NET3004 A/OSS 3004 A
Data Structures (0.5 credit)

Instructor: Hossain Samar Qorbani (Sam)
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Office Hours: Tuesday (online, by appointment)
Lecture: Tuesday 9:00 am – 12:00 pm (Asynchronous sessions, may include 20-30 minutes Online discussion)
Tutorial/Lab: TBD
Location:

TA: Siju Philip : sijuphilip@cmail.carleton.ca
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Course Description

Specification and design of abstract data types and their implementation as stacks, queues, trees, tables and graphs. Common and useful examples. Parsing and finite state machines. Analysis of algorithms, recursion, re-entrance. Special focus: abstraction, interface specification and hierarchical design using object-oriented programming.

Prerequisite: Basics (i.e., encapsulation, inheritance, polymorphism) of object-oriented design and programming (c++) as provided in BIT 2400.

Course Objectives/Learning Outcomes:

By the end of this course students should be able to:

- Understand the specification, design, implementation and use of basic abstract data types (ADT).
- Get familiar with C++ code implementation using either Visual Studio, Apache Netbeans or CodeBlocks
- Get a basic understanding of object-oriented design and of relevant Unified Modeling Language notation.
- Explain the concepts of data structure such as time and space complexity, the systematic methods of organizing and accessing data in algorithms.

Textbook/Reference Material:

Required:

- Open Data Structures (in C++). Pat Morin, 2013

Highly Recommended resources:

- Data Structures and Algorithm Analysis in C++. Clifford A. Shaffer , 2014
- Selected readings from different online resources

Compiler:

Students have the options to use any compiler they are familiar with which may include:

- Visual studio 2017 and higher
- Visual studio code with “Code Runner” extension (C/C++)
- NetBeans and/or CodeBlocks
  *Testing the codes with at least 2 compilers is a good practice.

Course Organization:
The course consists of online asynchronous lectures, discussion, and assignments. Some lectures will have a short, pre-recorded videos to be available via links on CUlearn.

Course Grading:

	%
Individual Assignments and reports	40
Mid-term Test	20
Final Exam (to be scheduled by Exam Services and held during the formal examination period)	30
Participation /Attendance	10
Total	100

- Total of four Individual assignments will cover topics related to the course content discussed during past weeks. Students will need to research and send the codes or reports by the dates shown in the table below.
- Participation/attendance will be evaluated based on the weekly activity by the students. Each week students will be tasked to conduct an online research (i.e. web articles/ tutorial videos) and write one paragraph to include any extra feature(s) or characteristics of a data structure topic they learned from that research.
- Mid-term test and final exam structure could be modified, based on the progress and feedbacks.

Course Policies:
Students must achieve a minimum grade of 50% on the final exam and a minimum grade of 40% on the written assignments to pass the course.

Course Schedule/List of Topics by Week:

Week	Due Date	Topics / Assignments	Reading / Assignment
1	Sep. 15th	Course Overview Introduction to Data structure	course outline. Reading List. (chapters of the books will be assigned for weekly reading)
2	Sep 22nd	C++ compiler (either options) See compiler section. -Intro to Complexity	Assignment 1
3	Sep 29th	Complexity Analysis +Arrays	
4	October 6th… Assignment 1	Linked Lists Skip Lists	Assignment 2
5	October 13th	Hashing/ Hash Tables	
6	October 20th	Heaps and Heapsort	
7	**Oct.26-30**	**Fall Break**	
8	Nov 3rd Assignment 2	Queues + Stacks	Assignment 3
9	***Nov 10th**	**Midterm**	Midterm Exam
10	Nov 17th	Sorting Algorithms Recursion + Trees	
11	November 24th Assignment 3	Binary Trees/Search Trees	Assignment 4
12	Dec 1st Assignment 4	Graphs	
13	December 8th.	Wrap up	

NOTES from the instructor:

1- Please send me a short paragraph about your knowledge of C++, your computer/laptop specs, and if you have any limitation in terms of internet access. I will make every attempt to accommodate and adjust the way I deliver content.
2- Students are recommended to post any questions or concern on the weekly discussion board on CUlearn. I will also be available online (on Zoom), during the official lecture hours (Tuesday 10:00 AM – 11:30 AM). Please feel free to join in for questions or discussions. However, considering the number of students for this course it might present technical challenges if everyone decides to join at the same time. I suggest sending me a note prior to the session so that I can provide time slots for different groups.

Midterm exam may shift to Nov.3rd

While every attempt will be made to keep to the schedule listed above, circumstances may necessitate modifications throughout the semester.

ACADEMIC ACCOMMODATION

You may need special arrangements to meet your academic obligations during the term. For an accommodation request, the processes are as follows:

Pregnancy obligation:

Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit the Equity Services website **carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf**.

Religious obligation:

Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit the Equity Services website **carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf**

Academic Accommodations for Students with Disabilities:

The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your ***Letter of Accommodation*** at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (*if applicable*). **Requests made within two weeks will be reviewed on a case-by-case basis.** After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website (www.carleton.ca/pmc) for the deadline to request accommodations for the formally-scheduled exam (*if applicable*).

Survivors of Sexual Violence:

As a community, Carleton University is committed to maintaining a positive learning, working, and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit https://carleton.ca/sexual-violence-support/

Accommodation for Student Activities:

Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit **https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf**

ACADEMIC INTEGRITY

The University Senate defines plagiarism in the regulations on instructional offenses as "to use and pass off as one's own idea or product work of another without expressly giving credit to another."
Borrowing someone else's answers, unauthorized possession of tests or answers to tests, or possession of material designed in answering exam questions, are also subject to university policy regarding instructional offences. Students who post their code online are making themselves a potential party to plagiarism and are subject to the consequences. For more information on Carleton University's Academic Integrity Policy, consult *https://carleton.ca/secretariat/wp-content/uploads/Academic-Integrity-Policy.pdf*

COURSE COPYRIGHT

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