CAS CS 112: Introduction to Computer Science II

Boston University, Spring 2022

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. Carries MCS divisional credit in CAS. Fulfills a single unit in each of the following BU Hub areas: Quantitative Reasoning II, Creativity/Innovation, Critical Thinking.

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, MCS 208, 111 Cummington Mall)
B1: David G. Sullivan, Ph.D. (dgs@bu.edu, PSY 228D, 64 Cummington Mall)
See the course website for the schedule of instructor, TA and CA office hours.

Teaching Assistants (TAs)

Ivan Izhbirdeev (ivani@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 info.

Lectures and Labs

lectures: section A1: TuTh, 12:30 am-1:45 pm, LAW Auditorium
section B1: MWF, 1:25-2:15 pm, KCB 101
section C1: TuTh, 2:00-3:15 pm, LAW Auditorium
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 (3/2 and 4/6) from 6:30-8:00 p.m. We are not scheduled to meet on any other Wednesday evenings.

COVID-19-Related Class Expectations

To promote a safe learning environment, students must:

- comply with the University mandates for COVID-19 vaccination, screening, testing and contact tracing
- wear a face covering at all times during class; ***it should fully cover both your mouth and your nose***.

Course Website: http://www.cs.bu.edu/courses/cs112
In addition, announcements and some course materials will be posted Blackboard.

Requirements and Grading

1. Weekly problem sets (25% of the final grade)
2. Exams: two midterm exams (30%) and a final exam (35%)
3. Participation (10%)

To pass the course, you must earn a passing grade on each of components 1 and 2.

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:

- *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 or via a Zoom meeting) for all problems completed as a pair, and your work must be a collaborative effort.
- You and your partner 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

You should also carefully review the CS department's page on academic integrity:
http://www.bu.edu/cs/undergraduate/undergraduate-life/academic-integrity

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 to 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)
- receiving assistance from others or collaborating with others during an exam, or consulting materials except those that are explicitly allowed.

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

Laptops: Students taking CS courses are expected to have a laptop capable of running a currently supported version of Microsoft Windows, Mac OS X, or Linux. See this page for more info: https://www.bu.edu/cs/undergraduate/undergraduate-life/laptops

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. **We will not accept any homework that is more than 24 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 complete an assigned reading and/or watch one or two short videos. This preparation is not graded, but failing to complete it will make it more difficult for you to understand the material presented in lecture.

The *attendance/participation* portion of your grade will be based on your consistent attendance at the lectures and lab sessions. Attendance will be taken at every lab, and you must attend 85% of the lab sessions to get full credit for lab participation. We will also periodically take attendance at lecture, and you must be present for 85% of the lectures at which attendance is taken to get full credit for lecture participation.

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 in 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: 1/20 B1: 1/21	Course overview and introduction Java basics
1	A1/C1: 1/25, 1/27 B1: 1/24, 1/26, 1/28	Conditional execution and user input Static methods; loops; variable scope
2	A1/C1: 2/1, 2/3 B1: 1/31, 2/2, 2/4	Primitives, objects, and references Arrays Object-oriented programming *2/2: last day to add a class* **Problem Set 1 due on 2/1**
3	A1/C1: 2/8, 2/10 B1: 2/7, 2/9, 2/11	Object-oriented programming (cont.) Inheritance and polymorphism **Problem Set 2 due on 2/8**
4	A1/C1: 2/15, 2/17 B1: 2/14, 2/16, 2/18	Inheritance and polymorphism (cont.) Memory management Recursion and the stack **Problem Set 3 due on 2/15**
5	A1/C1: 2/24 B1: **2/22**, 2/23, 2/25	Recursive backtracking Sorting and algorithm analysis *No lecture on 2/21 (Presidents' Day)* *B1: lecture on 2/22 (Monday schedule)* *2/24: last day to drop without a 'W'* **Problem Set 4 due on 2/22**
6	A1/C1: 3/1, 3/3 B1: 2/28, 3/2, 3/4	Sorting and algorithm analysis (cont.) **Midterm 1 on 3/2 from 6:30-8:00 pm**
		Spring break
7	A1/C1: 3/15, 3/17 B1: 3/14, 3/16, 3/18	Sorting wrap-up Linked lists
8	A1/C1: 3/22, 3/24 B1: 3/21, 3/23, 3/25	Linked lists (cont.) List ADT **Problem Set 5 due on 3/22**
9	A1/C1: 3/29, 3/31 B1: 3/28, 3/30, 4/1	List ADT (cont.); iterators Stack and queue ADTs Java generics *4/1: last day to drop a class with a 'W'* **Problem Set 6 due on 3/29**
10	A1/C1: 4/5, 4/7 B1: 4/4, 4/6, 4/8	Tree basics; binary trees Binary search trees **Midterm 2 on 4/6 from 6:30-8:00 pm**
11	A1/C1: 4/12, 4/14 B1: 4/11, 4/13, 4/15	Binary search trees (cont.); balanced trees
12	A1/C1: 4/19, 4/21 B1: 4/20, 4/22	Hash tables *B1: No lecture on 4/18 (Patriots' Day)* **Problem Set 7 due on 4/19**

13	A1/C1: 4/26, 4/28 B1: 4/25, 4/27, 4/29	Heaps and priority queues
14	A1/C1: 5/3 B1: 5/2, 5/4	Wrap-up **Problem Set 8 due on 5/3** *5/5-5/8: Study period*
15		**Final exam: time and date TBD** **Please wait until your instructor informs you of the date. The initial date posted by the Registrar will <u>not</u> be correct.** ***Make sure that you are available for the entire exam period – up to and including Friday evening, May 13!***