CAS CS 112: Introduction to Computer Science II  
Boston University, Fall 2019

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
B1: Christine Papadakis-Kanaris (cpk@cs.bu.edu, PSY 228B, 64 Cummington Mall)  
See the course website for the schedule of instructor, TF and CA office hours.

Teaching Fellows/Assistants (TF)  
Peilun Dai (peilun@bu.edu)
Andrew Wood (aewood@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 information, and for the schedule of office hours.

Meeting Times and Places
lectures: section B1: TuTh, 12:30-1:45 pm, CAS 522

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 from 6:30-8:00 p.m. We may meet on other Wednesday evenings for special topics or reviews as necessary.

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 (40%)
3. Preparation and participation (10%)

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 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)

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/](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, 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.

The attendance/participation portion of your grade will be based on your consistent attendance at the lectures and lab sessions, and on your participation in the activities for each class. In particular, you must participate in small-group activities during lecture in which your answers will be collected. These activities are designed to deepen your understanding of the material, and you will be graded on your participation, not on the correctness of your answers.

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)

<table>
<thead>
<tr>
<th>Week</th>
<th>lecture dates</th>
<th>topics, exams, assignments, and special dates</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>9/3, 9/5</td>
<td>Course overview and introduction; Java I/O; Control structures I (Java conditionals)</td>
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<tr>
<td>1</td>
<td>9/10, 9/12</td>
<td>Java Static methods; Control structures II (Java loops); Variable scope; Primitive and Reference Types and the Java Memory Model; Java Strings</td>
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<tr>
<td>2</td>
<td>9/17, 9/19, 9/20</td>
<td>Java Arrays; Introduction to Object-Oriented Programming PS1 due</td>
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<tr>
<td>3</td>
<td>9/24, 9/26, 9/27</td>
<td>OO programming and the object Model; Inheritance and Polymorphism PS2 due</td>
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<tr>
<td>4</td>
<td>10/1, 10/3, 10/4</td>
<td>ArrayBag Case study; Introduction to Recursion Recursion and the Stack PS3 due</td>
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<tr>
<td>5</td>
<td>10/8, 10/9, 10/10</td>
<td>Recursive Backtracking Midterm #1 Introduction to Algorithms; Basic Sorting algorithms (Selection) (Note 10/7 is the last day to drop without a “W” grade.)</td>
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<td>6</td>
<td>10/15*, 10/17</td>
<td>Classes run on a Monday schedule Divide and Conquer Algorithms</td>
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<td>7</td>
<td>10/20, 10/22, 10/24</td>
<td>PS4 due Sorting Algorithms wrap-up; Introduction to Linked Lists; Understanding references;</td>
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<td>8</td>
<td>10/29, 10/31, 11/1</td>
<td>String Node Case Study List Traversals; The List ADT PS5 due</td>
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<tr>
<td>9</td>
<td>11/5, 11/7, 11/8</td>
<td>The List ADT cont’d; List Iterators; The Stack ADT; Java Generics; PS6 due (Note 11/8, last day to withdraw with a “W” grade.)</td>
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<tr>
<td>10</td>
<td>11/12, 11/13, 11/14, 11/17</td>
<td>The Queue ADT; Introduction to Binary Trees; Midterm #2 Balanced Search Trees(2-3 Trees, B- Trees); PS7 due</td>
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<tr>
<td>11</td>
<td>11/19, 11/21</td>
<td>Balanced Trees wrap-up; Heap Trees; Heap Trees as priority queues Heapsort; Introduction to Hash Tables</td>
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<tr>
<td>12</td>
<td>11/26, 11/28*</td>
<td>Hash Tables Thanksgiving break</td>
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<tr>
<td>13</td>
<td>12/3, 12/5</td>
<td>Hash Tables Hash Tables wrap-up; Huffman Encoding</td>
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<td>14</td>
<td>12/10</td>
<td>Huffman Encoding; Course wrap-up Final exam: As posted by registrar.</td>
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