CAS CS 112: Introduction to Computer Science II

Boston University, Summer-I 2025

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

Teaching Assistants (TA)
Themis Nikas (tnikas@bu.edu)

Meeting Times and Places
Lectures: section A1: Mo,Tu,We, 10:00 am - 12:30 pm, CDS 364
section A3: Mo,Tu, We 1:30 - 4:00 pm, CDS 264
labs: see your schedule for the time.

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: one midterm exams (30%) and one final exam (35%)
3. Participation and Quizzes (15%)

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** 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.
- using online using tools that automate and/or assist with the writing of code or the completion of other types of solutions. **Please note that the use of ChatGPT is explicitly forbidden.**

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 24 hour late window for submission of Part II of the problem set, but with a 20% deduction. **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 completion of online questions connected to the lectures, and on your consistent participation in ***lecture*** and ***lab*** sessions.

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
1	5/20 *5/21** 5/22	Course overview and introduction - Java Basics: I/O, Variables and Java conditionals Lab session Java Methods; Java Loops
2	**5/26*** 5/27 5/28 5/29 *5/30**	**Memorial Day – no class** Variable Scope (static vs. local); Java Memory Model Java Arrays and the String API Classes and Objects, an introduction to OO programming *Lab session*
3	6/2 6/3 6/4 *6/5**	Classes and Objects: (Rectangle case study) Class Inheritance (Square class case study); Polymorphism Recursion and Introduction to Algorithms *Lab session*
4	6/9 6/10 6/11 *6/12**	Basic Sorting Analysis (selection/bubble sort) Insertion sort; Divide and Conquer sorting algorithms (Quick/Merge sort) Primitives, references, and an introduction to Linked Lists *Lab session*
5	6/16 6/17 6/18 **6/19***	Midterm Exam List ADT and List Iterators; Stack and Queue ADT Binary Trees and Search Trees; Balanced Trees: 2-3 Trees **University Holiday – no classes**
6	6/23 6/24 *6/25* **6/26***	Hash Tables; Introducing the Heap and Complete Trees Priority Queue; Heapsort *Study day or Lab day* **Final Exam (*tentative)**