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.

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

Teaching Assistants (TAs)
Aileen Chavez (aileenc@bu.edu)
Ivan Izhbirdeev (ivani@bu.edu)
Melissa Lin (mlin2022@bu.edu)
Tristan Marchand (tmarch@bu.edu)
Kelly Ruan (kruan@bu.edu)

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.

Meeting Times and Places

lectures: section A1: TuTh, 12:30 pm-1:45 pm, LAW AUD or remotely (see below)
section B1: MWF, 1:25-2:15 pm, YAW 613A or remotely (see below)
section C1: TuTh, 2:00-3:15 pm, LAW AUD or remotely (see below)
labs: see your schedule for the time; fully remote on Zoom (see below)
note: the Wed evening time in your schedule is only for the midterm exams (see below)

In keeping with the University’s Learn from Anywhere model:

- The lectures will be offered using a hybrid mode of instruction. Beginning with the second lecture, there will be in-person class meetings at the times listed in your schedule, but classes will also be live-streamed via Zoom for students who cannot attend in person.

- The first day of lecture will be fully remote. All students should attend lecture on Zoom that day. Links to the Zoom meetings for lecture will be provided on the course’s Blackboard Learn site before the first lecture.
• In-person lecture attendance will be managed using the **InClassLfA app**. Students who wish to attend class in person should use this app to indicate their preference for doing so.

• We encourage you to participate in the lectures either in person or on Zoom. However, if you cannot participate in a given lecture, there will be a recording that you can watch asynchronously. **To avoid falling behind, you should watch the recording within 24 hours of the original lecture.**

• **The weekly lab sessions will be fully remote. Students are expected to attend their lab session on Zoom at the time at which it is held.** Note that the letters of your lecture and lab do not need to match. For example, if you are in the A1 lecture, you can sign up for a B or C lab.

• Students who attend class in person or ask questions via audio on Zoom should be aware that they may be recorded. However, these recordings will only be shared with students and staff members who are part of the course.

**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](https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html)

• wear a **face covering** at all times during class and when in other public spaces

• maintain physical distancing of 6 feet from the nearest person at all times, including when entering and leaving the classroom

• 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](https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html)).

The instructors will follow the above guidelines, and students who choose to attend class in person must also adhere to them. Students who do not wish to follow these guidelines should take the class remotely.

**Exams**

The midterms and final exam will be administered online using an approach that we will announce later. You will be required to use a webcam and microphone during the exams. In addition, we strongly recommend that you have access to a mobile phone with a data connection in case of a Wi-Fi outage.

There will be two time options for each midterm exam. Students living in the US will be expected to take the midterms from 6:30-8:00 p.m. Eastern time on the Wednesday evenings mentioned in the schedule below (3/3 and 4/14). We will also schedule an alternate exam time for students whose time zone makes the Wednesday evening time impractical; this alternate time will be in the morning before the start of classes on either the day of the exam or the following day.

We will also offer two time options for the final exam, but we will not be able to determine them until midway through the semester. The initial exam information posted by the Registrar is likely to be incorrect. **Make sure that you are available for the entire final-exam period (through Sat. evening, May 8)!**
Course Website: http://www.cs.bu.edu/courses/cs112
In addition, announcements and some course materials will be posted on the course's Blackboard Learn site.

Requirements and Grading
1. Weekly problem sets (40% of the final grade)
2. Exams: two midterm exams (25%) and a final exam (30%)
3. Participation (5%; see below)

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](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, 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 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 the lab sessions on Zoom. You will receive full credit for participation if you answer at least 85% of the online lecture questions and if you participate in at least 85% of the lab sessions on Zoom. If you complete x% of the questions or participate in x% of the lab sessions for a value of x that is less than 85, you will get x/85 of the possible points.

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**

• 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)

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<thead>
<tr>
<th>Week</th>
<th>lecture dates</th>
<th>topics, exams, assignments, and special dates</th>
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</thead>
</table>
| 0    | A1/C1: 1/26, 1/28  
B1: 1/25, 1/27, 1/29 | Course overview and introduction; Java basics  
User input; conditional execution  
Static methods; loops |
| 1    | A1/C1: 2/2, 2/4  
B1: 2/1, 2/3, 2/5 | Loops (cont.); variable scope  
Primitives, objects, and references  
Arrays  
*2/5: last day to add a class* |
| 2    | A1/C1: 2/9, 2/11  
B1: 2/8, 2/10, 2/12 | Object-oriented programming  
Memory management  
**Problem Set 1 due on 2/12** |
| 3    | A1/C1: 2/18  
B1: 2/16, 2/17, 2/19 | Inheritance and polymorphism  
Bag data structure  
*No lecture on 2/15 (Presidents' Day)*  
*B1: lecture on 2/16 (Monday schedule)*  
**Problem Set 2 due on 2/19** |
| 4    | A1/C1: 2/23, 2/25  
B1: 2/22, 2/24, 2/26 | Recursion  
Recursive backtracking  
*3/1: last day to drop without a 'W'*  
**Problem Set 3 due on 2/26** |
| 5    | A1/C1: 3/2, 3/4  
B1: 3/1, 3/3, 3/5 | Recursive backtracking (cont.)  
Sorting and algorithm analysis  
**Midterm 1 on 3/3 or 3/4** (see page 2 above) |
| 6    | A1/C1: 3/9, 3/11  
B1: 3/8, 3/10, 3/12 | Sorting and algorithm analysis (cont.)  
**Problem Set 4 due on 3/12** |
| 7    | A1/C1: 3/16  
B1: 3/15, 3/17, 3/19 | Linked lists  
*A1/C1: No lecture on 3/18 (Wellness Day)* |
| 8    | A1/C1: 3/23, 3/25  
B1: 3/22, 3/24, 3/26 | Linked lists (cont.)  
List ADT; Iterators  
**Problem Set 5 due on 3/26** |
| 9    | A1/C1: 3/30, 4/1  
B1: 3/29, 4/2 | Stack and queue ADTs  
Java generics  
*B1: No lecture on 3/31 (Wellness Day)*  
*4/2: last day to drop a class with a 'W'* |
| 10   | A1/C1: 4/6, 4/8  
B1: 4/5, 4/7, 4/9 | Tree basics; binary trees  
Binary search trees  
**Problem Set 6 due on 4/6 (Tuesday)** |
| 11   | A1/C1: 4/13, 4/15  
B1: 4/12, 4/14, 4/16 | Binary search trees (cont.); balanced trees  
Hash tables  
**Midterm 2 on 4/14 or 4/15** (see page 2 above)  
**Problem Set 7 due on 4/18 (Sunday)** |
<table>
<thead>
<tr>
<th>Week</th>
<th>A1/C1: 4/20, 4/22</th>
<th>Hash tables (cont.) Heaps and priority queues B1: No lecture on 4/19 (Patriots’ Day)</th>
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<tbody>
<tr>
<td>12</td>
<td>B1: 4/21, 4/23</td>
<td>Hash tables (cont.) Heaps and priority queues B1: No lecture on 4/19 (Patriots’ Day)</td>
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<td>Final exam: time and date TBD Please wait until your instructor informs you of the date. The initial date posted by the Registrar will not be correct. Make sure that you are available for the entire exam period – up to and including Saturday evening, May 8!</td>
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