

CSC225: Algorithms and Data Structures I

Course Dates

CRN(s):	Section A01 CRN: 30191 Section A02 CRN: 30192
Term:	2023
Course Start:	2023-05-03
Course End:	2023-08-18
Withdrawal with 100% reduction of tuition fees:	2023-05-15
Withdrawal with 50% reduction of tuition fees:	2023-06-04
Last day for withdrawal (no fees returned):	2023-06-28

Scheduled Meeting Times (M=Mon, T=Tue, W=Wed, R=Thu, F=Fri)

Section:	Location:	Classes Start:	Classes End:	Days of week:	Hours of day:	Instructor:
A01	CLE A127	2023-05-03	2023-07-28	TWF	09:30-10:20	Adeline Jordon
A02	CLE A127	2023-05-03	2023-07-28	TWF	09:30-10:20	Adeline Jordon
B01	ECS 342	2023-05-15	2023-07-28	T	10:30-11:20	
B02	ECS 342	2023-05-15	2023-07-28	T	11:30-12:20	
B03	ECS 342	2023-05-15	2023-07-28	T	15:30-16:20	

Instructor(s)

Name: **Adeline Jordon**
 Office: ECS 621
 Phone: 250-472-5726
 Email: addie at uvic dot ca

Office Hours:	Comments
Wed 10:30am-11:30am	
Wed 02:00pm-03:20pm	
Fri 10:30am-11:30am	

Course Overview

CSC 225 introduces the formal study of the problem solving skills required by practicing computer scientists and software engineers. These skills include

- consistent and rigorous problem specification,
- choosing a suitable representation for data,
- identifying appropriate algorithmic techniques,
- presenting a formal description of a solution,
- implementing the solution,
- asserting the correctness of the solution, and
- critically evaluating the performance of algorithms.

In general, solutions to a computational problem can only be effectively evaluated through a combination of theoretical analysis (to consider all possible inputs and platforms) and implementation (to verify that the solution is practical). The goal of this course is to build a solid foundation in both areas. The theoretical techniques studied in this course will allow the comparison of different solutions to the same problem without the need for implementation. Besides being

important to justify the correctness and efficiency of algorithms, knowledge of these techniques is also important for technical communication in computer science. The course also studies algorithms for classical problems, such as searching, sorting and applications of graph theory, as well as fundamental data structures.

Topics

Algorithm Design and Analysis

- Algorithm design techniques
- Fundamental algorithm analysis
- Time and space complexity
- Asymptotic analysis
- Recursive analysis and recurrence relations
- Proof techniques
- Basic data structures: arrays, lists, stacks and queues

Searching and Sorting

- General purpose sorting algorithms, such as Heap sort, Insertion sort, Merge sort, Quick sort, and Selection sort
- Special purpose sorting algorithms, such as Radix sort, Heap sort
- Priority Queues (including Heaps)
- Trees, 2-3 and Red-Black trees
- Applications of Trees
- Hashing

Graphs

- Mathematical foundations
- Problem abstraction with graphs
- Data structures for graph representation
- Fundamental graph traversal algorithms and applications
- Connectivity and strong connectivity
- Topological sorting

Course Objectives And Learning Outcomes

Students successfully completing CSC 225 will be able to:

- give a precise, mathematical description of computational problems,
- develop algorithms to solve computational problems,
- choose appropriate data structures and algorithms for a given task, and justify their choice,
- analyze the running time and space requirements for an algorithm,
- critically evaluate the efficiency of algorithms,
- develop recursive algorithms,
- translate pseudocode into an implementation, preserving the running time and space complexity of the algorithm, and
- model problems using mathematical abstractions, such as graphs.

Textbooks

Please consult the course Brightspace site for information on required and optional materials before purchasing any books.

Optional:
Algorithm Design and Applications
by Goodrich & Tamassia
Wiley
Discrete Mathematics: an Open Introduction
by Oscar Levin
http://discrete.openmathbooks.org/

Other Materials

Various course materials will be made available online through Brightspace (bright.uvic.ca).

Assignments

The course includes 5 written assignments (20% in total) and 2 programming assignments (10% in total).

Written Assignments

Assignment	Weight	Tentative Due Date
Written Assignment 1	4%	May 20
Written Assignment 2	4%	June 3
Written Assignment 3	4%	June 30
Written Assignment 4	4%	July 15
Written Assignment 5	4%	July 29

Programming Assignments

Assignment	Weight	Tentative Due Date
Programming Assignment 1	5%	June 17
Programming Assignment 2	5%	July 21

You should start assignments early enough to allow time to seek help if you encounter difficulties. Late assignments will not be accepted.

You are encouraged to discuss assignment problems with each other and form study groups. However, final assignment submissions must be generated independently, and you will only receive credit for your own work. Submitting the work of another student or entity (in whole or in part) and claiming it as your own, or sharing your work with another student in this course (directly or indirectly, including through public posting on the internet), is plagiarism and will be handled accordingly. In general, you should feel free to discuss all aspects of assignments with your peers, but do not look at the code or written solution written by any other student (either electronically or over their shoulder), and do not allow others to look at your code or written solutions.

On some assignments, you may be permitted to use material from other sources **with proper citation**. Submitting the work of others without proper acknowledgement will be considered a serious academic offense and may result in failure of the course.

Plagiarism detection software will be used on assignment submissions. Substantiated instances of plagiarism, including cases where only a part of the submission has been plagiarized, will be referred to the Department's academic integrity committee. Note that the university calendar (in <http://web.uvic.ca/calendar2023-05/undergrad/info/regulations/academic-integrity.html>) clearly states that a largely plagiarized assignment should result in a failing grade being assigned for the course.

In-Class Exercises and Labs

Occasional in-class exercises (during lectures) will constitute 5% of the mark. The scheduling for such exercises will not generally be available in advance. Students who miss lectures in which an exercise is given will receive a mark of zero, unless the university's conditions for an academic concession apply.

Lab attendance and completion of lab objectives will constitute 5% of the mark. Students who miss labs will receive a mark of zero, unless the university's conditions for an academic concession apply.

Exams

There will be two in-class exams during the semester following the schedule below.

Exam	Weight	Date
Midterm 1	16%	June 6

Exam	Weight	Date
Midterm 2	16%	July 10
Final exam	28%	TBD

This course will have a final exam during the August exam period.

Missing an exam will result in a score of zero being assigned for that exam, except in cases where the university's conditions for an academic concession (with appropriate documentation) apply.

Grading

Coursework	Weight (out of 100%)
Written Assignments	20%
Programming Assignments	10%
In-Class Exercises	5%
Labs	5%
Exams	60%

To receive a passing grade in the course, all of the following conditions must be met:

1. The final percentage, according to the computation above, must be at least 50%
2. A grade of at least 30/60 must be achieved on the 60% of the course allocated to exams
3. A grade of at least 15/30 must be achieved on the 30% of the course allocated to written and programming assignments

Exceptions will be granted for missed work **only** in cases where an academic concession (with appropriate documentation) would apply. Documentation must be supplied to the instructor within **5 calendar days** of the missed component or the exception will not be granted. The university's policies on academic concessions (at <http://web.uvic.ca/calendar2023-05/undergrad/info/regulations/concessions.html>) will be strictly followed.

Posting of Grades

Marks for assignments and examinations, as well as provisional final grades, will be made available through Brightspace and Crowdmark. Each student will be able to view only their own grades.

Grading System

The University of Victoria follows a percentage grading system in which the instructor will submit grades in percentages. The University will use the following Senate approved standardized grading scale to assign letter grades. Both the percentage mark and the letter grade will be recorded on the academic record and transcripts.

F	D	C	C+	B-	B	B+	A-	A	A+
0-49	50-59	60-64	65-69	70-72	73-76	77-79	80-84	85-89	90-100

Grades	Description
A+, A, A-	Exceptional, outstanding or excellent performance. Normally achieved by a minority of students. These grades indicate a student who is <i>self-initiating</i> , <i>exceeds expectation</i> and has an <i>insightful</i> grasp of the subject matter.
B+, B, B-	Very good, good or solid performance. Normally achieved by the largest number of students. These grades indicate a <i>good</i> grasp of the subject matter or <i>excellent grasp in one area balanced with satisfactory grasp in the other areas</i> .
C+, C	Satisfactory, or minimally satisfactory . These grades indicate a <i>satisfactory performance and knowledge</i> of the subject matter.
D	Marginal Performance . A student receiving this grade demonstrated a <i>superficial grasp</i> of the subject matter.
F	Unsatisfactory performance . Wrote final examination and completed course requirements; no supplemental.

Posting of Grades

Typically marks for assignments, examinations, and provisional final grades, are made available through a Learning Management System (LMS) like Brightspace, where each student will be able to view only their own grades. Sometimes numerical marks/grades may be posted publicly to the entire class. In that case, full student numbers or names will not be included with the posted information.

Course Experience Survey (CES)

I value your feedback on this course. Towards the end of term you will have the opportunity to complete a confidential course experience survey (CES) regarding your learning experience. The survey is vital to providing feedback to me regarding the course and my teaching, as well as to help the department improve the overall program for students in the future. When it is time for you to complete the survey, you will receive an email inviting you to do so. If you do not receive an email invitation, you can go directly to the [CES site](#)

You will need to use your UVic NetLink ID to access the survey, which can be done on your laptop, tablet or mobile device. I will remind you closer to the time, but please be thinking about this important activity, especially the following three questions, during the course.

- What strengths did your instructor demonstrate that helped you learn in this course?
- Please provide specific suggestions as to how the instructor could have helped you learn more effectively.
- Please provide specific suggestions as to how this course could be improved.

Csc Student Groups

The Computer Science Course Union (<https://onlineacademiccommunity.uvic.ca/cscu/>) serves all students who are either in a computer science program or taking a class in computer science. Please sign yourself up on their mailing list if you would like to be informed about their social events and services.

The Engineering Students' Society (ESS) serves all students registered in an Engineering degree program, including Software Engineering (BSEng). For information on ESS activities, events and services navigate to <http://www.engr.uvic.ca/~ess>.

Course Policies And Guidelines

Late Assignments: No late assignments will be accepted unless prior arrangements have been made with the instructor at least 48 hours before the assignment due date. **Coursework Mark Appeals:** All marks must be appealed within 7 days of the mark being posted. **Attendance:** We expect students attend all lectures and labs. It is entirely the students' responsibility to recover any information or announcements presented in lectures from which they were absent.

Electronic devices in labs and lectures: No unauthorized audio or video recording of lectures is permitted. **Electronic devices in midterms and exams:** Calculators are only permitted for examinations and tests if explicitly authorized and the type of calculator permitted may be restricted. No other electronic devices (e.g. cell phones, pagers, PDA, etc.) may be used during examinations or tests unless explicitly authorized. **Plagiarism:** Submitted work may be checked using plagiarism detection software. Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult the link given below for the UVic policy on academic integrity. Note that the university policy includes the statement that "A largely or fully plagiarized assignment should result in a grade of F for the course."

The Faculty of Engineering and Computer Science Standards for Professional Behaviour are at <https://www.uvic.ca/ecs/assets/docs/student-forms/professional-behaviour.pdf> U.Vic guidelines and policy concerning fraud and academic integrity are at <http://web.uvic.ca/calendar/undergrad/info/regulations/academic-integrity.html> **U. Vic Privacy Policy:** If any student has concerns about their private information being stored or accessed outside of Canada, they are required to inform the course instructor about their concerns before the end of second week of classes.

Equality

This course aims to provide equal opportunities and access for all students to enjoy the benefits and privileges of the class and its curriculum and to meet the syllabus requirements. Reasonable and appropriate accommodation will be made available to students with documented disabilities (physical, mental, learning) in order to give them the opportunity to successfully meet the essential requirements of the course. The accommodation will not alter academic standards or learning outcomes, although the student may be allowed to demonstrate knowledge and skills in a different way. It is not necessary for you to reveal your disability and/or confidential medical information to the course instructor. If you believe that you may require accommodation, the course instructor can provide you with information about

confidential resources on campus that can assist you in arranging for appropriate accommodation. Alternatively, you may want to contact the [Centre for Accessible Learning](#) located in the Campus Services Building.

The University of Victoria is committed to promoting, providing, and protecting a positive, and supportive and safe learning and working environment for all its members.

Copyright Statement

All course content and materials are made available by instructors for educational purposes and for the exclusive use of students registered in their class. The material is protected under copyright law, even if not marked with a ©. Any further use or distribution of materials to others requires the written permission of the instructor, except under fair dealing or another exception in the Copyright Act. Violations may result in disciplinary action under the Resolution of Non-Academic Misconduct Allegations policy (AC1300).

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