CAS CS 112: Introduction to Computer Science II
Boston University, Spring 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/C1: Christine Papadakis-Kanaris (cpk@cs.bu.edu, PSY 228B, 64 Cummington Mall)
B1: David G. Sullivan, Ph.D. (dgs@cs.bu.edu, PSY 228D, 64 Cummington Mall)
See the course website for the schedule of instructor, TF and CA office hours.

Teaching Fellows/Assistants (TFs/TAs)
Peilun Dai (peilun@bu.edu)
Ivan Izhbirdeev (ivani@bu.edu)
Xin Lu (xl@bu.edu)
Hao Yu (haoyu@bu.edu)
Ryan Yu (ryu1@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, 11:00 am-12:15 pm, CGS 511
         section B1: MWF, 1:25-2:15 pm, Law Auditorium
         section C1: TuTh, 12:30-1:45 pm, CGS 511
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 (2/26 and 4/15) from 6:30-8:00 p.m. We may meet on other Wednesday evenings for special topics or review sessions as necessary, but it will not be a regular occurrence.

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

Requirements and Grading
1. Weekly problem sets (25% of the final grade)
2. Exams: two midterm exams (30%) and a final exam (40%)
3. Preparation and participation (5%)
To pass the course, you must earn a passing grade for each of these three 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 at the same computer for every problem that you complete as a pair.** While you are working, the screen should be visible to both of you. One person should 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](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](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).

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, 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 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 midterm-exam grade if doing so helps your final grade. There will be no make-up exams for either midterm.

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)

<table>
<thead>
<tr>
<th>Week</th>
<th>lecture dates</th>
<th>topics, exams, assignments, and special dates</th>
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<tbody>
<tr>
<td>0</td>
<td>A1/C1: 1/21, 1/23, B1: 1/22, 1/24</td>
<td>Course overview and introduction; Java basics; User input; conditional execution</td>
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<tr>
<td>1</td>
<td>A1/C1: 1/28, 1/30, B1: 1/27, 1/29, 1/31</td>
<td>Static methods; loops; variable scope; Primitives, objects, and references</td>
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<tr>
<td>2</td>
<td>A1/C1: 2/4, 2/6, B1: 2/3, 2/5, 2/7</td>
<td>Arrays; Object-oriented programming; 2/3: last day to add a class; <strong>Problem Set 1 due on 2/7</strong></td>
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<td>3</td>
<td>A1/C1: 2/11, 2/13, B1: 2/10, 2/12, 2/14</td>
<td>Object-oriented programming (cont.); Inheritance and polymorphism; Memory management; <strong>Problem Set 2 due on 2/14</strong></td>
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<td>4</td>
<td>A1/C1: 2/20, B1: 2/18, 2/19, 2/21</td>
<td>Recursion and the stack; Recursive backtracking; <em>No lecture on 2/17 (Presidents' Day)</em>; B1: lecture on 2/18 (Monday schedule); <strong>Problem Set 3 due on 2/21</strong></td>
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<tr>
<td>5</td>
<td>A1/C1: 2/25, 2/27, B1: 2/24, 2/26, 2/28</td>
<td>Recursive backtracking (cont.); Sorting and algorithm analysis; 2/25: last day to drop without a 'W'; <strong>Midterm 1 on 2/26 from 6:30-8:00 pm</strong></td>
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<td>6</td>
<td>A1/C1: 3/3, 3/5, B1: 3/2, 3/4, 3/6</td>
<td>Sorting and algorithm analysis (cont.); <strong>Problem Set 4 due on 3/5 (Thursday)</strong>; <em>Spring break</em></td>
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<td>9</td>
<td>A1/C1: 3/31, 4/2, B1: 3/30, 4/1, 4/3</td>
<td>Iterators; stack and queue ADT; Java generics; 4/3: last day to drop a class with a 'W'</td>
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<td>10</td>
<td>A1/C1: 4/7, 4/9, B1: 4/6, 4/8, 4/10</td>
<td>Tree basics; binary trees; Binary search trees; <strong>Problem Set 6 due on 4/7 (Tuesday)</strong></td>
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<td>11</td>
<td>A1/C1: 4/14, 4/16, B1: 4/13, 4/15, 4/17</td>
<td>Binary search trees (cont.); balanced trees; Hash tables; <strong>Midterm 2 on 4/15 from 6:30-8:00 pm</strong>; <strong>Problem Set 7 due on 4/19 (Sunday)</strong></td>
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<td>Week</td>
<td>A1/C1: 4/28, 4/30</td>
<td>Heaps and priority queues (cont.) Wrap-up</td>
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<td>B1: 4/27, 4/29</td>
<td>Problem Set 8 due on 4/29</td>
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<td>5/1-5/3: Study period</td>
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<thead>
<tr>
<th>Week</th>
<th>A1/C1: 4/28, 4/30</th>
<th>Final exam: time and date TBD</th>
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<tr>
<td></td>
<td>B1: 4/27, 4/29</td>
<td>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 9!</td>
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