



COURSE OUTLINE WINTER 2023

	Date	Initials
Prepared by Instructor	21-Dec	LDC, MK
Approved by Head	Jan 6 23	amk

1. Calendar Information

ENSF 338

Practical Data Structures and Algorithms

Introduction to foundational data structures such as stacks, queues, lists, heaps, hash tables, trees, and graphs. Sorting and searching algorithms. Complexity analysis. Applications for software development

Course Hours: 3 units; H(3-2)

Academic Credit: 3

Calendar Reference: <https://www.ucalgary.ca/pubs/calendar/current/software-engineering-for-engineers>

2. Learning Outcomes

At the end of this course, you will be able to:

- 1 Understand and use data structures commonly used by programmers in the course of software development
- 2 Understand and use algorithms commonly used to perform operations on data structures (such as searching and sorting)
- 3 Understand and perform simple algorithmic complexity analysis on algorithmic implementations
- 4 Understand and perform simple benchmarking and timing analyses of algorithmic implementations

3. Timetable

Section	Day(s) of the Week	Time	Location
LEC 01	MWF	13:00-13:50	KNB 132
LAB B01	T	14:00-15:50	ENG 24
LEC 02	MWF	11:00-11:50	MFH 160
LAB B02	F	14:00-15:50	ENG 24

4. Course Instructors

Course Coordinator

Section	First Name	Family Name	Phone	Office	Email
1	Lorenzo	De Carli	403-220-5628	ICT 240	lorenzo.decarli@ucalgary.ca

Other Instructors

Section	First Name	Family Name	Phone	Office	Email
2	Maan	Khedr	4038052171	CCIT 361	maan.khedr@ucalgary.ca

Teaching Assistants

Section	First Name	Family Name	Phone	Office	Email
TBA					

5. Assessments

Students are going to be assessed via five large take-home group assignments and a final project. Within the assignments, the lowest assignment score is going to be dropped. Each assignment is going to cover recently discussed topics; the four assignments with the highest score are going to count each for 15% of the final grade. The assignment due dates will be as follow: Jan 20th (section 1)/Jan 23rd (section 2) for Assignment #1; Feb 10th (sec 1)/Feb 13th (sec 2) for Assignment #2; March 3rd (sec 1)/March 6th (sec 2) for Assignment #3; March 24rd (sec 1)/March 27th (sec 2) for Assignment #4; April 14th (for both sec 1 and 2) for Assignment #5. The final project is going to be assigned no later than March 6th 2023; it is going to be a summative assignment covering topics seen throughout the class and is going to count for 40% of the final grade.

For reappraisals of term work or final assessments, please refer to the SSE Reappraisal of Graded Term Work and Academic Assessments Policy and forms available on the Engineering Student Center "ESC" D2L site.

6. Use of Calculators in Examinations

N/A.

7. Final Grade Determination

The final grade in this course will be based on the following components:

Component	Learning Outcome(s) Evaluated	Weight
Assignment #1	1,2,3,4	15%
Assignment #2	1,2,3,4	15%
Assignment #3	1,2,3,4	15%
Assignment #4	1,2,3,4	15%
Assignment #5	1,2,3,4	15%
Final project	1,2,3,4	40%

Total: 115%

Notes:

- a) It is necessary to earn 50% on the final exam in order to pass the course as a whole.
- b) Conversion from a score out of 100 to a letter grade will be done using the conversion chart shown below. This grading scale can only be changed during the term if the grades will not be lowered.

Letter Grade	Total Mark (T)
A+	$T \geq 95.0\%$
A	$90.0\% \leq T < 95.0\%$
A-	$85.0\% \leq T < 90.0\%$
B+	$80.0\% \leq T < 85.0\%$
B	$75.0\% \leq T < 80.0\%$
B-	$70.0\% \leq T < 75.0\%$
C+	$65.0\% \leq T < 70.0\%$
C	$60.0\% \leq T < 65.0\%$
C-	$56.0\% \leq T < 60.0\%$
D+	$53.0\% \leq T < 56.0\%$
D	$50.0\% \leq T < 53.0\%$
F	$T < 50.0\%$

8. Textbook

The following textbook(s) is required for this course:

Title	Introduction to Algorithms
Author(s)	Cormen, Leiserson, Rivest, Stein
Edition, Year	4th edition, 2022
Publisher	MIT Press

The following textbook(s) is recommended for this course:

Title	
Author(s)	
Edition, Year	
Publisher	

9. University of Calgary Policies and Supports

SSE ADVISING AND POLICIES

All Schulich School of Engineering students have access to a D2L site titled "Engineering Student Centre". Students have a responsibility to familiarize themselves with the policies available on this site.

ACADEMIC MISCONDUCT

Academic Misconduct refers to student behavior which compromises proper assessment of a student's academic activities and includes: cheating; fabrication; falsification; plagiarism; unauthorized assistance; failure to comply with an instructor's expectations regarding conduct required of students completing academic assessments in their courses; and failure to comply with exam regulations applied by the Registrar. The SSE Academic Misconduct Operating Standard can be found on the Engineering Student Center D2L site.

For more information on the University of Calgary Student Academic Misconduct Policy and Procedure please visit:

<https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Student-Academic-Misconduct-Procedure.pdf>

Additional information is available on the Academic Integrity Website at

<https://ucalgary.ca/student-services/student-success/learning/academic-integrity>.

ACADEMIC ACCOMODATION

It is the student's responsibility to request academic accommodations according to the University policies and procedures listed below. The Student Accommodations policy is available at <https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Student-Accommodation-Policy.pdf>

Students needing an accommodation based on disability or medical concerns should contact Student Accessibility Services (SAS) in accordance with the Procedure for Accommodations for Students with Disabilities (<https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Accommodation-for-Students-with-Disabilities-Procedure.pdf>). SAS will process the request and issue letters of accommodation to instructors. For additional information on support services and accommodations for students with disabilities, visit www.ucalgary.ca/access/.

Students needing an accommodation in relation to their coursework or to fulfil requirements for a degree based on a Protected Ground other than Disability, should communicate this need by submitting a SSE Request for Academic Accommodation Form (ESC D2L - Forms) to the Associate Head (Undergraduate Studies) within 10 business days prior to the class, test, exam, or assignment at issue.

INSTRUCTOR INTELLECTUAL PROPERTY

Course materials created by instructors (including presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the instructor. These materials may NOT be reproduced, redistributed or copied without the explicit consent of the instructor. The posting of course materials to third party websites such as note-sharing sites without permission is prohibited. Sharing of extracts of these course materials with other students enrolled in the course at the same time may be allowed under fair dealing.

FREEDOM OF INFORMATION AND PROTECTION OF PRIVACY

Student information will be collected in accordance with typical (or usual) classroom practice. Students' assignments will be accessible only by the authorized course faculty. Private information related to the individual student is treated with the utmost regard by the faculty at the University of Calgary.

COPYRIGHT LEGISLATION

All students are required to read the University of Calgary policy on Acceptable Use of Material Protected by Copyright (<https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Acceptable-Use-of-Material-Protected-by-Copyright-Policy.pdf>) and requirements of the copyright act (<https://laws-lois.justice.gc.ca/eng/acts/C-42/index.html>) to ensure they are aware of the consequences of unauthorised sharing of course materials (including instructor notes, electronic versions of textbooks etc.). Students who use material protected by copyright in violation of this policy may be disciplined under the Non-Academic Misconduct Policy <https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Student-Non-Academic-Misconduct-Policy.pdf>.

MEDIA RECORDING (if applicable)

Please refer to the following statement on media recording of students:

https://elearn.ucalgary.ca/wp-content/uploads/2020/05/Media-Recording-in-Learning-Environments-OSP_FINAL.pdf

**Media recording for lesson capture*

The instructor may use media recordings to capture the delivery of a lecture. These recordings are intended to be used for lecture capture only and will not be used for any other purpose. Although the recording device will be fixed on the Instructor, in the event that incidental student participation is recorded, the instructor will ensure that any identifiable content (video or audio) is masked, or will seek consent to include the identifiable student content to making the content available on University approved platforms.

**Media recording for self-assessment of teaching practices*

The instructor may use media recordings as a tool for self-assessment of their teaching practices. Although the recording device will be fixed on the instructor, it is possible that student participation in the course may be inadvertently captured. These recordings will be used for instructor self-assessment only and will not be used for any other purpose.

**Media recording for the assessment of student learning*

The instructor may use media recordings as part of the assessment of students. This may include but is not limited to classroom discussions, presentations, clinical practice, or skills testing that occur during the course. These recordings will be used for student assessment purposes only and will not be shared or used for any other purpose.

SEXUAL VIOLENCE POLICY

The University recognizes that all members of the University Community should be able to learn, work, teach and live in an environment where they are free from harassment, discrimination, and violence. The University of Calgary's sexual violence policy guides us in how we respond to incidents of sexual violence, including supports available to those who have experienced or witnessed sexual violence, or those who are alleged to have committed sexual violence. It provides clear response procedures and timelines, defines complex concepts, and addresses incidents that occur off-campus in certain circumstances. Please see the policy available at <https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Sexual-and-Gender-Based-Violence-Policy.pdf>

OTHER IMPORTANT INFORMATION

Please visit the Registrar's website at: <https://www.ucalgary.ca/registrar/registration/course-outlines>

for additional important information on the following:

- Wellness and Mental Health Resources
- Student Success
- Student Ombuds Office
- Student Union (SU) Information
- Graduate Students' Association (GSA) Information
- Emergency Evacuation/Assembly Points
- Safewalk

10. Additional Course Information

Course Format and Scheduling

All course content and information will be delivered as a team by both instructors regardless of section enrollment.

Course content will be delivered in a flipped learning format through a combination of both synchronous and asynchronous learning. Students are responsible for all content covered in both types of delivery.

Scheduled lecture times are held for office hours. It is recommended that you use this time to review the videos and other asynchronous material.

Scheduled lab times are going to be used for in-person active learning. Instructors and TAs are going to present and assign ungraded exercise and answer student questions.

Course material will be posted asynchronously to the course D2L site and GitHub. Students may access the material at times convenient to them but should engage with the material in a timely manner in order to keep up with course deliverables. All posted material remains the intellectual property of the instructors and should not be shared or duplicated in any form.

Weekly laboratory sessions will be held in-person during the scheduled lab time and will provide opportunities for real-time engagement.

Active engagement in class and with course material is essential in any course. In the flipped classroom context, students must take increased ownership of their learning.

During in-person lab sessions, students are expected to adhere to all university policies. These include: No eating or drinking in the lab room, on-topic use of technology, and communicating in a professional and respectful manner at all times.

Lab sessions encourage open participation and discussion. Sessions may be recorded for pedagogical purposes only and will not be shared with students. However, common questions and answers may be posted to the D2L discussion board following the session for those unable to attend.

Students may seek personalized assistance during laboratory sessions and office hours. Students should come prepared with specific questions and be able to show their code. During office hours, instructors and/or TAs will try to guide students toward solutions but will not debug or write code for students.

Guidelines for Completing and Submitting Coursework

Assignments are going to be provided as PDF documents on D2L. Students must submit the answer as a PDF document; if code is to be developed, such code must be uploaded to GitHub and a link to the GitHub repository must be present in the submitted PDF.

Contacting the Instructor

The instructor can be reached out via email or by attending office hours. Student emails will be answered within two business days.