COURSE CALENDAR DESCRIPTION

A study of fundamental data structures and their use in the efficient implementation of algorithms. Topics include abstract data types, lists, stacks, queues, trees and graphs. Prerequisites: cumulative GPA of 4.50 or better over all major EECS courses (without second digit “5”); LE/EECS 1030 3.00 or LE/EECS 2030 3.00; LE/EECS 1028 3.00 OR SC/MATH 1028 3.00 or LE/EECS 1019 3.00 or SC/MATH 1019 3.00. Previously offered as: LE/CSE 2011 3.00.

INSTRUCTOR(S)

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ADDITIONAL INFORMATION

TOPICS AND CONCEPTS

The main objective of this course is for students to become familiar with fundamental data structures commonly used in the design of algorithms, including an understanding of the classical data structures, and master the use of abstraction, specification and program construction using modules, and know how to apply these skills effectively in the design and implementation of algorithms. The components of this course cover:

- An overview of fundamental data structures.
- A review of some Java basics.
- Basic concepts of object-oriented design, including the use of abstraction, specification and program construction using modules.
- Basic concepts of algorithm design using fundamental data structures.
- Basic concepts of recursion.
- Fundamental data structures including stacks, queues, and deques; priority queues; maps, hash tables, and skip lists; search trees; sorting and selection; graph algorithms.
- Implementation of algorithms related to fundamental data structures.

Schedule of Topics

Week 1 Module 1: Introduction, review of some Java basics
Week 2 Module 2: Object-oriented design
Week 3 Module 3: Fundamental data structures
Week 4 Module 4: Algorithm analysis
Week 5 Module 5: Recursion
Week 6 Module 6: Stacks, queues, and deques
Week 7 Module 7: Priority Queues
Week 8 Module 8: Maps, hash tables, and skip lists
Course Learning Objectives
At the completion of this course, students should:
• Understand the classical data structures, including stacks, queues, and dequesues; priority queues; maps, hash tables, and skip lists; search trees; sorting and selection; graph algorithms.
• Understand the basic concepts of object-oriented design of data structures.
• Be able to use abstraction, specification and program construction using modules in the design of data structures.
• Be able to design and implement algorithms using fundamental data structures.
• Be able to analyze the average case and worst case performance for common operations performed on fundamental data structures.

Course Learning Outcomes
1. Instantiate a range of standard abstract data types (ADT) as data structures.
2. Implement these data structures and associated operations and check that they satisfy the properties of the ADT.
3. Apply best practice software engineering principles in the design of new data structures.
4. Demonstrate the ability to reason about data structures using contracts, assertions, and invariants.
5. Analyse the asymptotic run times of standard operations for a broad range of common data structures.
6. Select the most appropriate data structures for novel applications.

Evaluation Scheme
• 5% - Assignment 1
• 5% - Assignment 2
• 5% - Assignment 3
• 35% - Midterm Exam
• 50% - Final Exam

Note: Final course grades may be adjusted to conform to Program or Faculty grades distribution profiles.

Course Textbook

ASSIGNMENT SUBMISSION

Platform on Which Programs Are to be Implemented
The programs should be implemented using the Java programming language and students must make sure that the TAs/markers will be able to run them using the system at York.

Lateness Penalty
All students are expected to complete their assignments in a timely fashion. A mark of zero will be applied if the assignment is not submitted on or before the assignment due date.

Missed Exams
If a student does not attend the EECS 2011 Fall 2019 Midterm Exam but is able to submit a valid official York University Registrar's Office Attending Physician's Statement https://registrar.yorku.ca/pdf/attending-physicians-statement.pdf which specifically states that the student's
medical condition makes it impossible for the student to take the EECS 2011 Fall 2019 Midterm Exam, then the original percentage (35%) of the EECS 2011 Fall 2019 Midterm Exam in the final course grade, will be added to the original percentage (50%) of the EECS 2011 Fall 2019 Final Exam in the final course grade. This means that, for any student who does not attend the EECS 2011 Fall 2019 Midterm Exam but is able to provide a valid official York University Registrar's Office Attending Physician's Statement, the resulting new percentage of their EECS 2011 Winter 2019 Final Exam in the final course grade will be eighty five percent (35% + 50%) = 85%.

Students who miss the EECS 2011 Fall 2019 Midterm Exam without submitting a valid official York University Registrar's Office Attending Physician's Statement, will receive a mark of zero for the EECS 2011 Fall 2019 Midterm Exam.

Classroom Etiquette
Photography, movie making, or voice recording during class or lab by any means is not permitted without the instructor’s or the TAs permission. If you are late use a seat on the outside of the class room, the professor will ask you to leave if you cause a disruption coming in late. The use of electronic devices (smart-phones, tablets, etc.) during lectures and tutorials is only permitted for education purposes.

General Policies
• Marked course work will be returned only during class. If you miss picking up the material during one class it will be made available to you in the next two classes.
• All appeals of marks for assignments, and mid-term exam must be made within one week from the day of posting of results and submitted to the appropriate TA (for assignments) or to the instructor (for mid-term exams).
• For all course mark appeals, you must fill out the form “Request for Remarking.pdf” that is posted in the course directory /cs/course/2011E, sign it, and submit the completed form during lectures. Appeals will not be done by in-person-meeting.
• The final examination is for evaluation purposes only, and the paper will not be returned or made available to students after it is marked. Each exam is checked three times for accuracy.

Reminders
• To pass the course, a minimum mark of 50% on the final exam is required.
• All students are expected to familiarize themselves with the following information:
  General information (http://calendars.registrar.yorku.ca/2013-2014/policies/index.htm)
  Senate policy on academic honesty and the academic integrity website (http://www.yorku.ca/secretariat/policies/document.php?document=69) and (http://www.yorku.ca/tutorial/academic_integrity/)
  Ethics review process for research involving human participants (http://www.yorku.ca/research/support/ethics/)
  Course requirement accommodation for students with disabilities, including physical, medical, systemic, learning and psychiatric disabilities (http://www.yorku.ca/secretariat/policies/document.php?document=68)
  Additional resources related to add/drop courses, student life, academic resources, campus services, …etc. can be found at this link: http://www.yorku.ca/yorkweb/cs.html

ACADEMIC INTEGRITY LINKS
• Senate Policy on Academic Honesty - http://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/
• Academic Integrity - http://lassonde.yorku.ca/academic-integrity

STUDENT LINKS
LAND ACKNOWLEDGEMENT

- We acknowledge our presence on the traditional territory of many Indigenous Nations. The area known as Tkaronto has been care taken by the Anishinabek Nation, the Haudenosaunee Confederacy, the Huron-Wendat, and the Métis. It is now home to many Indigenous Peoples. We acknowledge the current treaty holders, the Mississaugas of the New Credit First Nation. This territory is subject of the Dish With One Spoon Wampum Belt Covenant, an agreement to peaceably share and care for the Great Lakes region.
- The Indigenous Framework for York University: A Guide to Action can be found here: http://indigenous.info.yorku.ca/
- Meaning of a land acknowledgement: http://healthydebate.ca/opinions/indigenous-land-acknowledgements

Many courses utilize Moodle, York University's course website system. If your course is using Moodle, click here to access it.

Moodle @ York University