COMP322: Introduction to C++ - Winter 2023

Friday 04:35 pm - 05:25 pm (Leacock Building 132)

1   General Information

This **one-credit** course will provide a basic introduction to the C++ programming language.

All related information such as announcements, lecture notes and assignments will be posted on mycourses. There also will be a course discussion board where you may ask questions to other students, TAs, and the instructor.

The instructor for this course is Dr. Chad Zammar. He can be reached by email at **chad.zammar@mcgill.ca**.

Office hours and teaching assistants information will be announced on mycourses.

2   Description

C++ is a popular general-purpose programming language, originally developed at Bell Labs by Bjarne Stroustrup from 1979-1983. C++ is descended from the C programming language (Kernighan and Ritchie, 1978) and is an ancestor of the Java language (Gosling, Joy and Steele 1996). C++ supports multiple paradigms such as object-oriented, imperative and procedural programming.

This course will cover the essential features of the C++ programming language. We will focus on the features that distinguish C++ from Java (pointers, memory allocation, templates) and C (classes, operator overloading, namespaces, exceptions). We will touch on some of the services provided by the C++ standard library. Given the limited time available in lectures, we cannot attempt to cover every single concept of C++. If there is a particular topic that you would like addressed, please reach out to your instructor to see if it's possible to include it in lectures or at least to find external resources.

3   Prerequisites

This course requires that you have already completed at least COMP 250 AND either COMP 206 or COMP 208. You should be very familiar with both C and Java because some of the material will discuss key differences between C++, C and Java. If you have not met all of

these prerequisites, you should not take this course. If you are concerned about this or worried about your knowledge of C or Java, please discuss with your instructor. While we do not have time to turn this into a full object-oriented (OO) programming course, we will attempt to explain OO principles at least as they apply to C++. This will often involve contrasting with Java, which is also an OOP language.

4   Goals of the course

At the end of this course, you should:

- Understand the differences between C++, Java, and C.
- Properly manage memory in a programming environment without garbage collection.
- Know how to use some of the features of C++ .
- Understand the basics of object oriented programming.
- Know some of the many powerful techniques of C++ and understand when to apply them.
- Have a richer understanding of programming based on seeing a different way to do things than in Java.

5   Course Resources

All course resources will be found on mycourses. It is your responsibility to get up to date information on assignments, quizzes and lectures (it is recommended that you subscribe to announcements to get automatic updates). All assignments will be submitted to my courses. In addition, there will be discussion boards on my courses which will be monitored by the instructor and TAs. You are encouraged to post questions here so that other students can help as well and share their knowledge. You may not post your code on my courses, but you may post small snippets of code (e.g. 3 or 4 lines) in order to clarify why something isn't working. When in doubt please consult your instructor for more information.

6   Textbook

There is no formal textbook for the class. However, it is recommended that you obtain one

of the standard reference texts on C++. One such book is:

- The C++ Programming Language by Bjarne Stroustrup.

Another highly recommended books are:

- Accelerated C++: practical programming by example by Andrew Koenig and Barbara Moo.
- C++ primer (5th Edition) by Stanley B. Lippman, Josée Lajoie and Barbara E. Moo

7   Evaluation

There will be three homework assignments and two quizzes:
1. **3 assignments worth 20% each (total 60%)**
2. **2 quizzes worth 20% each (total 40%)**

You will have roughly two or three weeks to complete each assignment (this may vary slightly). As the purpose of the class is to familiarize you with the C++ language, assignments will consist mostly of programming problems. An important component of any programming work is documentation, therefore you should use comments throughout the code to explain the reasoning behind your design choices. Both the quality and functionality of the code and the completeness and accuracy of your comments will be taken into account in the grading of assignments.

You are welcome to discuss assignments with your fellow students, but all submissions must reflect individual work.

Assignments must be submitted electronically via mycourses, by the due date. Late assignments will be penalized by 10 percent per day up to a maximum of 2 days. For example, an assignment received 25 hours late will be eligible for at most 80% of the possible score. An assignment received 50 hours late will not be accepted except in extenuating circumstances (e.g. illness).

The quizzes will be given on-line, and will consist of roughly 10 short answer or multiple choice questions. The quiz needs one hour to complete but it will be open for a window of time large enough to accommodate all students and to avoid any collision with other courses.

Each assignment or quiz will be worth 20% of the total final grade.

In accordance 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.

8   Approximate Schedule

Note that this is a tentative schedule only and it may be revised as the semester progresses. The dates for the assignments in particular may change and won't necessarily be due on Tuesdays.

1. 06 Jan - Hello World, Course introduction and some basics of C++
2. 13 Jan - Flow control, Functions and Input/Output
3. 20 Jan - Pointers and references (Assignment 1 out)
4. 27 Jan - Memory management
5. 03 Feb - More on pointers, arrays and strings
6. 10 Feb - Classes in C++ (Assignment 1 due)
7. 17 Feb - Quiz 1 (Assignment 2 out)
8. 24 Feb - Classes and Inheritance
9. 03 Mar - Reading week
10. 10 Mar – Operator Overloading (Assignment 2 due, Assignment 3 out)
11. 17 Mar - Exceptions
12. 24 Mar - Templates
13. 31 Mar- Quiz 2
14. 07 Apr - std template libraries and a word about C++14, 17 and 20. (Assignment 3 due)

9   Academic Integrity

McGill University values academic integrity. Therefore all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the

Code of Student Conduct and Disciplinary Procedures (see www.mcgill.ca/integrity for more information).

L'université McGill attache une haute importance à l'honnêteté académique. Il incombe par conséquent à tous les étudiants de comprendre ce que l'on entend par tricherie, plagiat et autres infractions académiques, ainsi que les conséquences que peuvent avoir de telles actions, selon le Code de conduite de l'étudiant et des procédures disciplinaires (pour de plus amples renseignements, veuillez consulter le site www.mcgill.ca/integrity).