Introduction to Object Oriented Scientific Programming: AM 3611f
Fall 2018

The University of Western Ontario

Class time: 8:30-9:30am MWF in MC17. Lecture attendance and participation is mandatory.

Prerequisite Requirements: Calculus 1301A/B, 1501A/B, Applied Mathematics 1201A/B or 1413. Pre-or Corequisite(s) Applied Mathematics 2402A, or Applied Mathematics 2811B, or Applied Mathematics 2814F/G, or Statistical Sciences 2857A/B.
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.

Instructor Information: Prof. Colin Denniston, cdennist@uwo.ca, office: MC266. If you wish to contact your instructor, please send an email **using your Western email address** and include *3611* in the subject line.

Course Description

Learning Outcomes: *i*) To be able to apply, and provide written explanation of appropriate algorithms, implemented in C/C++, to solve problems in scientific computing.
ii) To be able to use, analyze, and provide written explanations of the results of programs written to solve scientific computing problems.

Anticipated Topics: Lecture topics are centered on the key objectives of the course. The topic coverage shown below is only approximate and may change depending on lecture progress.

- PROGRAMMING BASICS: FLOW OF CONTROL; I/O
- POINTERS; FUNCTIONS
- CLASSES; INHERITANCE
- TEMPLATES; EXCEPTIONS; STL
- SCIENTIFIC COMPUTING PROJECTS

Course Materials

Text: We will use a few different resources as we go through the course. The primary reference will be notes provided by the instructor that will be posted on OWL.
In addition, we will use the first few chapters of the textbook, *Guide to Scientific Computing in C++* which is a Springer text available for free download if you are on campus at:
https://link.springer.com/chapter/10.1007%2F978-1-4471-2736-9_1
We will also make use of online resources such as at:
http://www.learncpp.com/

Assignments, supplemental information, and other references will be posted on the course website as needed.
Website: 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. The missing of critical information due to your failure to check OWL cannot be used as a basis for appeal.

Computer Resources: Most students prefer to do the assignments and projects using their own

computer. There will be some guidance at the beginning of the course on how to setup your computer to compile and run C++ programs. Note that the University provides access to cloud backup through a free Office 365 subscription (using OneDrive). Make sure you know how to use OneDrive to ensure that all your work is backed up to the cloud: there is no excuse for losing work due to computer failure. Should you experience a computer failure, or you do not have access to adequate computer resources, the department has a small computer lab that you can be given access to. This can be arranged through the course instructor or TA.

Course Evaluation: Your grade will be based on:
40% Assignments, 40% Projects, 20% Final Presentation

There will be five *assignments* of similar weight (about one every 2 weeks) that are designed for students to practice the basics. There will also be a *Project* to apply techniques learned in assignments to larger scale problems in scientific computing. Projects may be assigned in multiple parts, including a proposal, an outline, a mini-project, and a completed project. Projects and assignments *will require substantial written work* and will be graded based, not just on the scientific content, but also on grammar, spelling, organization and format. The final presentation will be based on the student's final project. No assignments or projects will be dropped from your grade for any reason (any course requirement missed due to academic accommodation due to illness will have to be made up). Late assignments will be penalized at a rate of up to 10% per day at the instructor's discretion.

Anticipated Dates for various tasks are:
Assignment due dates: 17 Sept, 1 Oct, 19 Oct, 2 Nov, 16 Nov
Project proposal due: 26 Oct
Mini-project due: 23 Nov
Presentations: 28 Nov-7 Dec
Full project due: 7 Dec

Assignments and projects must …

- be completed independently. Students may not obtain "help" from the problem solutions of another student in this or any previous class here at Western or any other university, or from any "answer key" from the internet. Students may discuss the problems to help each other, but NOT by simply lending solutions. The final solution must be your own work;
- provide complete solutions, including clear explanations and analysis;
- be completed using neat handwriting or typed;
- have each problem beginning on a new page;
- be submitted in person (problem sets submitted electronically or slid under my office door may not be accepted unless specifically arranged with the instructor);
- be stapled together in one group (unstapled assignments are only guaranteed to have the first page marked). Do not submit your assignment in a plastic "envelope".

Academic Accommodation Due to Illness:

If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or supporting documentation to the Academic Counselling Office of your home faculty as soon as possible. If you are a Science student, the Academic Counselling Office of the Faculty of Science is located in NCB 280, and can be contacted at scibmsac@uwo.ca.

For further information, please consult the university's medical illness policy at http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf.

No assignments or projects will be dropped from your grade for any reason (any course requirement missed due to academic accommodation due to illness will have to be made up).

Academic Integrity: Students must write their essays and assignments 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.

The website for Registrar Services is http://www.registrar.uwo.ca.
In accordance with policy, http://www.uwo.ca/its/identity/activatenonstudent.html, the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at his/her official university address is attended to in a timely manner.
Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at this website:
http:// www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

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).

Software may also be subject to submission for similarity to other code using plagiarism detection software such as MOSS.

Support Services: Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 ext. 82147 if you have questions regarding accommodation.

The policy on Accommodation for Students with Disabilities can be found here:
www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_disabilities.pdf

The policy on Accommodation for Religious Holidays can be found here:
http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf

Learning-skills counsellors at the Student Development Centre (http://www.sdc.uwo.ca) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Students who are in emotional/mental distress should refer to Mental Health@Western (http://www.health.uwo.ca/mental_health) for a complete list of options about how to obtain help.

Additional student-run support services are offered by the USC, http://westernusc.ca/services.