# Course Outline

## CPSC 1160 Algorithms and Data Structures I

Year and semester: Fall 2023

Section: 002/3

CRN: 30481/2

Course Format: Lecture 4.0 h + Lab 2.0 h

Credits: 3 for transfer credit information, visit [bctransferguide.ca](http://www.bctransferguide.ca)

### Course Description:

Covers low-level operations, recursion, systematic software development, abstract data types, creation of libraries of reusable routines, sorting and searching algorithms, efficiency, algorithm analysis, pointers, arrays, dynamic memory management, linked lists, stacks, queues, introduction to hashing, binary trees and tree traversals, and advanced data manipulation. Object-oriented programming will be introduced.

### Prerequisites:

A minimum “C” grade in one of CPSC 1150 or 1155; and one of the following: a minimum “B” grade in Precalculus 12; or a minimum “C” grade in MATH 1170, 1171, 1173, or 1174; or a min. “C+” in Precalculus 12 and a min. “C-” grade in Calculus 12; or MDT 85.

### Learning Outcomes:

Upon successful completion of this course, a student should be able to independently

* design, implement, test, and documenting complete programs using efficient algorithms and appropriate data structures
* design and implement an Abstract Data Type (using static and dynamically allocated data)
* apply procedural abstraction as well as data abstraction to solve problems when programming
* program in C++17 correctly and efficiently under time constraints
* analyze algorithms and code for complexity (efficiency)
* describe and compare common searching and sorting algorithms (selection sort, insertion sort, bubble sort, quicksort and mergesort)
* apply recursion as a problem solving technique (e.g. to traverse a binary tree)
* use good software engineering principles when programming

## Instructor(s):

Office: B019Q

Email: rziervogel@langara.ca

Office Hours: Monday 10 – 1230 (In-Person), Wednesday 10:00 – 14:00 (zoom only)

Zoom Link: <https://langara.zoom.us/j/97761460774>

## Textbook and Course Materials:

Revel for Introduction to C++ Programming and Data Structures, 5e, Y. Daniel Liang. (Pearson : <https://console.pearson.com/enrollment/lrmpki>)

Note: This course may use an electronic (online) instructional resource that is located outside of Canada for mandatory graded class work. You may be required to enter personal information, such as your name and email address, to log in to this resource. This means that your personal information could be stored on servers located outside of Canada and may be accessed by foreign government authorities, subject to federal laws. Where possible, you may log in with an email pseudonym as long as you provide the pseudonym to me so I can identify you when reviewing your class work.

## Assessments and Weighting:

Assignments 35%

Quizzes 10%

Labs 5%

Midterms 20%

Final Exam 30%

## Grading Legend

[Grades, Grade Points, & Notations](https://langara.ca/registration-and-records/resources/grading-and-withdrawals/grades-notations.html)

A+ 90 – 100% B+ 76 – 79% C+ 64 – 67% D 50 – 54%

A 85 – 89% B 72 – 75% C 60 – 63% F < 50%

A- 80 – 84% B- 68 – 71% C- 55 – 59%

**NOTE:** It is your responsibility to know the minimum grade required in this course to meet prerequisite and/or Program requirements. If you are not sure, please check the [Langara website program information pages](https://langara.ca/programs-and-courses/index.html).

In order to get a ‘C’ or higher in a Computer Science course, a student must achieve at least a 50% in the weighted combined exam components of the course. Marks on assignments, labs, quizzes, midterms and the final exam are based on merit and the quality of a student’s academic work and are non-negotiable. Personal circumstances are not a factor in determining a mark or final course grade. If personal circumstances are affecting your ability to complete your academic work, please seek help early through the various support services. You can find Langara’s support and counselling services under  [https://langara.ca/student-services/index.html.](https://langara.ca/student-services/index.html) Confidential counselling is also available through [Empower Me.](http://www.studentcare.ca/rte/en/LangaraCollegeLSU_EmpowerMe_EmpowerMe)[[1]](#footnote-2)

## Detailed Course Schedule:

| **Module or Week** | **Week Starting** | **Topics** | **Homework/Assignments/ Assessments/Exams** |
| --- | --- | --- | --- |
| 1 | Sept 4 | Sept 4: Labour Day: College Closed | |
| C++ review |  |
| 2 | Sept 11 | Functions/Templates  arrays/vectors |  |
| 3 | Sept 18 | recursion  bit shifting and other bit ops | Assgn #1 due |
| 4 | Sept 25 | sorting | Assgn #2 due |
| Sept 30: National Day for Truth and Reconciliation: Campus closed | |
| 5 | Oct 2 | Oct 3: National Day for Truth and Reconciliation (Observed): Campus closed | |
| sorting  complexity analysis | Assgn #3 due |
| 6 | Oct 9 | Oct 9: Thanksgiving Day: Campus closed | |
| struct | Assgn #4 due |
| 7 | Oct 16 | objects and classes  operator overloading | Midterm |
| 8 | Oct 23 | pointers  dynamic memory | Assgn #5 due |
| **October 28, 2023 LAST DAY TO WITHDRAW FOR REGULAR COURSES (BEFORE 2100 HOURS VANCOUVER TIME)** | | | |
| 9 | Oct 30 | “the big three”   singly linked lists | Assgn #6 due |
| 10 | Nov 6 | Nov 11, Remembrance Day: Campus closed  Nov 13, Remembrance Day (Observed): Campus Closed | |
| recursive and iterative functions for linked lists | Assgn #7 due |
| 11 | Nov 13 | stacks | Assgn #8 due |
| 12 | Nov 20 | queues | Assgn #9 due |
| 13 | Nov 27 | Review/ Extra Topics |  |
| **FINAL EXAMINATION PERIOD**: Check the final exam schedule on the Langara website for the exact date and time. The college requires you to be available to sit final examinations during this period. If you miss the final examination, you will receive an ‘N’ on your permanent academic transcript. | | | |
| 14..16 | Dec 4 | Dec 4: Last day of classes. |  |
| Dec 5 – 16: Final Exam Period. | [Final Exam Policy](https://langara.ca/about-langara/policies/pdf/F1007.pdf) |
|  | Dec 18 | Dec 21: Final grades available online. | |
| Dec 22- Jan 1: College Closed. Inter-Semester Break. | |
|  |  | Dec 31: End of Semester | |

The schedule is flexible, i.e. various topics may or may not be given on the dates shown below and all the dates (including the dates of the midterms) are subject to change.

## Policy

As a student at Langara, you are responsible for familiarizing yourself and complying with the   
following policies:

### College Policies:

[Student Code of Conduct - E1003](https://langara.ca/about-langara/policies/pdf/E1003.pdf)

[Academic Integrity - F1004](https://langara.ca/about-langara/policies/pdf/F1004.pdf)

[Academic Standing - Academic Probation and Academic Suspension - E2008](https://langara.ca/about-langara/policies/pdf/E2008.pdf)

[Appeal of Final Grade - E2006](https://langara.ca/about-langara/policies/pdf/E2006.pdf)

[Concerns about Instruction - F1002](https://langara.ca/about-langara/policies/pdf/F1002.pdf)

[Withdrawal from Courses and Deferred Standing - E2011](https://langara.ca/about-langara/policies/pdf/E2011.pdf)

### Departmental/Course Policies:

<http://langara.ca/programs-and-courses/courses/CPSC/index.html>

### Course Policies:

A student may be excused from an assignment, lab, or midterm due to a properly documented medical reason. Do not ask for extensions. Email the instructor if you are going to miss a midterm (even though no substitute midterm will be given).

* The grade for the assignments is based on the assignments submit with Brightspace and **not** email
  + If an assignment is handed in after the TA has marked the assignments. It will be marked at some point but only a grade will be given, no feedback ( late assignments will be marked based on matching sample output. Late assignments that don’t compile and run will get grade of zero).
  + But it is best to hand in your assignments in on time
  + Assignments can be submitted multiple times but only the last submission is marked
  + submit a single compressed file:the source code, possibly the input and output files: do not submit any object code, binary files, Eclipse, Visual Studio, XCode nor any IDE project files
  + every assignment must compile without warnings using the flags in g++

-pedantic -Wall -Wextra -std=c++17

* + You will lose one mark per warning up to a max of 5 marks off
  + Students are not permitted to work together (not during the assignments nor midterms nor final exam).
  + Bring your questions to lecture, to the lab, to office hours, or the [online Langara College Computer Science Tutoring.](https://langara.mywconline.net/index.php?scode=COMPUTERSCIENCE)
  + Do not share any material anywhere nor to anyone during any midterm nor final exam.

### Plagiarism and Cheating will not be tolerated

* The assignments and labs that you submit must be your own. Code given in class and textbook material may be included in an assignment or lab but you must cite these sources.
* Unless otherwise stated, even if you cite the source but submit code that is not your own as part of your assignment or lab, you will get zero and be reported for cheating. Ask your instructor if in doubt.
* Students are expected to take measures to protect their work. Do not show your code to anyone. Do not post your code anywhere. If you do and someone copies your code and submits it, you will get zero and be reported for cheating.
* If you pay someone to write your program or a part thereof, it is plagiarism.
* If a student cheats or plagiarizes in an assignment, this will be discussed in the following code review and the student will get a zero in that code review.
* Do not post any material associated with this course. It is copyrighted material.

1. Students covered under th[e LSU Student Health & Dental Plan h](https://www.studentcare.ca/RTEContent/Document/EN/Brochure/Previous_LSU.pdf)ave access to the mental health and wellness service <http://www.studentcare.ca/rte/en/LangaraCollegeLSU_EmpowerMe_EmpowerMe> [↑](#footnote-ref-2)