

Course Outline

Course Code, Number, and Title: CPSC 1160 sections 001 and 004 Algorithms and Data Structures I

Year and semester: Spring 2023

Course Format: Lecture 4.0 h + Lab 2.0 h

Credits: 3.0

Transfer Credit: For information, visit bctransferguide.ca

Course Description:

Students focus on practicing and developing programming skills. Students implement algorithms along with appropriate data structures to produce good software. Students apply recursion, abstract data types, algorithm analysis, sorting and searching algorithms, pointers, arrays, dynamic memory management, linked lists, stacks, and queues. Students also learn about low-level data representations and systematic software development. As a tool, object-oriented programming is 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 document 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
- perform time and space complexity analysis of algorithms and of programs
- describe and compare common searching and sorting algorithms (selection sort, insertion sort, bubble sort, quicksort and mergesort)
- apply recursion as a problem solving technique
- use good *software engineering* principles
- analyze, test, maintain and modify code written by someone else

all under time constraints.

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Instructor: Gladys Monagan

Office: B019L

Phone: 604 323 5859

Email: gmonagan@langara.ca please put “CPSC 1160” as part of the subject line

Office hours:

Monday	2:20pm – 3:20pm	in B019L
Monday	3:20pm – 4:20pm	in B019L
Monday	8:00pm – 9:00pm	over Zoom
Monday	9:00pm – 10:00pm	over Zoom
Tuesdays	1:20pm – 2:20pm	in B019L
Wednesday	1:20pm – 2:20pm	in B019L

email gmonagan@langara.ca to set up an appointment if those times do not work for you.

Delivery form of the course:

Face-to-face: A student is expected to attend the lectures and the labs in person.

The midterms and final exam are practical (with a paper component) in a Langara computer lab.

Textbook and Course Materials:

Introduction to C++ Programming and Data Structures by Y. Daniel Liang, 5th edition, Pearson, 2022.

Langara Brightspace course

CPSC-1160-001-004 - Algrthms & Data Strctrs I – 10731.202310

Note: This course uses 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 U.S. authorities, subject to federal laws. Where possible, you may log in with an email pseudonym as long as you provide the pseudonym to the instructor so that she can identify the student when reviewing the class work.

Assessments and Weighting:

The term grade is calculated as follows:

- Best 9 out of 10 Assignments 35%
- 2 Code Reviews 5%
- 2 Midterms 30%
- Final Exam 30%

The Assignment part of the course cannot exceed 35% even if the student attempts all the bonuses of the assignments and completes all 10 assignments.

The midterms and final exam are taken in the Langara labs, on paper and using the Citrix lab computers. The midterms and final exam are closed book, no access to any files other than the ones provided for the midterms and final exam, and no access to the Internet (except for Brightspace which will be used for submission exclusively).

Grading:

The term grade is determined as follows:

Letter Grade	A+	A	A-	B+	B	B-	C+	C	C-	D	F
Overall Average	90-100	85-89	80-84	76-79	72-75	68-71	64-67	60-63	55-59	50-54	Less than 50%

In order to get a 'C' or higher in a Computer Science course, a student must achieve at least a 50% in the combined exam components of the course.

Marks on assignments, code reviews, midterms and the final exam are based on merit and the quality of a student's academic work and are non-negotiable.

If personal circumstances are affecting your ability to complete your academic work, please seek help early through the various support services (e.g. counselling services) as listed under <https://langara.ca/student-services/index.html>.

Please reach out for help as needed. Life happens.

Confidential counselling is also available through [Empower Me](#).¹

¹Students covered under the [LSU Student Health & Dental Plan](#) have access to the mental health and wellness service http://www.studentcare.ca/rte/en/LangaraCollegeLSU_EmpowerMe_EmpowerMe

Course Schedule:

Semester	Date	Lecture Topic	Lab	Assignment
week I	Jan. 4	C++ basics, data types	Jan. 5, 6 Lab I	
week II	Jan. 10 Jan. 11 Jan. 12, 13	C++ strings, flow of control, I/O functions and parameter passing arrays and random numbers	Lecture lab	Assgn #1 due Jan. 11
week III	Jan. 17 Jan. 18	recursion recursion and selection sort	Jan. 19, 20 Lab III	Assgn #2 due Jan. 18
week IV	Jan. 24 Jan. 25 Jan 26, 27	complexity analysis quicksort and mergesort random numbers and arrays	Lecture lab	Assgn #3 due Jan. 25
week V	Jan. 31 Feb. 1	timings and analysis structs & enumeration types	Feb. 2, 3 Lab V	Assgn #4 due Feb. 1
week VI	Feb. 7 Feb. 8 Feb. 9, 10	ADTs and C++ classes Wednesday Midterm #1 object oriented programming C++	Lecture lab	
week VII	Feb. 14 Feb. 15	operator overloading class I/O in C++	Feb. 16,17 Lab VII	Assgn #5 due Feb. 15
spring break	Feb. 20 to Feb. 24	no lectures and no labs		
week VIII	Feb. 28 March 1	pointers and dynamic memory dynamic arrays and ptr arithmetic	March 2, 3 Lab VIII	Assgn #6 due March 1
week IX	March 7 March 8	linked lists linked list fcts and growing arrays	March 9, 10 Lab IX	Assgn #7 due March 8
week X	March 14 March 15	copy constructor, overloaded =, and destructor, the big 3	March 16, 17 Lab X	Assgn #8 due March 15
week XI	March 21 March 22 March 23, 24	static and ADTs and the ADT stack Wednesday Midterm #2 stack implementations	Lecture lab	
week XII	March 28 March 29	ADT queue and ADT set C++ templates, the C++ STL	March 30, 31 Lab XII	Assgn #9 due March 29
week XIII	April 4 April 5	code review #2 code review #2	April 6, 7 Lab XIII	Assgn #10 due April 5

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.

The 2 hour final exam takes place in the Citrix labs during the Langara final exam period in December.

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

College Policies:

[E1003 - Student Code of Conduct](#)

[F1004 - Academic Integrity](#)

[E2008 - Academic Standing - Academic Probation and Academic Suspension](#)

[E2006 - Appeal of Final Grade](#)

[F1002 - Concerns about Instruction](#)

[E2011 - Withdrawal from Courses and Deferred Standing](#)

Departmental/Course Policies:

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

Course Policies:

In this course, it is expected that a student be able to take notes and listen at the same time. The handwritten lecture notes made in class by the instructor will be posted in Brightspace (as Scribbles) but they might not be posted until the weekend.

The student is responsible for the material in a missed class or lab; thus it is up to the student to ask a classmate about the material covered in the missed class or lab. Lectures are not recorded.

Since the lowest assignment grade is dropped, the student does **not** need to notify the instructor that an assignment was not submitted, even if the reason for not submitting the assignment was medical.

A student may be excused from a midterm due to a medical reason. Whenever possible, please inform the instructor if you are going to be missing a midterm but even then, no substitute midterm will be given. If the midterm is missed due to a medical reason, when calculating the final grade, one of the exam components' marks is substituted for the missed midterm mark.

A code review is for reviewing and discussing the student's submitted assignments.

The 1st code review is given during the scheduled lab time or it can be taken during office hours on Monday afternoons.

The 2nd code review takes place during the last week of classes.

To pass the course, it is a **requirement** to take at least one code review.

Getting zero in a code review due to assignment plagiarism counts as the student having "taken" a code review.

- No assignment, midterm, or final exam will be accepted via e-mail: use Brightspace.
- You may submit an assignment, midterm, and final exam as many times as you want in Brightspace but the previous submissions (all the files) are overwritten. You need to resubmit all the files and then hit “submit”. The last submission is the only one that is marked.
- There is a 20% late penalty for submitting an assignment within 14 hours after the due date. 14 hours after the due date, the assignment is not marked even if it can still be submitted. Typically, assignments will be due at 11:50pm on Wednesday nights. A late assignment will be accepted until 1:50pm on Thursdays (i.e. 30 minutes before the first section lab on Thursdays: the deadline and late penalty is the same regardless of the section of CPSC 1160).
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- You cannot submit a midterm or the final exam after the due date.
- Your assignments, midterms and final exam will get a failing mark if your program does not solve the required task. Even if your program is beautiful and long, if you are solving a problem other than the one assigned or if you are not using the required data structure or algorithm, you will get a failing mark. You must follow the specifications e.g. that the function be recursive or that you cannot use an auxiliary data structure or library function. Use the header files with the function (class) prototypes when provided. Note that you will be graded not only on the correctness of solutions but also on the simplicity and efficiency of your answers.
- Every assignment, midterm and final that you submit must compile properly without warnings using the flags in g++ in the Langara labs

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-pedantic -Wall -Wextra -std=c++17
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- You are encouraged to discuss the algorithms and ideas with your classmates, but you are to code individually. If you program on your own, the resulting code will be different enough. Code that is too similar will be considered plagiarized code. Write your own program and do not get “inspired” by studying someone else’s program and then try to claim that your code just happens to be the same. If you see someone else’s code and yours is similar to theirs, both parties are penalized (see below).
- Do not send, post or share in any way any assignment, midterm or exam code with anyone.
- Do not email nor post any material from this course: it is copyrighted material.

Plagiarism and Cheating are not tolerated

<https://langara.ca/student-services/academic-integrity/index.html>

- The complete assignments, midterms, and final exam that you submit must be your own. Code given in class and textbook material may be included in an assignment but you must cite these sources.
- Because the midterms and final exam are closed book, you can use known algorithms (and code fragments) like selection sort in the midterm and final exam without a citation.
- Cheating or plagiarising in an assignment in this course has as consequences all of the following
 - being reported for the violation, refer to [Langara College Academic Integrity Policy](#)
 - a zero on the assignment and that zero will not be dropped when calculating the best 9 out of 10 assignments
 - a zero on a subsequent or previous code review
- Plagiarism is submitting work that is not your own as though it were your own, without giving credit to the original author. For your assignments, do not use code from other sources, including previous offerings of this course, even if you were to cite the source.
- Unless otherwise stated, even if you cite the source but submit some code that is not your own as part of your assignment, you will be reported, get a zero on the assignment, and a zero in a subsequent code review. Ask your instructor if in doubt.
- Do not submit any code that is not yours even if you understand the code well. That is plagiarism.
- Students are expected to take measures to protect their work.
Do not show your code to anyone.
Do not leave your computer unattended so that someone copies it.
If someone copies your code (or part thereof) with or without your consent and submits it, you will get zero in the assignment and a zero in a code review and you too will be reported for Academic Misconduct.
- If you pay or get someone to write your program or a part thereof, it is cheating. Don't do it.
- The Langara library provides resources on what is plagiarism and how to avoid it.
Please refer to [Langara's Avoid Plagiarism](#) as well as to <https://langara.libguides.com/cite-programming-code>.
- Ask your instructor if in doubt.