CIS*2520 Data Structures

Fall 2020
Section(s): C01

School of Computer Science
Credit Weight: 0.50
Version 1.00 - July 21, 2020

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1 Course Details

1.1 Calendar Description

This course is a study of basic data structures, such as lists, stacks, queues, trees, and tables. Topics which will be examined include abstract data types, sequential and linked representations, and an introduction to algorithm analysis; various traversal, search, insertion, removal, and sorting algorithms.

Pre-Requisites: CIS*2500, (1 of CIS*1910, ENGG*1500, MATH*2000)

1.2 Timetable

Lecture Section 01: Tuesdays, and Thursdays, 02:30PM - 03:50PM, Virtual (connection details TBA).

Lecture Section 02: Tuesdays, and Thursdays, 5:30PM - 6:50PM, Virtual (connection details TBA).

Classes begin on Sept. 10th, 2020 and end on Dec. 3, 2019. There are no classes on Oct. 13th (study break).

Labs begin on Sept. 14th, 2019 and end on Nov. 27th, 2019. There are no labs Oct. 12th-16th (study break week). (But there is a lecture on Oct. 15th).

1.3 Final Exam

There will be no exams in this course.

2 Instructional Support

Help Centre E-mail:

For help with course material, lectures, labs, assignments, examinations, on-line exercises, please use the help centre e-mail:

cis2520@socs.uoguelph.ca

This is the best and fastest way to get answers to your questions.

2.1 Instructional Support Team

Instructor: Stefan C. Kremer
Office Hours: Mondays, Wednesdays, Fridays 13:00-14:00, or by appointment.

For any personal issues, including academic consideration, special circumstances or issues surrounding the TAs, contact the instructor directly at: skremer@uoguelph.ca. For issues related to course material, lectures, labs, assignments, examinations, on-line exercises, please use the help centre e-mail:

cis2520@socs.uoguelph.ca

2.2 TAs

TBA.

3 Learning Resources

3.1 Required Resources

Course Web Page URL (Website)
Announcements, lecture materials, assignments, discussions, and grades will be posted on CourseLink at: https://courselink.uoguelph.ca/d2l/home/634155

ZyBooks Textbook (Required) (Textbook)
https://www.zybooks.com/catalog/data-structures-essentials/
This is an on-line textbook for this course. It contains reading materials, demos and

interactive quizzes used throughout the course. It covers the conceptual aspects of data structures in a language-independent manner. It doesn't cover the C programming language at all.

- zyBook: CIS 2520: Data Structures
- zyBook code: UOGUELPHCIS2520KremerFall2020
- zyBook ISBN: 978-1-394-04334-7

1. Sign in or create an account at learn.zybooks.com
2. Enter zyBook code: UOGUELPHCIS2520KremerFall2020
3. Subscribe

A subscription is **$58**. Students may begin subscribing on Aug 27, 2020 and the cutoff to subscribe is Dec 07, 2020. Subscriptions will last until Jan 01, 2021.

Repository (Other)

https://gitlab.socs.uoguelph.ca
This is a software repository that you will use to store versioned copies of your code, submit work, and receive feedback.

To create an empty repository for your assignment use:

clone https://{userid}@gitlab.socs.uoguelph.ca/2520F20/{userid}/{A#}

Where {userid} is your login-id, {A#} is the assignment that you are working on (e.g. A1). Then "cd" to the directory.

Use:

git add {files}

to add your files to the repository (you can use wild cards here).

Use:

git commit -a

to commit your changes.

Finally, use

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git push -all
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to push your files to the server.

You are encouraged to regularly add file, commit changes and push your work to the server as a back-up system. No consideration will be given for students who lose work that has not been deposited to the git server.

3.2 Additional Resources

Physical textbook covering data structures and implementation in C (Textbook)
T. A. Standish, *Data Structures, Algorithms & Software Principles in C*, Addison Wesley, 1994.

This is a suggested book that covers the C programming language implementation of the data structures covered in this course. There are also many examples covered in the lectures and in the labs as well as many on-line resources that cover this material, but if you are looking for everything in one place, in a nicely organized way, all in the C programming language, this is the book.

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4 Learning Outcomes

Students will learn concepts of the commonly used data structures, as well as their representations and uses, and algorithms for manipulating the structures. The emphasis is on the use of data structures in software development and evaluation of alternative implementations. Students will acquire skills of designing and implementing data structures for solving problems in C. The topics include:

- Review of C, including pointers, recursion, etc.
- Introduction of algorithm analysis
- Stacks, queues, strings, lists, trees, graphs, dictionaries, and hashing
- Searching and sorting

4.1 Course Learning Outcomes

By the end of this course, you should be able to:

1. Describe and implement common data structures for solving complex programming problems including algorithms for the creation, insertion, deletion, searching, and sorting of each data structure.
2. Analyse the space and time efficiency of algorithms including algorithms for the creation, insertion, deletion, searching, and sorting of data structures discussed.

3. Select and correctly use the appropriate abstract data type for programming problems.

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5 Teaching and Learning Activities

5.1 Lecture

Week 1

Topics: Review of C programming.

Week 2

Topics: Review of C programming (style, pointers, dynamic memory).

Week 3

Topics: Introduction to data structures and algorithms.

Week 4

Topics: Searching, sorting and algorithm analysis.

Week 5

Topics: Lists, stacks and queues.

Week 6

Topics: Hash tables.

Week 7

Topics: Trees and balanced trees.

Week 8

Topics: Heaps and treaps.

Week 9

Topics: Graphs and algorithms.

Week 10

Topics: B-trees.

Week 11

Topics: Sets.

Week 12

Topics: Review.

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6 Assessments

NOTE: It is your responsibility to resolve any conflicts concerning the dates and times below. If you contact the instructor ***early*** it is likely that conflicts can be resolved.

6.1 Marking Schemes & Distributions

Name	Scheme A (%)
Assignment 1	12
Assignment 2	12
Assignment 3	12
Assignment 4	12
Assignment 5	12
Assignment 6	12
Assignment 7	12
zyBook Exercises	16
Total	100

6.2 Assessment Details

Assignment 1 (12%)
Date: Tue, Sep 22, 11:59 PM

Assignment 2 (12%)
Date: Thu, Oct 1, 11:59 PM

Assignment 3 (12%)
Due: Thu, Oct 15, 11:59 PM

Assignment 4 (12%)

Date: Sun, Oct 27, 11:59 PM

Assignment 5 (12%)
Date: Thu, Nov 5, 11:59 PM

Assignment 6 (12%)
Date: Tue, Nov 17, 11:59 PM

Assignment 7 (12%)
Date: Thu, Nov 26, 11:59 PM

zyBook Exercises (16%)
Date: Weeks 2-11.
As assigned (see zyBooks web-site), students will complete the zyBooks exercises by 11:30am on class days.

6.3 Assignment Hand-in

All assignments must be submitted by depositing them to the git server for the course as per the instructions given on CourseLink. Assignments submitted by e-mail or any other way, will not be graded. Late penalties will be applied based on the time of a successful submission to the git server.

6.4 Late work

The time that you hand in an assignment will be based on the last submission you made for that assignment to the git server, and it is the last submission that will be graded. Work submitted after the deadline will receive a penalty of 0.5% of the assignment's maximum value per hour (24x7), unless extenuating circumstances (as defined in the Undergraduate Calendar) apply.

Example: an assignment submitted 40 hours late that achieved a grade of 70% earns a grade 50%.

6.5 Missed zyBooks exercises

Students who are unable to complete a zyBooks exercise for a given day due to extenuating circumstances, etc, should contact the instructor as soon as possible. Their grade for the missed exercise will be assigned based on their grades on other zyBooks exercises. A medical note is **not** required.

6.6 Missed Assignments

If you miss an assignment during the semester for a documented valid reason (e.g., medical illness) your other assignments will be re-weighted to make up for the missed work.

6.7 Regrade requests

Regrade requests must be received by e-mail within 7 calendar days of the grade being posted. A regrade request will result in the entire deliverable being regraded. The revised grade may be higher or lower than the original grade.

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7 University Statements

7.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

7.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Graduate Calendar - Grounds for Academic Consideration
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions
https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml

7.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

Graduate Calendar - Registration Changes
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml

Associate Diploma Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml

7.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

7.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance and not later than the 40th Class Day.

For Guelph students, information can be found on the SAS website
https://www.uoguelph.ca/sas

For Ridgetown students, information can be found on the Ridgetown SAS website
https://www.ridgetownc.com/services/accessibilityservices.cfm

7.6 Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity, and it is the responsibility of all members of the University community-faculty, staff, and students-to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff, and students have the responsibility of supporting an environment that encourages academic integrity. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Undergraduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

Graduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

7.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

7.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars
https://www.uoguelph.ca/academics/calendars
