or posting your code on a public web site such as github).

I realize there is sometimes a fine line between giving hints and revealing solutions, so I ask you try to follow a simple guideline: any discussion you have about an assignment should be *open* in the sense that the discussion meets the criteria of the previous paragraph, and you would be comfortable if anyone else including the TAs or me were listening in.

Cheating on quizzes:

I am planning to have quizzes online and to let you do them with a time interval, and wherever you like (from home, library, Trottier labs, etc). I will use the honour system here, namely you must do the quizzes entirely on your own just as if you were writing an exam in class. Any communication between two students about a quiz before the time limit for finish the quiz is complete will be considered cheating.

Re-grading assignments:

Mistakes can occur when grading assignments. Not surprisingly, requests for re-grading are always situations in which you feel that you received fewer points than deserved, rather than more points than you deserved. With that upward tendency in mind, please note that if you wish me or the TAs to re-grade a question on an exam or assignment, we will do so. However, to avoid upward grade ratcheting, *we reserve the right to re-grade other questions as well.*

In choosing a grading scheme for each assignment, we often partition the assignment into small parts and give either 0 % or 100 % on each of those parts. We recognize that this 'all or none' method may be imperfect, namely you may get 0 % on a question even though you made only one small mistake that led to the error. However, we ask you also to recognize that the errors can go the other direction: you might get 100 % on a part, even though your solution is imperfect e.g. your code is inefficient or awkward or poorly commented, or your solution may have met the criterion we set but would not have met a more stringent criterion that we could have set. My view is that over the four assignments, these errors will tend to average out such that you will receive an overall course grade that approximately reflects your overall performance.

Bonus points:

If you inform me of significant errors in the lecture slides, exercises, or assignments, then I will be very appreciative and will make a note of it and you *may* be eligible for bonus points.

Final grade:

There are many factors that determine your grades including how hard you work, how talented you are in this subject, how much time you have available because of other commitments, what your academic background is, what your health situation or family situation is, etc. *However, your final course grade is independent of all these other factors. Your final grade is calculated according to the grading scheme specified above.*

Additional Work:

If you receive a grade of D, F or J, you will *not* be given the opportunity to complete additional work to upgrade your grade.

Supplemental Exam:

It will cover the same material as the Final Exam and will replace the Final Exam grade. For information on Supplemental Exams, see <https://www.mcgill.ca/science/student/general/exams/supplemental>.

McGill language policy

In accord with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded.

https://www.mcgill.ca/study/2017-2018/university_regulations_and_resources/undergraduate/gi_lang_policy

McGill policy on academic integrity

McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offenses under the Code of Student Conduct and Disciplinary Procedures. See <http://www.mcgill.ca/students/srr/honest/> for more information