

CAS CS 112: Introduction to Computer Science II

Boston University, Fall 2021

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 the following BU Hub areas: Quantitative Reasoning II, Creativity/Innovation, and 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.

Instructor

Christine Papadakis-Kanaris (cpk@cs.bu.edu), MCS 208

See the course website for the schedule of instructor and TF office hours.

Teaching Assistants (TFs)

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Meeting Times and Places

Lectures: section A1: T-Th, 11:00 am-12:15 pm, PHO 206*

section B1: T-Th, 12:30-1:45 pm, WED 130*

labs: see your schedule for the time

**Note: the lecture classroom location may change beginning the week of 9/6 if we can find an open lecture hall which will allow for both CS112 sections to meet back-to-back in the same lecture hall. A blackboard announcement will be sent if such a change takes place.*

COVID-19-Related Class Expectations

To promote a safe learning environment, those who attend lecture in person must:

- comply with University-mandated [COVID-19 testing and health attestation requirements](#)
- wear a [face covering](#) at all times during class and when in other public spaces
- contact Student Health Services at 617-353-3575 if you experience symptoms of COVID-19 (see <https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html>).

Exam(s) and Course Information to be provided on our Course Website:
<http://www.cs.bu.edu/courses/cs112>

Requirements and Grading

1. Weekly problem sets (20% of the final grade)
2. Exams: two midterm exams (30%) and a final exam (35%)
3. Labs, Quizzes, and Participation (15% of the final grade)

To pass the course, you must earn a passing grade on each of the first two 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 (e.g., via a Zoom meeting)** for every problem that you complete as a pair, and your solution must be a 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>

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 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)
- 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 20% 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 *participation* portion of your grade will be based on your active attendance in lecture and on completion of online questions connected to the lectures, and on your consistent participation in the lab sessions on Zoom.

Attendance will be taken during each lab section. If you cannot attend lab (on a given week) or need to attend a different section other than the one you are registered for, please e-mail your lab TA and inform them in advance.

Throughout the semester there will be up to four (pop) quizzes. The lowest grade will be dropped and there will be no make-ups allowed for any missed quizzes.

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

- You are *not* required to buy a textbook. Instead, we will provide detailed lecture slides and assign readings from freely available online resources.
- Required:** We will be using the Top Hat Pro platform. More detail will be provided in class.

Schedule (tentative)

Week	lecture dates	topics, exams, assignments, and special dates
0	9/2	Course overview and introduction
1	9/7, 9/9	Understanding Data structures and the compiled program paradigm Java I/O; Control structures I (Java conditionals)
2	9/14, 9/16, 9/17	Java Static Methods, Scope of Variables Java Loops; More with Scope; Primitives and References and the JMM PS1 due*
3	9/21, 9/23	Java Memory Model; Representing Sequences Java Arrays Why classes? OO programming and the Object Model;
4	9/28, 9/30	OOP; Inheritance Inheritance and Polymorphism wrap-up
5	10/5, 10/7	Inheritance and Polymorphism; ArrayBag Case study Recursion (and the Stack) (Note 10/7 is the last day to drop without a "W" grade.)
6	10/12*, 10/13 10/14	Classes run on a Monday schedule Midterm #1 Recursive Backtracking; Introduction to Algorithms Big-O
7	10/19, 10/21	Sorting Algorithms, the basics (Selection, Bubble, Insertion) Sorting Algorithms Divide and Conquer Algorithms (quicksort)
8	10/26, 10/28	Sorting Algorithms (mergesort); Introduction to Linked Lists; Understanding references
9	11/2, 11/4	StringNode and List Traversals The List ADT (Note 11/5, last day to withdraw with a "W" grade.)
10	11/9, 11/11	The Stack ADT; The Queue ADT; Introduction to Trees and Binary Trees

11	11/16 11/17 11/18	Binary Search Trees and operations Midterm #2 Balanced Trees, Heap Trees
12	11/23, 11/25*	Heap Trees as priority queues; Heapsort <i>Thanksgiving break</i>
13	11/30, 12/2	Hash Tables Hash Tables
14	12/7 12/9	Hash Tables and Huffman Codes Semester Review Final exam: TBA <i>**midterm and problem set due dates are tentative and subject to change.</i>