Computer Science E-22
Data Structures

Harvard University Extension School
Fall 2016

Syllabus

Overview
A survey of fundamental data structures for information processing, including lists, stacks, queues, trees, and graphs. The course explores the implementation of these data structures (both array-based and linked representations) and examines classic algorithms that use these structures for tasks such as sorting, searching, and text compression. The Java programming language will be used to demonstrate the concepts discussed in lecture, and programming problems must be completed in Java. Key notions of object-oriented programming, including encapsulation and abstract data types, are emphasized.

Prerequisites
A good working knowledge of Java (at least a grade of B in CSCI E-10b or the equivalent). If your background is in another language, you will need to quickly come up to speed with Java, and you may want to consider first taking Computer Science E-10b. You should also consider taking E-10b if you have had little or no prior experience with recursion.

Instructor
David G. Sullivan, Ph.D. (sullivan@post.harvard.edu)
Senior Lecturer on Computer Science, Boston University

Teaching Assistants
Alex Breen (abreen@bu.edu)
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and possibly one or more others to be announced

Meeting Times and Places
lectures: Wednesdays, 7:40-9:40 p.m., Harvard Hall, room 104
sections: weekly one-hour meetings; times and locations TBA
Distance-education students: The lectures will be streamed live online; in addition, recorded videos of the lecture will be available within 24-48 hours of the original lecture. The sections will also be available online. All of the other aspects of the course are "live." This means that you are responsible for homework, exams, and all other work according to the posted dates. See the exam policy below for more information about exams.

Requirements

1. Problem sets: five assignments including a combination of written exercises and programming problems. All programming problems ***must be completed in Java***, and they must compile and run in order to be eligible for full credit. Students taking the course for graduate credit will complete additional work on most assignments.
2. Midterm exam
3. Final exam
4. Programming project (*graduate-credit students only*): an extra programming project that we will assign for you to complete during the last six weeks of the course. The grade for this project will be factored into the homework portion of your grade.

Important note: The problem sets tend to be fairly time-consuming. Don't wait until the last minute to begin them! You should plan on devoting approximately 10-20 hours of work per week. If you have other major time commitments, you should reconsider whether to take this course.

Grading Policies

Late penalties: Homework is due prior to the start of lecture. If it is submitted more than 10 minutes after the start of lecture, it will be considered a full day late. There will be a 10% deduction for homework that is up to four days late, and a 20% deduction for homework that is 5-7 days late. ***We will not accept any homework that is more than 7 days late.*** Plan your time carefully, and don't wait until the last minute to begin an assignment. Starting early will give you ample time to ask questions and obtain assistance.

Determining the final grade:

homework	50%
midterm exam	17%
final exam	33%

The exams will count for larger percentages if doing so improves your final grade.

An EXT (extension) grade will be granted only in extreme circumstances (e.g., illness), and only when appropriate documentation has been provided. Please bring any such circumstances to Dr. Sullivan's attention as soon as possible.

Exam Policy for the Distance Education Program

Students whose primary residence throughout the term is in the six-state New England region (CT, ME, MA, NH, RI, VT) are expected to take the midterm and final examinations on campus as scheduled. Students whose primary residence throughout the term is outside of New England are expected to arrange to take their exams at alternate locations by finding a qualified proctor and submitting an online proctored examination form no later than one week before the on-campus exam date. See the course website for instructions on how to submit the proctor information online. Students should contact Academic Services, 617-495-0977, if they have any questions about this policy.

Academic Conduct

Unless otherwise stated, all work submitted as part of this course is expected to be your own. You may discuss the main ideas of a given problem with other students (provided that you acknowledge doing so in your solution), but you must write the actual solution by yourself. This includes both programming assignments and other types of problems that we may assign.

Prohibited behaviors include:

- copying all or part of another person's work, even if you subsequently modify it
- viewing all or part of another student's work
- showing all or part of your work to another student
- consulting solutions from past semesters, or those found in books or on the Web.

You are also responsible for understanding Harvard Extension School policies on academic integrity:
www.extension.harvard.edu/resources-policies/student-conduct/academic-integrity
Not knowing the rules, misunderstanding the rules, running out of time, submitting "the wrong version", or being overwhelmed with multiple demands are not acceptable excuses. There are no excuses for failure to uphold academic integrity.

If we believe that a student is guilty of academic dishonesty, we will refer the matter to the Administrative Board of the Extension School, who could require withdrawal from the course and suspension from all future work at the School.

Other Extension School Policies

We also expect you to know and adhere to the general policies and procedures of the Extension School. You can find more information here:
http://www.extension.harvard.edu/resources-policies

Accessibility Services

The Extension School is committed to providing an accessible academic community. The Accessibility Services Office offers a variety of accommodations and services to students with documented accessibility issues. Please visit the following site for more information:
www.extension.harvard.edu/resources-policies/resources/disability-services-accessibility

Textbooks

- Computer Science E-22 coursepack. This will be available for download from the course website. More information will be given during the first lecture.
- Optional readings will be also given from the following book:
  - *Data Structures & Algorithms in Java, 2nd edition* by Robert Lafore (SAMS Publishing, 2003, ISBN 9780672324536).

  This book is not required, but you may find it useful to purchase it. It will be available for purchase at the Harvard Coop, and it will also be on reserve in Grossman Library.

Schedule

1	August 31	Introduction. Abstract data types and object-oriented programming
2	September 7	Recursion and backtracking
3	September 14	Sorting and algorithm analysis I
4	September 21	Sorting and algorithm analysis II *Problem set 1 due*
5	September 28	Linked lists
6	October 5	Lists, stacks, and queues I *Problem set 2 due*
7	October 12	Lists, stacks, and queues II
8	October 19	**Midterm exam** (first hour) State-space search (second hour)
9	October 26	Binary trees and Huffman encoding Binary search trees *Problem set 3 due*
10	November 2	Balanced search trees (2-3 and B-trees) Heaps and priority queues
11	November 9	Heaps and priority queues (cont.) Hash tables
12	November 16	Graphs I *Problem set 4 due*
13	November 23	*Thanksgiving break. No class.*
14	November 30	Graphs II
15	December 7	Wrap-up and review *Problem set 5 due*
	December 9	*Programming projects due from grad-credit students*
16	December 14	**Final exam**

Other important dates:
August 28: regular registration ends
September 6: late registration ends; course drop deadline for full-tuition refund
September 13: course drop deadline for half-tuition refund
November 25: Last day to withdraw for a grade of WD (no refund)