THE UNIVERSITY OF WINNIPEG

SCIENTIFIC COMPUTING
PHYS-2102-050 · ACS-2102-050
Fall 2017

Course Information

Meeting time: Tuesdays, 5:30 PM – 8:15 PM
Room number: 2L14
Website: t2kwinnipeg.uwinnipeg.ca/~jamieson/courses/scicomp
Web-forum: https://groups.google.com/forum/#!forum/phys2102acs2102-f2017

Contact information:

Instructor	Blair Jamieson
Office	3L24
Phone	204-786-9216
Email	bl.jamieson@uwinnipeg.ca
Office hours	Immediately after class or by appointment

Important dates:

5 Sep. 2017	First class
8-14 Oct. 2017	No class (reading week)
24 Oct. 2017	Midterm in 2L14 (18:30)
10 Nov. 2017	Final day to withdraw without academic penalty. Withdrawal before this date does not result in a fee refund
28 Nov. 2017	Last class and Final project due
12 Dec. 2017	Final exam in 2L14 (18:00)

Course Material

Required textbook/reading:

- Bjarne Stroustrup, "Programming: Principles and Practice using C++, 2nd edition," Addison Wesley, 2014.

Another useful reference:

- Stanley B. Lippmann, Josee Lajoie, Barbara Moo, " C++Primer, 5th edition," Addison-Wesley, 2012.

Evaluation Criteria

Your final grade will be calculated from the following components:

- Computer Labs 20%
  - There will be weekly programming assignments, based on the material being taught each week.
  - Assignments will be posted on the course website on the day of class, and will be due the following Friday (due date will be noted on the assignment).
  - Hand in assignments as a tar.gz or zip archive using the web form at: `http://t2kwinnipeg.uwinnipeg.ca/~jamieson/courses/scicomp/handin.html`
  - Late assignments will not be accepted.

- Midterm 20%
  - A 1 hour midterm will be on the second half of class on Oct. 24.
  - Questions will be based on the C++ code you have learned up to the end of Oct.17.

- Final project 30%

- A final project, will be handed out Oct. 24 and will be due Nov. 28.
- You will be given a problem to solve using C++ code

- Final exam 30%
  - Calculators will not be permitted.
  - Photo-identification will not be asked for.

The guidelines for conversion from numerical (percentage) grades to letter grades are as follows:

Letter Grade	Percentage	Letter Grade	Percentage
A+	95–100	C+	61–66
A	87–94	C	53–60
A−	80–86	D	50–52
B+	74–79	F	0–49
B	67–73		

Note that the above are guidelines and that final grades shall be approved by the Department Review Committee and may be subject to change.

Topics to be Covered

Calendar description: Many problems arising in science are too difficult to solve analytically, and thus require analysis of some form by a computer. Using the language of C/ C++, this course introduces the most common programming constructs used in scientific computing. The critical importance of data structures to represent information is emphasized, which naturally leads to an object-oriented approach to problem solving. The use of external libraries, such as those for numerical analysis, to solve more advanced problems are explored, with attention paid to checks that can be made on the reliability of the results.

This section of the course will introduce the C++ programming language. The course topics and readings are as follows, and are accompanied by summary slides available on the course website. Please read the relevant chapters, and go through the summary slides before the weekly class. We will work on exercises based on those chapters and summary slides in class, so it is recommended to be prepared.

Week	Topics	Reading Chapter(s)
1	Getting started: "Hello world program", compiling, linking, simple makefile, environment setup, comments, flow control	0-2
2	Data types, pointers, references, classes, function basics	3-4
3	Vector, errors and debugging	4-5
4	Writing a Program	6-7
5	Functions, header files, scope, namespace	8
6	Classes	9
7	IO Streams, and formatting	10-11
8	Introduction to graphics programming	12
9	Graphics classes	13
10	Graphics class design, and graphing	14-15
11	Graphical user interfaces and sequential containers	16,17, 20
12	Algorithms, maps, dynamic memory, templates, review	18,19, 21

Additional topics on scientific computing may include representation of numbers, estimating rounding uncertainties, random numbers, function evaluation, methods of finding zeros, methods of sorting, interpolation, and matrix calculations.

Not all topics will necessarily be covered and other topics may be added or substituted.

Notes from the dean

- When it is necessary to cancel a class due to exceptional circumstances, instructors will make every effort to inform you via uwinnipeg email, as well as the departmental assistant and Chair/Dean so that class cancellation forms can be posted outside classrooms.

- Your uwinnipeg email address will normally be used for course related correspondence.

- Please note that withdrawing before the VW date does not necessarily result in a fee refund. Students are free to consult with the instructor in case they can help in any way.

- April 5, 2018 is the class make-up date for courses that conflict with Good Friday, March 30.

- No classes: Oct. 8 ? 14 Mid-term reading week; Feb. 18-24 Winter Mid-term reading week; Friday, March 30 (Good Friday).

University of Winnipeg senate regulations

- Students with documented disabilities, temporary or chronic medical conditions, requiring academic accommodations for tests/exams (e.g., private space) or during lectures/laboratories (e.g., note- takers) are encouraged to contact Accessibility Services (AS) at 786-9771 or accessibilityservices@uwinnipeg.ca to discuss appropriate options. All information about a student?s disability or medical condition remains confidential http://www.uwinnipeg.ca/accessibility.

- Reference to the appropriate items in the Regulations and Policies section of the Course Calendar, including Senate appeals and academic misconduct (e.g. plagiarism, cheating) http://uwinnipeg.ca/academics/calendar/docs/regulationsandpolicies.pdf. Procedures for dealing with alleged academic misconduct can be found here: http://pace.uwinnipegcourses.ca/sites/default/files/pdfs/publications/Academic%20Misconduct%20Procedures.pdf.

- All students, faculty and staff have the right to participate, learn, and work in an environment that is free of harassment and discrimination. The UW Respectful Working and Learning Environment Policy may be found online at www.uwinnipeg.ca/respect .

- Students may choose not to attend classes or write examinations on holy days of their religion, but they must notify their instructors at least two weeks in advance. Instructors will then provide opportunity for students to make up work examinations without penalty. A list of religious holidays can be found in the 2017-18 Undergraduate Academic Calendar.