

Unit 00: Course Overview

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CSC 225: Algorithms and Data Structures I

University of Victoria

Who are your instructors?

- ▶ Anthony Estey - teaching sections A01 / A02
 - ▶ I am from a small town - Sechelt - here in BC, Canada
 - ▶ I completed my Ph.D at the University of Victoria in 2016
 - ▶ I was an instructor at UBC from September 2016 - August 2019
 - ▶ Since the September 2019 semester, I have lectured at UVic
- ▶ CSC 225:
 - ▶ Although I have not been the instructor for an in-person offering of this course before at UVic, I was the instructor for this course in 2020 and 2021 when it was taught online and lectures were held over Zoom
 - ▶ I also taught UBC's version of this course twice (in 2017 and 2018)

Who are your instructors?

- ▶ Zhenjian Lu - teaching sections A03/A04
 - ▶ First time teaching CSC 225 at UVic
 - ▶ I study theoretical computer science, particularly computational complexity theory.
 - ▶ CSC 225 is a (entry-level) theory course.
 - ▶ The theoretical concepts you will encounter for the first time in this course will be useful for more advanced theory courses (e.g., CSC 320) and for theoretical computer science more broadly.

Who are you?

- ▶ My assumption is that most of you are coming from CSC 115...
 - ▶ But there may be some of you without prior Java Programming experience

External Tool Usage

- ▶ Tools like ChatGPT continue to change how we do things
 - ▶ I like to think of them as productivity tools, or **amplifiers**
 - ▶ I do *not* think they should completely replace **learning** or **expertise**
- ▶ Think about your other skills, and something that might boost it...
 - ▶ My colleagues (in industry and education) use these tools every day. Many of them are experts in their field, allowing them to fully utilize the benefits
 - ▶ Now they automate many tasks that previously required time (or other people)
 - ▶ From industry: problem-solving and critical thinking skills are in incredibly high-demand - if all you know how to do is use AI-tools, you are replaceable

External Tool Usage

Key Takeaway: Skill development is important!

- ▶ Worldwide, there is *a lot* of research exploring how AI tools can support learning, comprehension, and software development practices
- ▶ Last year, a study split students into groups to solve problems on core CSC 225 topics: (1) using ChatGPT; (2) tutor; and (3) visualization app
 - ▶ Students found ChatGPT very helpful in solving problems
 - ▶ But did not do very well on quizzes afterward (compared to other group)
 - ▶ Perhaps due to the fact they interacted with the tutor and ChatGPT differently
 - ▶ They asked the tutor to explain things, and listened to explanations, whereas with ChatGPT they often skimmed the explanation and rushed to the solution
 - ▶ The app provided the least support (it allowed students to algorithms visually)

External Tool Usage

- ▶ During your degree, you will increasingly get exposure to many tools
 - ▶ First year was more about the development of fundamental programming skills than it was about tool usage
 - ▶ This fundamental knowledge is critical for later in your education/career when you can use the knowledge to use libraries and AI tools effectively
 - ▶ Similar to your first-year programming courses, CSC 225 is the first course in a sequence of theoretical courses that focus on algorithms and data structures
 - ▶ This course focuses on skill development and process, not solutions. The goal is for you to understand the process of writing proofs and analyzing algorithms
- ▶ To prepare you for future success, my thoughts are:
 - ▶ If you rely on AI tools to get through introductory material, **you should fail.**
 - ▶ If in 4th year you don't leverage tools to increase productivity, **you should fail.**

Course plan (Preview)

- ▶ First month: Discrete Math
 - ▶ Focus on counting and proofs
 - ▶ This will help us evaluate the efficiency of our algorithms and data structures throughout the remainder of the course
- ▶ October onward: Algorithms and Data Structures
 - ▶ Assumption: You have already have some experience programming some data structures - linked lists, stacks and queues, trees, etc.
 - ▶ We will focus on analysis of the tradeoffs associated with different common algorithms (like insertion, searching, and sorting)
 - ▶ And explore some new data structures (Graphs) as well as some extensions on some of the data structures you have covered previously (Trees)

Grade Breakdown

Component	Weight
Lecture Quizzes	5%
Labs	4.5%
Assignments	28%
Midterm Exams	27.5%
Final Exam	35%
TOTAL	100%

Course Format

▶ Pre-Lecture Videos

- ▶ before each lecture, there will be videos introducing the concept
- ▶ these will contain slides, visualizations, proofs, and code examples
- ▶ ASSUMPTION: You will watch these videos BEFORE the lecture

▶ Review Quiz: (5%)

- ▶ there will be a short quiz to be completed by 10:30am the day of each lecture ensuring you understand the concepts introduced in the videos

▶ Lectures:

- ▶ work through activities introduced in the pre-lecture videos
- ▶ IDEA: videos introduce the concepts; lecture time is spent exploring the concepts at a deeper level (and working through more challenging problems)

Course Format (cont'd)

▶ Labs (4.5%)

- ▶ Start NEXT week
- ▶ 10 labs, one hour each, held in ECS 258
- ▶ There will be a tutorial component to each lab. The goal is to provide an environment for you to work through exercises on topics introduced in the previous week. The TAs will work through some of the exercises with you, and assist you as you work through the remainder of the exercises.

▶ Assignments

- ▶ Completed individually and submitted through BrightSpace
- ▶ First assignment is worth 3% to get you warmed up with discrete math, and the remaining five assignments are each worth 5% and cover the main course topics

Course Format (cont'd)

▶ Exams

- ▶ Two midterm exams, which make up 27.5% of your total grade
- ▶ They will be held OUTSIDE of lecture, at the time and place shown below

▶ Dates:

- ▶ Midterm 1: Wednesday, October 8th at 6:00pm in ECS 123 (worth 12.5%)
- ▶ Midterm 2: Wednesday, November 5th at 6:00pm in ECS 123 (worth 15%)
- ▶ A final exam (worth 35%) will be scheduled by the university
 - ▶ We will provide an update about the details once the scheduling is complete

Administrative things

- ▶ A few **administration** notes:
 - ▶ Everyone should be registered in both a lecture and a lab section
 - ▶ If you are on the waitlist:
 - ▶ we are working to get you into the course
 - ▶ it looks like we should be able to accommodate everyone currently on the waitlist
(but no promises - as this is outside my control)

Plagiarism

- ▶ Submitted work may be checked using plagiarism detection software
- ▶ An Academic Integrity Committee (AIC) has been formed to handle student plagiarism within the computer science department
- ▶ Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department.
- ▶ For the UVic policy on academic integrity, you should consult:
 - ▶ <https://web.uvic.ca/calendar2019-01/undergrad/info/regulations/academic-integrity.html>
 - ▶ 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"**

Resources

- ▶ Textbooks (not required - but certainly very helpful):
 - ▶ Discrete and Combinatorial Mathematics, An Applied Introduction, Fifth Edition, *by Ralph P. Grimaldi*. Pearson Education India, 2006
 - ▶ Algorithm Design and Applications, *by Robert Sedgewick and Kevin Wayne*, Addison-Wesley, Toronto, 2011
 - ▶ Algorithms, Fourth Edition, *by Michael Goodrich and Roberto Tamassia*, Wiley, 2014
- ▶ BrightSpace site: <https://bright.uvic.ca>
 - ▶ All course material will be posted on our BrightSpace site
 - ▶ pre-lecture video links, quizzes, slides, assignments, announcements, etc.
 - ▶ You should all be automatically added to our BrightSpace site