Fall 2025 CSC 225: Algorithms and Data Structures I (Units: 1.5)

Territory Acknowledgement

We acknowledge and respect the Lək̓ʷəŋən (Songhees and Xʷsepsəm/Esquimalt) Peoples on whose territory the university stands, and the Lək̓ʷəŋən and W̱SÁNEĆ Peoples whose historical relationships with the land continue to this day.

Withdrawal without reduction of tuition fees: 2025-09-16
Withdrawal with 50% reduction of tuition fees: 2025-10-07
Last day for withdrawal (no fees returned): 2025-10-31

Accessible Learning

The University of Victoria is committed to creating a learning experience that is as accessible as possible. If you are registered with the Centre for Accessible Learning and anticipate or experience any barriers to learning in this course, please feel welcome to discuss your concerns with me. If you are a student with a disability or chronic health condition, you can meet with a CAL advisor to discuss access and accommodations.

How to contact CAL: https://www.uvic.ca/accessible-learning/students/how-to-register/index.php.

Academic Concessions

The university recognizes its responsibility to offer academic concessions to students whose ability to complete course requirements is interrupted by unexpected and unavoidable circumstances or conflicting responsibilities.

Review the Academic Concession Regulation:

https://www.uvic.ca/calendar/future/undergrad/index.php#/policy/HJjAxiGO4?bc=true&bcCurrent=11%20-%20Academic%20Concessions&bcGroup=Undergraduate%20Academic%20Regulations&bcItemType=policies

and web site:

https://www.uvic.ca/students/academics/academic-concessions-accommodations/request-for-academic-concession/index.php#ipn-undergraduate-requests-for-academic-concession.

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 implementation scenarios) 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 and data structures for fundamental problems, such as searching, sorting and applications of graph theory.

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
- Applications to Computational Geometry

Searching and Sorting

- Algorithms for comparison-based sorting (including Heap sort, Insertion sort, Merge sort, Quick sort, and Selection sort)
- Case studies in non-comparison-based sorting (such as applications of Bucket Sort and Radix Sort)
- Trees
- Algorithmic applications of trees (such as Huffman Coding)
- Heaps
- Binary Search Trees, 2-3 Trees and Red-Black Trees

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,
- interactively justify decisions made during algorithm design and implementation,
- analyze the running time and space requirements for an algorithm,
- construct formal proofs related to algorithm analysis and asymptotic complexity,
- construct formal proofs related to properties of trees and graphs,
- critically evaluate the efficiency of algorithms,
- develop and analyze 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

There are no required textbooks for this course; new material is introduced through short videos with accompanying lecture slides. If you want additional reading material to supplement the material provided as part of the course, you are encouraged to ask the instructor during office hours.

This course has three optional textbooks, which have been used as reference books for CSC 225 in the past:

1. 'Algorithm Design and Applications' by Michael Goodrich and Roberto Tamassia (Wiley, 2014)
2. 'Algorithms' by Robert Sedgewick and Kevin Wayne, 4th Ed. (Addison-Wesley, Toronto, 2011)
3. 'Discrete and Combinatorial Mathematics, An Applied Introduction' by Ralph P. Grimaldi, 5th Ed. (Pearson Education India, 2006)

Communication Platforms

Course materials will be made available online through Brightspace (at
https://bright.uvic.ca/d2l/home/436312)

This course will use Microsoft Teams as the communication platform for messages between the teaching team and students. Please use Teams private messages instead of email for all course-related communication. **It is your responsibility to activate your Teams account and monitor it regularly during the semester**. Details on how to set up your Teams account, and links to the Teams channel for the course, are posted on the course Brightspace site.

Lectures

The course is in-person and both lectures and labs will happen in an in-person mode unless there are exceptional circumstances, in which case we may shift to a remote online or hybrid mode.

Pre-Lecture Work: There will be mandatory pre-lecture work that will comprise **5%** of the total course mark.

The pre-lecture work will require you to work through a set of lecture material provided with video explanations and augmented with a condensed slide set. A quiz will assess your comprehension of this material. This pre-lecture content will be posted before each lecture on BrightSpace and **must be completed before the associated lecture**. **Late submissions will not be accepted**.

Lectures will be run in an active learning format described below:

- You will be given problems based on pre-lecture material
- You will be given time to work through problems independently or in a group.
- The instructor will demonstrate problem-solving and encourage students to provide feedback.

Assignments

This course includes 6 assignments worth 30% of the final grade. The tentative schedule is as follows:

Assignment	Weight	Tentative Due Date
Assignment 1	3%	Friday, September 12th, 2025
Assignment 2	5%	Friday, October 1st, 2025
Assignment 3	5%	Friday, October 17th, 2025
Assignment 4	5%	Friday, October 29th, 2025
Assignment 5	5%	Friday, November 21st, 2025
Assignment 6	5%	Friday, November 28th, 2025

You should start assignments early enough to allow time to seek help if you encounter difficulties. Late assignments will not be accepted; if you have not submitted your assignment by the due date, you will receive a mark of zero.

Students are encouraged to discuss assignment problems with each other and form study groups. However, final assignment submissions must be generated by you independently, and you will only receive credit for your own work. Submitting the work of another person (or work generated by any automated system) and claiming it as your own (in whole or in part), or providing your work to another person for them to submit, is plagiarism. In the context of programming assignments (where the submission is code), you are encouraged to discuss all aspects of the assignment with your peers, and to collaborate on the conceptual aspects of the solution, but do not look at the code written by any other student (either over their shoulder or by sharing it electronically).

On some assignments, you may be permitted to use material from other sources with proper attribution. Submitting the work of others (whether they are your fellow students or not) 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 https://web.uvic.ca/calendar/undergrad/info/regulations/academic-integrity.html)) clearly states that a largely plagiarized assignment should result in a failing grade being assigned for the course.

Labs

There will be 10 lab throughout the semester, which will count for a total of 5**%** of the final grade. Labs start the week of **Monday, September 8th, 2025**. Each week you will meet with your lab instructor where they will work on examples with you and assign exercises. Those exercises will be worth 1% and the top 9 out of 10 will count towards a total of 4.5% on the lab exercises. You must attend the lab and work on the exercises while in the lab to receive full credit.

Exams

In this course there will be two midterm exams (together worth 27.5% of the course grade) and a final exam (worth 35%) scheduled by the university during the final exam period. All exams will be written in-person.

This schedule is subject to change. Please consult the course BrightSpace page for accurate due dates.

Exam	Weight	Tentative Exam Date
Midterm 1	12.5%	Wednesday, October 8th, 2025
Midterm 2	15%	Wednesday, November 5th, 2025
Final Exam	35%	Scheduled by the university during the end-of-term examination period

Exam performance can be verified using an oral exam component if the instructor deems necessary.

Students are strongly advised not to make final plans for travel or employment during the final exam period since special arrangements will not be made for examinations that may conflict with such plans.

Missed exams: A missed exam will be given a zero grade.
Concession for a missed exam is granted in extenuating circumstances (ie. illness) **only if** the following is provided to the instructor:

- notification by email to the instructor **before the date/time of the exam**
- Concession cannot be granted for more than one missed exam.

Plagiarism detection software will be used on exam submissions. Collaboration with other students in any form and the solicitation of answers from any outside source (electronically, visually, orally or by any other means) is strictly prohibited. Any instance of impersonation during an exam is considered a serious academic offence by both the student being impersonated and the impersonator.

Grading

In order to pass the course, students must obtain (a) A passing grade on the weighted average of their assignment scores; (b) A grade of at least 50% on the final examination; and (c) The final percentage, according to the computation described below, must be 50% or higher.

Course Component	Weight (out of 100%)
Assignments	28%
Pre-Lecture Quizzes	5%
Labs	4.5%
Midterm Exams	27.5%
Final Exam	35%

On the other hand, in cases where a large proportion of coursework cannot be completed (e.g. if multiple assignments or two midterms are missed due to illness), it may become impossible to demonstrate the

necessary learning outcomes to pass the course.

Regrade policy

At times, you may feel that marks were unfairly deducted during an assignment or midterm as errors in grading do occur. In this situation, you can submit your work for a regrade. Regrade requests need to point to a specific, clear error in grading.

We will only accept assignment and midterm regrade requests if they are submitted within 7 days of the given grade being returned. **NOTE:** We reserve the right to regrade the entirety of any assignment/midterm submitted. When requesting a regrade, your old grade will be removed and your new grade could be higher or lower.

Exceptions will be granted for missed work (exams, assignments, exercises) only in cases where **the university's policy on academic concessions (with appropriate documentation, such as a doctor's note) applies**. 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](#) will be strictly followed. In particular, please note that no exceptions can be made for incidental scheduling issues that may result in a missed exam (e.g. sleeping in, traffic, late busses, etc.). You are responsible for taking the necessary precautions to ensure that you arrive to exams on time.

Course Withdrawal Deadlines

For the Fall 2025 semester, the following drop deadlines apply to withdrawing from (dropping) courses.

- Tuesday, September 16th: Last day to withdraw with 100% tuition refund.
- Tuesday October 7th: Last day to withdraw with 50% tuition refund.
- Friday, October 31st: Last day to withdraw (academic drop date). All students enrolled after this date will be expected to complete the course requirements, and will receive a final grade.

Academic Integrity

Plagiarism detection software will be used on assignment and exam submissions. Submitting the work of other people (or work synthesized by any kind of computational process) without attribution and enabling others to submit your work without attribution are considered serious academic offences and may result in failure of the course. You cannot share your work with others, neither directly, indirectly or by placing it in a publicly accessible location (such as GitHub).

In the context of programming assignments (where the submission is source code), you are encouraged to discuss high-level aspects of the assignment with your peers, and to collaborate on the conceptual aspects of the solution. However, the implementation of an assignment submission must be generated independently, and you will only receive credit for your own work. Do not look at the code written by any other student (sharing solutions electronically, visually, orally or by any other means is prohibited). Collaboration on the coding aspect of programming assignments is not allowed unless explicitly permitted in writing by the course instructor.

In the context of online and take-home exams, collaboration with other students in any form and the solicitation of answers from any outside source is strictly prohibited. Any instance of impersonation during an exam is considered a serious academic offence by both the student being impersonated and the impersonator.

The use of an editor or tutor, either paid or unpaid, to correct or augment your work is strictly prohibited on both assignments and exams.

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. 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/engineering/assets/docs/professional-behaviour.pdf

UVic guidelines and policy concerning fraud and academic integrity are at
http://web.uvic.ca/calendar/undergrad/info/regulations/academic-integrity.htm

Use of Generative AI

Generative AI tools can be helpful as an interactive informational resource, and can often serve as a useful extra source of exercises and verification while studying. For these reasons, the use of generative AI is encouraged as a possible study tool for this course. Since generative AI can often produce meaningless or contradictory information, remember to critically evaluate any information produced by generative AI before believing it.

However, the use of generative AI for **any part** of graded work (assignments, labs, exams) in this course is strictly prohibited. To avoid ambiguity, note that the use of AI-based tools for translation, formatting, typesetting or as a brainstorming tool for any graded component of the course is prohibited. Providing assignment materials (such as assignment questions) in any form to a generative AI tool is also prohibited.

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.

Csc Student Groups

The Engineering & Computer Science Students' Society (ECSS) serves all students registered in an Engineering and Computer Science degree program, including Software Engineering (BSEng). For information on ECSS activities, events and services navigate to https://sites.google.com/view/uvic-ecss/.

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: Appeals of marks for coursework will only be considered if received 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.

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 *self-initiating*, *exceeds expectation* and has an *insightful* 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 *good* grasp of the subject matter or *excellent grasp in one area balanced with satisfactory grasp in the other areas*.
C+, C	**Satisfactory**, or **minimally satisfactory**. These grades indicate a *satisfactory performance and knowledge* of the subject matter.
D	**Marginal Performance**. A student receiving this grade demonstrated a *superficial grasp* of the subject matter.
F	**Unsatisfactory performance**. Wrote final examination and completed course requirements; no supplemental.

Student Experience of Learning (SEL)

I value your feedback on this course. Towards the end of term you will have the opportunity to complete a confidential Student Experience of Learning (SEL) survey 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 SEL 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.

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.

Resources for students

a. UVic Learn Anywhere is the primary learning resource for students that offers many learning workshops and resources to help students with academics and learning strategies.
b. Library resources
c. Indigenous Student Services (ISS)
d. Academic Skills Centre (ASC)
e. Math & Stats Assistance Centre (MSAC)
f. Learning Strategies Program (LSP)
g. Community-Engaged Learning (CEL)
h. Academic concession
i. Academic accommodation
j. Academic accommodation & access for students with disabilities
k. Student groups and resources

l. [Student wellness](#)
m. [Ombudsperson](#)

University statements and policies

a. [University Calendar - Information for all students](#)
b. [Accommodation of Religious Observance](#)
c. [Student Conduct](#)
d. [Non-academic Student Misconduct](#)
e. [Academic Accommodations and Accessibility](#)
f. [Diversity / EDI – VPAC commitment](#)
g. [Sexualized Violence Prevention and Response](#)
h. [Discrimination and Harassment](#)

Copyright Statement

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