CAS CS 112: Introduction to Computer Science II

Boston University, Fall 2020

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: Wayne Snyder (snyder@bu.edu)
B1: Christine Papadakis-Kanaris (cpk@cs.bu.edu)
See the course website for the schedule of instructor, TF and CA office hours.

Teaching Fellows/Assistants (TFs and TA)

Will Fazier (<u>wfrazier@bu.edu</u>) Hassan Saidi (hsaadi13@bu.edu) Tristan Marchand (<u>tmarch@bu.edu</u>)

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

A1 lecture: TuTh 11:00a.m.-12:15 p.m., remote B1 lecture: TuTh, 12:30-1:45 p.m., remote A1/B1 tutorial: W 6:00-8:00 p.m, CGS 129 in person hybrid Lab: a weekly, one-hour session; see your schedule for the time and location

In keeping with the University's *Learn from Anywhere* (LFA) model, both sections of CS112 will offer both in person and remote instruction. Specifically:

- Lectures for both A1 and B1 will run fully remote during their scheduled T/Th time frames. All Lectures will be streamed live using Zoom. Students are expected and encouraged to attend live during their scheduled section, however, recorded lectures will be posted as soon as they are available.
- In person instruction will be offered (for both sections) weekly by Christine Papadakis during our Wednesday evening scheduled block. These sessions will run in the form of weekly tutorials. Students who would like in person instruction can use this time for more depth of instruction on specific topics. These sessions will also be live streamed, but not recorded.
- Labs will be offered for both remote and in person instruction. Students who choose to attend lab in person will have the opportunity do so in a safe manner while insuring social distancing requirements are maintained. Labs that run in a remote setting will also be recorded. Students are **expected** to attend lab on a weekly basis (either in person or remote). Those students who are remote and in a different time zone will have the ability to join a remote lab that is offered during a more convenient time for your time zone.
- To allow for social distancing during in person instruction, we will create weekly rotations and/or sign-ups to ensure that we follow University guidelines.
- All office hours will be offered remote only. There will be **no exceptions** for the TFs and CAs. Students who wish to have an in person meeting will have the opportunity to request an in person meeting with Professor Papadakis only.
- All problem set collaboration should also be done remotely. You can use a feature of Virtual Studio Code which will allow you to share code.

Exams

The exams will be administered online, fully remote using an approach that will be announced later. **Please note that we may require that you use a webcam and microphone during the exams.** We also strongly recommend that you have access to a mobile phone with a data connection in case of a Wi-Fi outage.

- The midterm exam(s) will take place during the Wednesday evening scheduled time block. This allows students in all time zones to take the exam at the exact same time. Please note that *the dates specified on this syllabus are tentative and subject to change*.
- The final exam information posted by the Registrar is not realistic in the Covid era. Be sure that you are available for the entire final-exam period up to and including Saturday evening, December 19!

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

Requirements and Grading

- 1. Weekly problem sets (35% of the final grade)
- 2. Exams: two midterm exams (25%) and a final exam (35%)
- 3. Lab attendance and participation (5%)

To pass the course, you must earn a passing grade for each of these three components. These percentiles are guidelines and may change at the discretion of the instructor to better reflect the course.

Collaboration Policy

You are 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* (in a shared virtual environment) for every problem that you complete as a pair. While you are working, the screen should be visible to both of you. One person can 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).

It is important that you review in detail the information available on the following link: http://www.bu.edu/cs/undergraduate/undergraduate-life/academic-integrity/

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. 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.

The *attendance/participation* portion of your grade will be based on your consistent attendance and participation in lab sessions, and on your participation in the assigned activities for each lab.

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: None

Schedule (tentative)

Week	lecture dates	topics, exams, assignments, and special dates
0	9/3	Course overview and introduction
1	9/8,	Understanding Datastructures and the compiled program paradigm
	9/10,	Java I/O; Control structures I (Java conditionals)
	,	
2	9/15,	Java Static Methods, Scope of Variables
	9/17.	Java Loops: More with Scope: Primitives and References and the JMM
	9/20	PS1 due*
3	9/22.	Java Memory Model: Representing Sequences Java Arrays
	9/24	Why classes? OO programming and the Object Model:
	9/27	PS2 due**
	<i>>/2/</i>	
4	9/29.	OOP: Inheritance
	10/1.	Inheritance and Polymorphism wrap-up
	10/1,	
5	10/6.	Inheritance and Polymorphism: ArrayBag Case study
	10/6.	PS3 due**
	10/8	Recursion (and the Stack)
	10/0	
		(Note 10/7 is the last day to drop without a "W" grade.)
6	10/11	PS4 due**
-	10/13*.	Classes run on a Monday schedule
	10/14	Midterm #1
	10/15	Recursive Backtracking: Introduction to Algorithms Big-O
	10/10	
7	10/20,	Sorting Algorithms, the basics (Selection, Bubble, Insertion)
	10/23	PS5 due*
	10/22	Sorting Algorithms Divide and Conquer Algorithms (quicksort)
8	10/27,	Sorting Algorithms (mergesort);
	10/29	Introduction to Linked Lists; Understanding references
	11/1	PS6 due**
9	11/3,	StringNode and List Traversals
	11/5	The List ADT
	11/8	PS7 due**
		(Note 11/6, last day to withdraw with a "W" grade.)
10	11/10,	The Stack ADT; The Queue ADT;
	11/12	Introduction to Trees and Binary Trees
	11/15	PS8 due**
11	11/17	
11		Binary Search Trees and operations
		Midterm #2
	11/19	Balanced Trees, Heap Trees
	11/24	D20 4**
10	11/24	
12	11/24,	Heap I rees as priority queues; Heapsort
	11/26*	I nanksgiving break
	10/1	
15	12/1, 12/2	Hash Tables
	12/3	
14	12/10	Last Day of Classes;

	PS10 due
	Final exam: TBA
	**midterm and problem set due dates are tentative and subject to change.