

Course Outline

COMP 250 Introduction to Computer Science

Winter 2022

MWF 3:35PM-4:25 PM on zoom

Instructor

Michael Langer

Office Hours: after class on zoom (MWF starting at 4:25pm) or by appointment

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Teaching Assistants (T.A.)

T.A. office hours and contacts will be posted on mycourses.

1 Overview

This course has two parts. The first part is an introduction to object oriented programming, using the Java programming language. You will learn the basics of Java programming including ideas and tools for object oriented design. In particular you will learn how to work and create Java objects and classes and how to organize classes into hierarchies. This will lead you to COMP 303 Software Design which also uses Java.

The second part is an introduction to data structures and algorithms. You will learn basic data structures for lists (arrays, linked lists, stacks, queues), trees (search trees, heaps), and graphs. You will also learn fundamental algorithms that use these data structures, in particular, non-recursive and recursive algorithms for traversing these data structures. The assignments will give you hands-on experience working with these data structures and algorithms in Java. Finally you will learn how to analyze such algorithms in terms of the amount of computation they use. These data structures, algorithms, and analysis tools all will be used heavily in subsequent CS courses, for example, COMP 251 Algorithms and Data Structures.

2 Prerequisites

According to the e-Calendar the official prerequisite is “*Familiarity with a high level programming language and CEGEP level Math.*” Here are more details about the programming and math prerequisites.

2.1 Programming prerequisites

You should have taken one of COMP 202/204/208 or some other one semester introduction to programming course. COMP 202/204/208 all use the Python programming language, but any other high level language such as Java, Javascript, C, C++ is fine.

COMP 250 will use Java so if you already know basic Java then you are in great shape and will have a head start. McGill's ECSE 202 in particular uses Java.

If you have not taken a programming course and instead you have learned programming on your own, then you'll have to judge for yourself whether you should take COMP 250 or start instead with COMP 202. Here are a few guidelines. First, you should be *very* comfortable with basics elements of programming such as variables, expressions, assignments, conditional statements (if-then-else), loops (while, for), methods/functions, data structures such as arrays or lists, strings, and input/output from a keyboard and to a console and from/to a file. Second, whatever language you do know, you should have at least 50 hours experience programming. That is roughly the minimum amount of experience that a student gets in COMP 202/204/208/etc.

Note that you cannot take COMP 202/204/208 simultaneously with COMP 250. If you try to do this, then when it comes time to graduate, you will find yourself to be in trouble: you will be told that the 3 credits for COMP 202/204/208 won't count.

2.2 Math Prerequisites

The official prerequisite is "CEGEP level math". This means you should have taken Calculus 1. Why? Although COMP 250 will not use derivatives and integrals, some of the ideas from Calculus will be used. For example,

- We also will use sequences extensively, and you should be familiar with the notation;
- We will use logarithms extensively. 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 properties of logarithms. We will use "log base 2" in this course, rather than the natural logarithm.
- At the end of COMP 250, we will use limits of a sequence.
- There will be many mathematical ideas in the course, and some formulations such as mathematical induction. So you will need to understand formal mathematical statements that use logical quantifiers "for all" and "for each". Calculus 1 should give you the experience you need.

2.3 Recommended Co-requisites

If you are registered for COMP 250 in Fall 2021 and you are thinking of pursuing a program in Computer Science, then we strongly recommend that you take:

- MATH 240 (for CS only programs) or MATH 235 (if you do Math & CS program).
[Note: MATH 235 is not offered in Winter 2022.]

These courses will help you with the mathematical parts of COMP 250. Moreover, doing one of them now will allow you to take COMP 251 next. (You *must* take one of these two MATH courses either before or while taking COMP 251; we strongly recommend that you do it *before*.)

- Calculus 2, assuming you have taken Calculus 1. Some of the upper level COMP courses will require Calculus 3, so the sooner you take Calculus 2 the better.
- COMP 206. This is not necessary though, and if you are just doing a minor in CS then maybe not do 250 and 206 at the same time. COMP 206 will use the C programming language. There are many similarities (and differences!) between C and Java, so there are advantages but also disadvantages in doing both at the same time.

If you are considering taking COMP 250, 206, and 273 all in one semester, then I would suggest not doing so – unless you have a lot of programming experience already. Instead just take 250 and 206 and leave 273 for next semester.

3 Course Materials

3.1 Software for this course

The programming language for this course is Java. Thus you will use the Java compiler and the Java Virtual Machine (JVM) to compile and run any programs we give you and to do the assignments. The Java compiler and the JVM are included in a larger software package called the Java Development Kit (JDK).

To edit and run your programs, we recommend you use a high powered IDE such as Eclipse or IntelliJ which can assist you in writing your code. The Teaching Assistants will provide support for both. You are encouraged to install the JDK and IDE on your own machine so you do not have to depend on the SOCS computer laboratory facilities to do your work. *Instructions for installing the JDK and the IDE can be found under the mycourses Content tab.* If you need help with installation, you can consult a TA during office hours in the first few weeks.

3.2 How to learn Java ?

Since you already know the basics of programming in at least one language, you will be able to learn Java at an accelerated pace. I will cover some basic Java in week 1, and we will get into some objects and classes in weeks 2 and 3. But I will not cover all basic Java elements such as variable declarations, expressions, assignments, conditional statements (if-then-else), loops (while, for), methods or functions. You'll need to learn these elements on your own in weeks 1 and 2.

Here is are a few resources you can use to learn these basic elements:

- Free online tutorials. I would recommend w3schools, but there are others e.g. codecademy or sololearn, ...
- Free online Java book by Downey and Mayfield “How to think like a computer scientist”.

3.3 Lecture Recordings

I will record the zoom lectures, and make the recordings available on mycourses.

3.4 Lecture Slides, Lecture Notes, Exercises

Lecture slides will be made available on mycourses. I will also offer typeset lecture notes as well as plenty of exercises for you to test your level of understanding, practice for the quizzes and final exam, and even go a bit beyond what is covered in class.

The materials from the Fall 2021 version of the course are available on mycourses. I will update some of these materials as we go along.

3.5 Copyright policy

You are not allowed to post any of my course materials on github, coursehero, any other websites. This includes PDFs of lecture slides, lecture notes, exercises, quizzes, assignment questions or anything else that we provide for you.

Stated more formally: “Instructor-generated course materials are protected by law and may not be copied or distributed in any form or in any medium without explicit permission of the instructor(s). Note that infringements of copyright can be subject to follow up by the University under the Code of Student Conduct and Disciplinary Procedures.”

In addition to copyright issues, there are also issues of Academic Integrity. See Sec. 6.3.

4 Evaluation

4.1 Grade components and calculation

The final grades will be calculated using the following percentage breakdown, with one very important exception which is explained in the Conditional Pass policy below:

- **Four Assignments: 40% total, each worth 10%**
 - A1 to be posted around January 28
 - A2 to be posted around February 11
 - A3 to be posted at the start of March (during Reading Week)
 - A4 to be posted by March 25

You will be given two weeks to complete each assignment. This is much longer than you need. I give two weeks to allow you flexibility. Get started early!

If you do not do an assignment, then you will receive a grade of 0 for it. No exceptions.

Late Policy:

You may submit an assignment up to two days after the deadline, but with a small penalty that is specified on each assignment PDF. I am willing to waive this late penalty in cases of more serious illness or other unforeseen personal circumstances. However, you must make a formal request. See email policy.

Examples of *invalid* requests are:

- Your laptop broke or was stolen and so you lost all your code and had to restart. (This is not a valid excuse. You should be using an automatic backup system e.g. Office 365, Dropbox, google drive, etc.)
- You have midterm exams, a job interview, a family wedding, etc. These are invalid because we give you two weeks. You need to plan accordingly.
- You were sick for a few days. This is not a valid excuse since the assignment is posted for two weeks.

Late submissions *beyond the two day deadline* are allowed only under extreme and rare circumstances.

• Online Quizzes: 0% or 15%

We will have five quizzes throughout the semester, each worth 3% of your final course grade. The planned dates of each quiz are listed below. If the dates covered change, then I will announce it beforehand on mycourses.

1. Fri. Jan. 28
2. Fri. Feb. 11
3. Fri. Feb. 25
4. Fri. Mar. 18
5. Mon. Apr. 4

These quizzes will be done online with mycourses. The quizzes will be combination of multiple choice and multiselect questions. I strongly suggest that you do them in a location where the internet connection is reliable.

The quizzes are designed to take less than 40 minutes. I give you a full hour, and this is to accommodate students registered with OSD who need more time for exams. You can do the quiz anytime during the day from 8 AM to 8 PM.

The quizzes must be done entirely on your own. No crib sheets, or web access, etc is allowed. The conditions of the quiz are intended to be the same as the final exam. See policy below about “Cheating on quizzes”.

It is possible that you will not be available to write all of the quizzes. Therefore, the quizzes are “optional” in the following sense. You will receive a grade of 0/3 if you cannot write that quiz; however, when I calculate your final course grade, if your final exam percentage grade is greater than your overall quiz percentage grade including quizzes that you missed, then I will *automatically* make your final exam worth 60 % of your final grade instead of 45 %, and your quizzes will be worth 0 %. This policy is meant to encourage you to do as many of the five quizzes as possible, even if you are not as well prepared as you want to be.

Each quiz will cover the material of roughly 6-7 lectures. The details of exactly which lecture you will be responsible for in each quiz will be posted at least a week beforehand under the Quiz tab.

- **Final Exam: 45% or 60% (see Quizzes above)**

The Final Exam will be held during Final Examination Period. The plan is for it to be an *in person* exam.

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

It will be a multiple choice exam out of 45 points. There will be four choices on each question. If you answer a question correctly, you get 1/1. If you do not answer a question or if you answer a question incorrectly, you get 0/1. Therefore, you should never leave a question blank.

Conditional pass policy: *If your calculated grade is C or higher but your final exam grade is less than 45% (namely 20/45 or less), then you will receive a grade of D and you will need to write the Supplemental Exam in order to get a higher grade.* Note that a D grade counts as a pass for an elective course only.

If the average class grade on the final exam is lower than anticipated – namely, if it is below 70% – then I will increase everyone’s final exam grade so that the class average becomes at least 70%. The same conditional pass threshold (20/45) would be applied to the increased grade.

Rounding off policy: When I calculate your final course grade, I will use a formula that rounds off to the nearest integer. If your grade is 84.49 then it rounds to 84 and you get an A-, whereas if it is 84.5 then it rounds to 85 and you get an A. The same round off procedure holds for low grades. If your calculated final course grade is 49.49 then it rounds to 49 which is an F. I will draw a very a hard line on this, so if you don’t want to fail then make sure you stay far away from that line.

No Special Consideration policy: There are many factors that determine your course grade 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, I do not consider these factors when I calculate your final course grade. Rather, I calculate your final grade exactly according to the grading scheme specified above.* No exceptions.

4.2 No Additional Work (to increase grade)

You will *not* have the opportunity to complete additional work to improve your grade. This is regardless of whether you passes the course or not.

4.3 Supplemental/Deferred Exam [wording updated in April 2022]

The Supplemental/Deferred exam will cover the same material as the Final Exam. The same grading policy will be used as described above – with the Deferred/Supplement Exam grade component replacing the Final Exam grade component.

Note that those writing the Supplemental will receive a second grade on your transcript: your assignment (and possibly quiz) grades will be counted in both of the grades, i.e. for your GPA, those grades will be double counted.

There will be grade curving for the Deferred/Supplemental exam.

For information on Supplemental Exams, see [here](#).

5 Communication Policies

5.1 Course Announcements

Important information about the course will be announced in class and/or on mycourses. Please subscribe now to mycourses Announcements, if you haven't done so already.

Relatively minor updates will be announced on the discussion board.

5.2 Getting help from the instructor (me) or a T.A.

If you have a technical question about the course material or an assignment, *do not email me*. Instead:

- If it is an assignment question, then see a T.A. during their office hours, or post your question on the discussion board.
- If it is a question about a quiz or lecture material, then post your question on the *Ed Discussion Board*. (See Discussion Board policies below.) That way, other students can benefit from the answer. I will do my best to answer your question within 24 hours.

For other help with the course lecture material (but not assignments), you can ask at the CSUS Help Desk in Trottier 3rd floor.

- If the above do not work for you and you would like to meet with either a T.A. or me, then please make a private posting on the Ed discussion board to request a zoom appointment. Depending on the situation with the pandemic, it may also be possible to have in-person appointments.

5.3 Instructor email policy

Email me *only if*:

- You have an urgent and important *personal* matter that is relevant to the course.
- You notice a mistake or ambiguity with a question on a quiz.
- There are missing slides or PDF on mycourses, or lecture recordings haven't been posted within 48 hours of the lecture, etc.

When emailing me or the T.A.'s, please follow the guidelines on etiquette described in the video here and on this website.

McGill official email policy is here. You should include your name and student ID on all emails sent to instructors, and you should send it from your mcgill address to ensure it is not spam filtered.

5.4 Discussion Board Guidelines

The T.A.s and I will moderate the Discussion Board. We also strongly encouraged you to help each other out by responding to posts. Guidelines for posting on the Discussion Board are as follows.

- Use the search feature to check if your question has been asked before by entering relevant keywords into the search box. Post your question only if you are sure it has not been posted before.
- Choose the appropriate folder (Topic) and subject line.
- If you have multiple questions that are unrelated, then use multiple postings so others can more easily follow the thread.
- Proofread before posting. Ensure that what you have written makes sense before hitting Enter.
- If you would like your posting to be deleted, make a request within the thread.

6 Policies on Academic Integrity

6.1 Collaboration on Assignments

I encourage you to discuss the assignment problems with each other. There is no better way to learn than through discussion with your peers. I also encourage you to help each other out with debugging problems, especially with the basic mechanics of debugging such as how to make the best use of an IDE. Finally I encourage you to pose questions on the Discussion Board and to answer each other's questions there too.

That said, there are strict limits on this collaboration. Your discussion should never go so far that you are revealing the solutions to each other. *Sharing code is absolutely forbidden.*

The solution code that you submit must be your own work!

6.2 Plagiarism and text matching software

We will run software for detecting similarities between submissions, and we will conduct a manual code review in cases where similarity between two solution is suspiciously high. *When we strongly suspect that plagiarism has occurred, we will report the case to the Disciplinary Officer in the student's Faculty* (Science, Arts, Engineering, etc). This will lead to a letter grade NA on your transcript ("not available"). It may take several months to resolve the situation.

For more details on the process, see Section III Articles A.37 (p. 10) and A.48 (p. 13) of the Code of Student Conduct and Disciplinary Procedures as well the web site listed below.

6.3 Posting assignment solutions on a website

We encourage you to use tools like github for version control systems. However, you must not share your assignment solutions by posting them on a public space such as your github account. If you do and if another student copies your solution from there, then there will be no way to discriminate who did the work, and you may be accused of plagiarism along with the other student(s).

This rule extends beyond the duration of the course, since I sometimes recycle assignments from previous years. If the old versions are easily accessible (github has a search feature) then this leads to plagiarism by others.

6.4 Cheating on quizzes

The quizzes will be online and we will let you do them with a 12 hour time interval, and wherever you like (from home, library, Trottier labs, etc). We 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 during the 12 hour time interval of the quiz is forbidden.
- Posting questions or solutions on a website is forbidden.

6.5 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 this web site for more information.”

7 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.

See this web site for more info. Note that this policy does not apply in this course because of how the evaluation works and what you are evaluated on.