



# THE UNIVERSITY OF WINNIPEG

SCIENTIFIC COMPUTING  
PHYS-2102-050 · ACS-2102-050  
Fall 2018

## Course Information

Meeting time: Wednesdays, 6:00 PM – 9:00 PM

Room number: 2L14

Website: [t2kwinnipeg.uwinnipeg.ca/~jamieson/courses/scicomp](http://t2kwinnipeg.uwinnipeg.ca/~jamieson/courses/scicomp)

Contact information:

Instructor Blair Jamieson

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Office hours Immediately after class or  
by appointment

Important dates:

5 Sep. 2018 First class

7-13 Oct. 2018 No class (reading week)

24 Oct. 2018 Midterm in 2L14 (18:00)

31 Oct. Class will be held one  
day early (not on  
Halloween).

30 Oct. 2018

12 Nov. 2018 Final day to withdraw  
without academic penalty.

Withdrawal before this date  
does not result in a fee refund

28 Nov. 2018 Last class

12 Dec. 2018 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 Lab Assignments 25%
  - 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 25%
  - A 1.5 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 exam 50%
  - 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 Physics 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 objectives for this class include: learning about compiled programs; learning the syntax of C++; becoming proficient in writing functions and classes; learning basics of call-back type programming, such as in graphical user interfaces; and learning to read and understand what C++ code is doing.

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

Not all topics will necessarily be covered.

## Notes from the Dean

- When it is necessary to cancel a class due to exceptional circumstances, instructors will make every effort to inform students via uwinnipeg email (and/or using the preferred form of communication, as designated in this outline), as well as the Departmental Assistant and Chair/Dean so that class cancellation forms can be posted outside classrooms.
- Students are reminded that they have a responsibility to regularly check their uwinnipeg e-mail addresses to ensure timely receipt of correspondence from the university and/or their course instructors.
- Please note that withdrawing before the VW date does not necessarily result in a fee refund. (November 12 is VW date for classes that begin in September and end in December).
- No make-up classes will be scheduled.
- No classes: October 8, 2018 October 7-13, 2018 November 11, 2018 Dec 22/18-Jan 2/19 February 17-23, 2019 Thanksgiving Mid-term reading week Remembrance Day University closed Winter Mid-term reading week.
- Avoiding Academic Misconduct. Uploading essays and other assignments to essay vendor or trader sites (filesharing sites that are known providers of essays for use by others who submit them to instructors as their own work) involves “aiding and abetting” plagiarism. Students who do this can be charged with Academic Misconduct.
- Avoiding Copyright Violation. Course materials are owned by the instructor who developed them. Examples of such materials are course outlines, assignment descriptions, lecture notes, test questions, and presentation slides. Students who upload these materials to filesharing sites, or in any other way share these materials with others outside the class without prior permission of the instructor/presenter, are in violation of copyright law and University policy. Students must also seek prior permission of the instructor /presenter before photographing or recording slides, presentations, lectures, and notes on the board.

## 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](mailto: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](http://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 2018-19 Undergraduate Academic Calendar.