THE UNIVERSITY OF BRITISH COLUMBIA

Department of Computer Science, Mathematics, Physics and Statistics
Okanagan Campus

COSC 222 Data Structures
W2021 T-1

Instructor:
Name: Mohammad Khalad Hasan
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Location: SCI 260

Office Hours: Friday 15:30 – 17:00 (Online)

Course Website: https://canvas.ubc.ca/ (Course name *COSC 222 001 2021W1*)

Mode of Delivery for lectures and labs: Online

Course Description:
Introduction to the design, implementation and analysis of data structures. Topics will include lists, stacks, queues, trees, and graphs. Credit will only be granted for one of COSC 210 or COSC 222.
Credits: 3
Prerequisites: A score of 60% or higher in COSC 121.

Course Format:
The course will be delivered via online. Pre-recorded video lectures will be available for students, complemented by out-of-class readings and labs. In-class activities will take place on Wednesdays between 15:30 and 17:00 (see the tentative course outline for the dates and deadlines). Midterm break and other calendar dates can be found at http://okanagan.students.ubc.ca/calendar/

Course Overview, Content and Objectives:
The course will introduce various common data structures such as lists, stacks, queue, graphs, and trees for solving complex problems. Students will also learn about mathematical techniques to analyze the efficiency of various algorithms and common operations on data structures. Additionally, they will understand how to design new algorithms for the data structure that they studied to solve problems.

Topics to be covered include: Algorithm Analysis, Stacks and Queues, Array and Linked Lists, Recursion, Binary Trees, B-Trees, Sorting and Searching, Heaps, Graph Theory and Hash Tables.

Learning Outcomes:
Upon completion of this course, students will be able to:

- Describe common data structures and mathematically analyze them
- Understand how to implement various data structures and related algorithms.

- Understand and quantify why one data structure and its related algorithmic solution is better than another

Course Evaluation:

In-Class Activities	10%	
Labs	30%	
Midterm Exam (Online)	20%	Exam Date: November 3, 2021 (15:30-16:30)
Final Exam (Online)	40%	Exam Date: TBA

Mode of Delivery for Exams (both midterm and final exams): Online

In-Class Activities: A set of questions/problems will be posted by 15:30 on Wednesdays (see the tentative course outline for the in-class activity dates). The activity will be available from 15:30 to 21:59 and students are required to complete them by 21:59. The instructor will be available online during the class time (between 15:30 and 17:00 on Wednesdays) to help students with in-class activities.

Please note that bonus marks from labs or in-class activities will not overflow and be added to other components. Final grades will be based on the evaluations listed above and the final grade will be assigned according to the standardized grading system outlined in the UBC Okanagan Calendar. Note: Any requests for changes to final exams must be sent to the office of the Associate Dean of Students (bsasdeansoffice.ubco@ubc.ca).

Textbook and Suggested Readings (optional):

- Introduction to Algorithms by Thomas H. Cormen and others. (Available on UBCO library)
- Java Software Structures: Designing and Using Data Structures by John Lewis and Joseph Chase
- Open Data Structures (in Java) by Pat Morin. URL: http://opendatastructures.org/ods-java/.

Late lab and in-class activity Policy

Late submissions are not accepted after the deadline.

Missed Midterm Policy

No make-up midterm will be given. If a student misses a midterm without a medical note, the mark received will be 0. If a medical note is provided to the instructor, then the midterm portion of the grade will be combined with the other marks.

Passing Criteria

In order to pass the course:

- Students MUST achieve a passing grade in the lab component.
- Students MUST achieve a passing grade in the exams component.

Failure to satisfy all of the above clauses will result in a maximum of 45% for the course.

Expectations

- Listen the pre-recorded lectures, the assigned readings before the lecture.
- Learn the material in the course and undertake sufficient effort to produce all the programming assignments.
- Enjoy attending online classes and feel free to participate according to your personality. Feel free to ask questions by raising your hand or speaking out at appropriate times.
- Please actively participate in class discussions, questions, and problem-solving exercises.
- I want all students to pass the course, receive a good grade, and feel the course was beneficial.
- For this course, it is expected that you will spend at least six hours per week on out-of-class preparation.

Tentative Course Outline

Wk	Dates (Wed/Fri)	In-Class Activities	Topic	Lab	Lab Topics	Lab due
1	Wed, Sep 8		Course overview, Algorithm analysis	No labs	N/A	N/A
	Fri, Sep 10					
2	Wed, Sep 15		Lists and Linked Lists	Practice lab	Java basics, OOP	N/A
	Fri, Sep 17					
3	Wed, Sep 22	Activity 1	Stack, Queue	Lab 1	Lists & linked lists	Practice lab
	Fri, Sep 24					
4	Wed, Sep 29	Activity 2	Trees and Terminology Binary search tree and operations	Lab 2	Stack & Queue	Lab 1
	Fri, Oct 1					
5	Wed, Oct 6	Activity 3	Binary search tree and operations	Lab 3	Recursion & tree basics	Lab 2
	Fri, Oct 8					
6	Wed, Oct 13	Activity 4	Balanced tree, AVL, Red-Black tree	Lab 4	Binary search tree	Lab 3
	Fri, Oct 15					
7	Wed, Oct 20	Activity 5	Priority queues, Heaps	Lab 5	Balanced tree, red-black trees	Lab 4
	Fri, Oct 22					
8	Wed, Oct 27	Activity 6	Graph terminology, Graph traversal	Lab 6	AVL, Priority queues, heaps	Lab 5
	Fri, Oct 29					
9	Wed, Nov 3		Midterm (Nov 3)	TA office hours (midterm)	N/A	Lab 6
	Fri, Nov 5					
10	Wed, Nov 17	Activity 7	Minimum spanning tree, Hashing	Lab 7	Graphs	N/A
	Fri, Nov 19					
11	Wed, Nov 24	Activity 8		Lab 8	Min span tree, hash, sort, search	Lab 7
	Fri, Nov 26		Sorting & searching			
12	Wed, Dec 1	Activity 9		TA office hours (Final exam)	N/A	Lab 8
	Fri, Dec 3					
13	Wed, Dec 8		Exam review	TA office hours (Final exam)	N/A	N/A

Grading Practices

Faculties, departments, and schools reserve the right to scale grades in order to maintain equity among sections and conformity to University, faculty, department, or school norms. Students should therefore note that an unofficial grade given by an instructor might be changed by the faculty, department, or school. Grades are not official until they appear on a student's academic record.

http://www.calendar.ubc.ca/okanagan/index.cfm?tree=3,41,90,1014

Final Examinations

Except in the case of examination clashes and hardships (three or more formal examinations scheduled within a 24-hour period) or unforeseen events, students will be permitted to apply for out-of-time final examinations only if they are representing the University, the province, or the country in a competition or performance; serving in the Canadian military; observing a religious rite; working to support themselves or their family; or caring for a family member. Unforeseen events include (but may not be limited to) the following: ill health or other personal challenges that arise during a term and changes in the requirements of an ongoing job.
Further information on **Academic Concession** can be found under **Policies and Regulation in the *Okanagan Academic Calendar*** http://www.calendar.ubc.ca/okanagan/index.cfm?tree=3,48,0,0

Academic Integrity

The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand, and follow the codes of conduct regarding academic integrity. At the most basic level, this means submitting only original work done by you and acknowledging all sources of information or ideas and attributing them to others as required. This also means you should not cheat, copy, or mislead others about what is your work. Violations of academic integrity (i.e., misconduct) lead to the breakdown of the academic enterprise, and therefore serious consequences arise and harsh sanctions are imposed. For example, incidences of plagiarism or cheating may result in a mark of zero on the assignment or exam and more serious consequences may apply if the matter is referred to the President's Advisory Committee on Student Discipline. Careful records are kept in order to monitor and prevent recurrences.

A more detailed description of academic integrity, including the University's policies and procedures, may be found in the Academic Calendar at: http://okanagan.students.ubc.ca/calendar/index.cfm?tree=3,54,111,0.

Cooperation vs. Cheating

Working with others on assignments is a good way to learn the material and we encourage it. However, there are limits to the degree of cooperation that we will permit. Any level of cooperation beyond what is permitted is considered cheating.

When working on programming assignments, you must work only with others whose understanding of the material is approximately equal to yours. In this situation, working together to find a good approach for solving a programming problem is cooperation; listening while someone dictates a solution is cheating. You must limit collaboration to a high-level discussion of solution strategies, and stop short of actually writing down a group answer. Anything that you hand in, whether it is a written problem or a computer program, must be written by you, from scratch, in your own words. If you base your solution on any other written solution, you are cheating. If you provide your solution for others to use, you are also cheating.

Copyright Disclaimer

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Grievances and Complaints Procedures

A student who has a complaint related to this course should follow the procedures summarized below:

- The student should attempt to resolve the matter with the instructor first. Students may talk first to someone other than the instructor if they do not feel, for whatever reason, that they can directly approach the instructor.
  If the complaint is not resolved to the student's satisfaction, the student should e-mail the Department Head pro tem, Dr. Andrew Jirasek at andrew.jirasek@ubc.ca

Student Service Resources

Disability Assistance

The Disability Resource Centre ensures educational equity for students with disabilities, injuries or illness. If you are disabled, have an injury or illness and require academic accommodations to meet the course objectives, e-mail us or visit our website for more information.
Web: http://students.ok.ubc.ca/drc/welcome.html **E-mail** DRC at: drc.questions@ubc.ca

Equity, Human Rights, Discrimination and Harassment

UBC Okanagan is a place where every student, staff and faculty member should be able to study and work in an environment that is free from human rights-based discrimination and harassment. If you require assistance related to an issue of equity, discrimination or harassment, please contact the Equity Office, your administrative head of unit, and/or your unit's equity representative. **UBC Okanagan Equity Advisor: ph. 250-807-9291**
Web: https://equity.ok.ubc.ca/ **E-mail:** equity.ubco@ubc.ca

Health & Wellness - UNC 337

At UBC Okanagan health services to students are provided by Health and Wellness. Nurses, physicians and counsellors provide health care and counselling related to physical health, emotional/mental health and sexual/reproductive health concerns. As well, health promotion, education and research activities are provided to the campus community. If you require assistance with your health, please contact Health and Wellness for more information or to book an appointment.
Web: www.students.ok.ubc.ca/health-wellness **Email:** healthwellness.okanagan@ubc.ca

Sexual Violence Prevention and Response Office (SVPRO)

A safe and confidential place for UBC students, staff and faculty who have experienced sexual violence regardless of when or where it took place. Just want to talk? We are here to listen and help you explore your options. We can help you find a safe place to stay, explain your reporting options (UBC or police), accompany you to the hospital, or support you with academic accommodations. You have the right to choose what happens next. We support your decision, whatever you decide. Visit svpro.ok.ubc.ca or call us at 250-807-9640

Independent Investigations Office (IIO)
If you or someone you know has experienced sexual assault or some other form of sexual misconduct by a UBC community member and you want the Independent Investigations Office (IIO) at UBC to investigate, please contact the **IIO**. Investigations are conducted in a trauma informed, confidential and respectful manner in accordance with the principles of procedural fairness. You can report your experience directly to the **IIO by** calling 604-827-2060.
Web: https://investigationsoffice.ubc.ca/ **E-mail:** director.of.investigations@ubc.ca

The Hub
The Student Learning Hub (LIB 237) is your go-to resource for free math, science, writing, and language learning support. The Hub welcomes undergraduate students from all disciplines and year levels to access a range of supports that include **tutoring in math, sciences, languages, and writing, as well as help with study skills and learning strategies**. **Web:** (https://students.ok.ubc.ca/student-learning-hub/) **Ph:** 250-807-9185.

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Call Safewalk at 250-807-8076 For more information: https://security.ok.ubc.ca/safewalk/