Applied Mathematics 3611F
Introduction to Object Oriented Scientific Programming in C++

Undergraduate Course Outline Fall 2019
Department of Applied Mathematics
Western University

Course Description

Basic introduction to C++ and the concept of object-oriented programming techniques. Applications to scientific computation applied to numerical methods, linear algebra and differential equations. Grade is largely based on projects and presentations.

Lectures

MWF 8:30 - 9:30 AM, UCC-61

Attendance will be taken. Bring your ID.

Requirements

Prerequisites: Calculus 1301A/B, Calculus 1501A/B, Applied Mathematics 1201A/B or Applied Mathematics 1413.

Antirequisites: The former Applied Mathematics 4611F/G.

Pre- or Corequisites: Applied Mathematics 2402A, or Applied Mathematics 2811B, or Applied Mathematics 2814F/G, or Statistical Sciences 2857A/B.

Instructor

Dr. Eunice Chan
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Office Hours: Tuesday 4–5 pm & Thursday 3–4 pm

Teaching Assistant

Gianfranco Bini
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Office Hours: Wednesday 1–2 pm

Textbook

- *Guide to Scientific Computing in C++* by Joe Pitt-Francis & Jonathan Whiteley, Print ISBN: 978-1-4471-2735-2.

    - eBook available for free through UWO library: `https://link.springer.com/chapter/10.1007%2F978-1-4471-2736-9_1`

Supplementary Material (optional)

For C++:

- *Programming: Principles and Practice Using C++* by Bjarne Stroustrup, ISBN-13: 978-0321992789.

- *C++ Primer (5th Edition)* by Stanley B. Lippman, Josée Lajoie, Barbara E. Moo, ISBN-13: 978-0321714114.

For numerical methods:

- *A Graduate Introduction to Numerical Analysis* by Robert M. Corless and Nicolas Fillion, e-Book ISBN: 978-1-4614-8453-0 (eBook available for free through UWO library).

Course Content

- Programming basics: flow of control, I/O
- Pointers, functions
- Classes, inheritance
- Templates, exceptions, STL
- Scientific computing projects
- Git/GitHub

Students should check OWL (`http://owl.uwo.ca`) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class. Students are responsible for checking OWL on a regular basis.

Evaluation

Your grade will consist of:

- 45% Assignments (9% for each assignment)
- 55% Final Project (2% proposal, 8% mini-project, 15% presentation, 15% code, 15% paper).

Schedule (tentative)

Name	Dates Held	Date Due
Assignment 1		Sept. 20
Project Proposal		Oct. 4
Assignment 2		Oct. 4
Assignment 3		Oct. 18
Assignment 4		Nov. 1
Reading Week	Nov. 4 – Nov. 8	
Mini-Project		Nov. 11
Last day to drop course	Nov. 12	—
Assignment 5		Nov. 22
Final Presentations	Nov. 25 – Dec. 4	—
Final Project		Dec. 4

Late Marks

Late marks for assignments:

- 20% deducted for up to **one** day late
- 40% deducted for up to **two** days late
- 60% deducted for up to **three** days late
- 80% deducted for up to **four** days late
- 100% if not submitted within 4 days

Addendum to all Applied Mathematics Course Outlines

Responsibility for checking prerequisites: Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

On Academic Ethics for Assignments: Collaboration with students in the course is acceptable; however, credit must be given in written form within the assignment in moderate detail. Collaboration is really good when you help someone else, or they help you, and it solidifies your understanding of the topic. On the other hand, collaboration is bad when someone does your work for you, and you learn nothing. Taking others' work and claiming it as your own is an academic offence.

Despite being allowed to collaborate on their assignments, students must write their essays and assignments (including code) in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence.

Statement on academic offences: Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site: `http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf`.

Use of plagiarism-checking software: All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (`http://www.turnitin.com`).

Use of cheating-analysis software: Computer-marked multiple-choice tests and/or exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

Statement on services for students in emotional/mental health distress: Students who are in emotional/mental distress should refer to Mental Health@Western `http://www.uwo.ca/uwocom/mentalhealth/` for a complete list of options about how to obtain help.

Accessibility statement: Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Student Accessibility Services (SAS) at 661-2147 if you have any questions regarding accommodations.

Acknowledgment of the Science Student Donation Fund: This course is supported by the Science Student Donation Fund. If you are a BSc or BMSc student registered in the Faculty of Science or Schulich School of Medicine and Dentistry, you pay the Science Student Donation Fee. This fee contributes to the Science Student Donation Fund, which is administered by the Science Students' Council (SSC). One or more grants from the Fund have allowed for the purchase of equipment integral to teaching this course. You may opt out of the Fee by the end of September of each academic year by completing the online form linked from the Faculty of Science's Academic Counselling site. For further information on the process of awarding grants from the Fund or how these grants have benefitted undergraduate education in this course, consult the Chair of the Department or email the Science Students' Council at ssc@uwo.ca.