CAS CS 112: Introduction to Computer Science II

Boston University, Spring 2018

Syllabus

Description: The second course for computer science majors and anyone seeking a rigorous introduction. Covers advanced programming techniques and data structures using the Java language. Topics include searching and sorting, recursion, algorithm analysis, linked lists, stacks, queues, trees, and hash tables.

Prerequisites: CAS CS 111, or the equivalent. If you have not had significant prior experience with recursion, you are strongly encouraged to take CS 111 first.

Instructors
A1/C1: Christine Papadakis-Kanaris (cpk@cs.bu.edu, PSY 228B, 64 Cummington Mall)
B1: David G. Sullivan, Ph.D. (dgs@cs.bu.edu, PSY 228D, 64 Cummington Mall)
See the course website for the schedule of instructor, TF and CA office hours.

Teaching Fellows/Assistants (TFs/TAs)
Andy Huynh (ahuynh@bu.edu)
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Course Assistants (CAs)
We are fortunate to have a number of undergraduate course assistants (CAs) as members of the course staff. They will be working with you in the labs and holding office hours each week. See the course website for their names and contact information, and for the schedule of office hours.

Meeting Times and Places
lectures: section A1: TuTh, 9:30-10:45 am, CAS B12
section B1: MWF, 1:25-2:15 pm, KCB 101
section C1: TuTh, 12:30-1:45 pm, COM 101
lab: a weekly, one-hour session; see your schedule for the time and location
Important: You must also be able to take the midterm exams, which will be held on two Wednesday evenings (2/21 and 3/28) from 6:30-7:45 p.m. We will ***not*** meet on any other Wednesday evenings.

Course Website: http://www.cs.bu.edu/courses/cs112

Requirements and Grading
1. Weekly problem sets and final project (40% of the final grade)
2. Exams: two midterm exams (20%) and a final exam (30%)
3. Preparation and participation (10%)

To pass the course, you must earn a passing grade for each of these three components.

Collaboration Policy

You are strongly encouraged to collaborate with one another in studying the lecture materials and preparing for quizzes and exams.

Problem sets will include two types of problems:

- *individual-only* problems that you must complete on your own
- *pair-optional* problems that you may complete alone or with a partner.

For both types of problems, you may discuss ideas and approaches with others (provided that you acknowledge this in your solution), but such discussions should be kept at a high level, and should not involve actual details of the code or of other types of answers. **You must complete the actual solutions on your own** (or, in the case of a pair-optional problem, with your partner if you choose to use one).

Rules for working with a partner on pair-optional problems:

- You may *not* work with more than one partner on a given assignment. (However, you are welcome to switch partners between assignments.)
- **You may *not* split up the work and complete it separately.**
- **You must work *together at the same computer* for every problem that you complete as a pair.** While you are working, the screen should be visible to both of you. One person should type, while the other person observes, critiques, and plans what to do next. You should switch roles periodically, and your solution should be a true collaborative effort.
- You must *both* submit the same solution to each problem that you did as a pair, and you must clearly indicate that you worked on the problem as a pair by putting your partner's name at the top of the file.

Academic Misconduct

We will assume that you understand BU's Academic Conduct Code:
http://www.bu.edu/academics/policies/academic-conduct-code

Prohibited behaviors include:

- copying all or part of someone else's work, even if you subsequently modify it; this includes cases in which someone tells you what you should write for your solution
- viewing all or part of someone else's work (with the exception of work that you and your partner do together on a pair-optional problem)
- showing all or part of your work to another student (with the exception of work that you and your partner do together on a pair-optional problem)
- consulting solutions from past semesters, or those found online or in books
- posting your work where others can view it (e.g., online).

Incidents of academic misconduct will be reported to the Academic Conduct Committee (ACC). The ACC may suspend/expel students found guilty of misconduct. ***At a minimum, students who engage in misconduct will have their final grade reduced by one letter grade (e.g., from a B to a C).***

Other Policies

Late problem sets: Problem sets must be submitted by the date and time listed on the assignment (typically by 11:59 p.m.). There will be a 10% deduction for submissions up to 24 hours late, and a 20% deduction for submissions between 24 and 48 hours late. **We will not accept any homework that is more than 48 hours late.** Plan your time carefully, and don't wait until the last minute so you will have ample time to ask questions and obtain assistance from the course staff.

Pre-lecture preparation: To help you prepare for lecture, you will typically be required to read or review some online materials. You will also be required to perform some type of brief task (an online quiz or other exercise) to demonstrate that you have completed the necessary preparation. Your work on these tasks will not typically be graded for correctness, but it should demonstrate that you have adequately prepared for lecture. The pre-lecture tasks must be submitted by the specified date and time. **Late pre-lecture work will not be accepted**.

The *attendance/participation* portion of your grade will be based on your consistent attendance at the lectures and lab sessions, and on your participation in the activities for each class. In particular, you must participate in small-group activities during lecture in which you will discuss questions with other students and "vote" on the answers. These activities are designed to deepen your understanding of the material, and you will be graded on your participation, *not* on the correctness of your answers. To accommodate unavoidable absences or lateness, you will receive full credit for attendance as long as you make at least 85% of the votes over the course of the semester and attend 85% of the lab sessions. **Voting for someone else is not allowed, and will result in a lowering of the participation grade of both of the students involved.**

The final exam will replace your lowest problem-set grade if doing so helps your final grade. The final exam will also replace your lowest midterm-exam grade if doing so helps your final grade.

The final grades are *not* curved. The performance of the class as a whole is taken into account when assigning letter grades, but this can only improve your grade, not harm it.

Extensions and makeup exams will only be given in *documented* cases of serious illness or other emergencies.

You cannot redo or complete extra work to improve your grade.

Incompletes will not be given except in extraordinary circumstances.

Course Materials

Textbook: You are not required to purchase a textbook. Instead, we will be assigning readings from freely available online resources. If you are interested in purchasing a Java reference book, we will recommend some possible titles in lecture.

In-class software: We will be using the Top Hat platform for in-class activities and attendance. More detail will be provided in class.

Schedule (tentative)

Week	lecture dates	topics, exams, assignments, and special dates
0	A1/C1: 1/18 B1: 1/19	Course overview and introduction Java basics
1	A1/C1: 1/23, 1/25 B1: 1/22, 1/24, 1/26	Control structures, methods, and data types in Java Arrays; memory management
2	A1/C1: 1/30, 2/1 B1: 1/29, 1/31, 2/2	Object-oriented programming and abstract data types *1/31: last day to add a class* **Problem Set 1 due on 1/30**
3	A1/C1: 2/6, 2/8 B1: 2/5, 2/7, 2/9	Recursion and backtracking **Problem Set 2 due on 2/6**
4	A1/C1: 2/13, 2/15 B1: 2/12, 2/14, 2/16	Sorting and algorithm analysis **Problem Set 3 due on 2/13**
5	A1/C1: 2/22 B1: 2/21, 2/23	Sorting and algorithm analysis (cont.) *No lectures on 2/19 or 2/20 (Presidents' Day)* *2/22: last day to drop without a 'W'* **Midterm 1 on 2/21 from 6:30-7:45 pm**
6	A1/C1: 2/27, 3/1 B1: 2/26, 2/28, 3/2	Linked lists **Problem Set 4 due on 2/27**
		Spring break
7	A1/C1: 3/13, 3/15 B1: 3/12, 3/14, 3/16	Lists, stacks, and queues Iterators
8	A1/C1: 3/20, 3/22 B1: 3/19, 3/21, 3/23	Lists, stacks, and queues (cont.) **Problem Set 5 due on 3/20**
9	A1/C1: 3/27, 3/29 B1: 3/26, 3/28, 3/30	Binary trees Huffman encoding *3/30: last day to drop a class with a 'W'* **Midterm 2 on 3/28 from 6:30-7:45 pm**
10	A1/C1: 4/3, 4/5 B1: 4/2, 4/4, 4/6	Binary search trees **Problem Set 6 due on 4/3**
11	A1/C1: 4/10, 4/12 B1: 4/9, 4/11, 4/13	Balanced search trees (2-3 and B-trees) Heaps and priority queues
12	A1/C1: 4/17, 4/19 B1: 4/18, 4/20	Heaps and priority queues (cont.) *B1: No lecture on 4/16 (Patriots' Day)* **Problem Set 7 due on 4/17**
13	A1/C1: 4/24, 4/26 B1: 4/23, 4/25, 4/27	Hash tables
14	A1/C1: 5/1 B1: 4/30, 5/2	Wrap-up **Problem Set 8 due on 5/1** *5/3-5/6: Study period*
15		**Final exam: time and date TBD** **Please wait until your instructor posts the date. The Registrar's initial info will be incorrect.** ***Make sure that you are available for the entire exam period – through Friday evening, May 11!***