Description: The first course for computer science majors and anyone seeking a rigorous introduction. Develops computational problem-solving skills by programming in the Python language, and exposes students to variety of other topics from computer science and its applications. Carries MCS divisional credit in CAS. This course fulfills a single unit in each of the following BU Hub areas: Quantitative Reasoning II, Creativity/Innovation, Critical Thinking.

Prerequisites: none

Instructors
A1/C1/D1: David G. Sullivan, Ph.D. (dgs@cs.bu.edu)
B1: Vahid Azadeh-Ranjbar, Ph.D. (vranjbar@bu.edu)
See the course website for instructor, TF/TA and CA office hours.

Teaching Fellows/Assistants (TFs/TAs)
Benjamin Draves (dravesb@bu.edu)
Ashby Hobart (ahobart@bu.edu)
Melissa Lopez (mlopez99@bu.edu)
Rachel Peng (rvpeng@bu.edu)
Harrison Richmond (hrchmnd@bu.edu)
Siqi Wang (siqiwang@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 assisting you in the labs and holding office hours each week. See the course website for their names and contact info.

Lectures and Labs
lectures: section A1: MWF, 10:10-11:00 am, PHO 206 or remotely (see below)
section B1: MWF, 11:15 am-12:05 pm, PHO 206 or remotely (see below)
section C1: MWF, 12:20-1:10 p.m., STO B50 or remotely (see below)
section D1: MWF, 1:25-2:15 p.m., KCB 101 or remotely (see below)
lab: see your schedule for the time and location; also available remotely (see below)

In keeping with the University's Learn from Anywhere model, both the lectures and the labs will be offered using a hybrid mode of instruction. In particular:

- 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.
- To allow for social distancing, students who choose to attend class in person
will be divided into several “rotations” (groups who may attend a given class session in person) to allow everyone the option of attending some portion of the class sessions in person. Rotations will begin with the second lecture.

- Initial rotation assignments will be made on the basis of LfA status information that students have provided on Student Link.
- It may be necessary to adjust the rotations over the course of the semester. Students planning to attend class should check the course announcements on Blackboard Learn for the latest rotation details.
- Students who initially indicate an intention to attend class in person may switch at any time to remote-only participation. Please email your instructor.
- Students may also switch from participating remotely to attending class in person, but they must email their instructor and await instructions before attending class. Doing so will allow your instructor to adjust the rotations as needed to ensure adequate social distancing.
- We strongly encourage you to participate in the lectures and labs at the times at which they are held, either in person or on Zoom. However, doing so is not required. To accommodate students in different time zones, the lectures and at least one of the weekly lab sessions will be recorded and made available for you to watch asynchronously.
- Students attending class in person 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 wish to attend lecture or lab 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 on campus
- maintain physical distancing of 6 feet from the nearest person at all times, including when entering and leaving the classroom

The instructors, TFs and TAs will all 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. We may require that you 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 6:30-7:30 p.m. Eastern time on the Wednesday evenings mentioned in the schedule below (10/14 and 11/11). We will also schedule an alternate exam time for students whose time zone makes it impractical for them to take the Wednesday evening exam; this alternate time will likely 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 – up to and including Saturday evening, December 19!

Course Website:  http://www.cs.bu.edu/courses/cs111
In addition, announcements and some course materials will be posted on the course's Blackboard Learn site.

Requirements and Grading

1. Weekly problem sets and final project (45% of the final grade)
2. Exams: two midterm exams (25%) and a final exam (25%)
3. Pre-lecture quizzes (5%)

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 the 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 and your partner 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 to 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 from 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. Eastern time). There will be a 10% 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 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 watch one or two short videos and to complete a short online quiz. Your work on these quizzes will not typically be graded for correctness, but it should demonstrate that you have adequately prepared for lecture. The pre-lecture quizzes must be submitted by the specified date and time; **late submissions will not be accepted.**

You will receive full credit for the portion of the final grade based on the pre-lecture quizzes if you answer at least 85% of the quiz questions. If you answer x% of the questions 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-project grade cannot be replaced.) 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

- **Required:** CS 111 Coursepack. This contains all of the lecture notes for the course. More detail will be provided in class and in Lab 0.
- **Optional:** *CS for All* by Alvarado, Dodds, Kuenning, and Libeskind-Hadas (Franklin Beedle, 2019). This book is not required.
- **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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<tbody>
<tr>
<td>0</td>
<td>9/2, 9/4</td>
<td>Course overview and introduction</td>
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<tr>
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<td>Computing fundamentals with Scratch</td>
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<td>Getting started in Python</td>
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<td>Data types and expressions; strings</td>
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<td>No lab meetings this week</td>
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<td>1</td>
<td>9/9, 9/11</td>
<td>Lists</td>
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<td>A first look at functions</td>
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<td>Making decisions (conditional execution)</td>
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<td>No lecture on 9/7 (Labor Day)</td>
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<td>No lab meetings this week</td>
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<td><strong>Problem Set 0 (all) due on 9/13</strong></td>
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<td>2</td>
<td>9/14, 9/16, 9/18</td>
<td>Functions (cont.)</td>
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<td>Local and global variables; the runtime stack</td>
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<td>Recursion</td>
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<td>9/16: last day to add a class</td>
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<td><strong>Problem Set 1, part I due on 9/17</strong></td>
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<td><strong>Problem Set 1, part II due on 9/20</strong></td>
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<td>3</td>
<td>9/21, 9/23, 9/25</td>
<td>Higher-order functions and list comprehensions</td>
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<td>Recursive design</td>
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<td><strong>Problem Set 2, part I due on 9/24</strong></td>
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<td><strong>Problem Set 2, part II due on 9/27</strong></td>
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<td>4</td>
<td>9/28, 9/30, 10/2</td>
<td>Lists of lists; encryption and decryption</td>
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<td>Algorithm design</td>
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<td>Representing information</td>
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<td><strong>Problem Set 3, part I due on 10/1</strong></td>
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<td><strong>Problem Set 3, part II due on 10/4</strong></td>
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<td>Week</td>
<td>Dates</td>
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| 5    | 10/5, 10/7, 10/9 | Digital logic and circuit design  
*10/7: last day to drop without a 'W'*  
**Problem Set 4, part I due on 10/8**  
**Problem Set 4, part II due on 10/11** |                                                 |
| 6    | **10/13, 10/14, 10/16** | Digital logic and circuit design (cont.)  
Assembly language  
*No lecture on 10/12 (holiday)*  
*Lecture on 10/13 (Mon. schedule)*  
*No labs this week.*  
**Midterm 1 on 10/14 or 10/15** (see page 2 above)  
**Problem Set 5, part I due on 10/18** |                                                 |
| 7    | 10/19, 10/21, 10/23 | Assembly language (cont.)  
Loops and imperative programming  
Cumulative computations  
**Problem Set 5, part II due on 10/25** |                                                 |
| 8    | 10/26, 10/28, 10/30 | Design using loops  
Nested loops  
References; mutable vs. immutable data  
**Problem Set 6, part I due on 10/29**  
**Problem Set 6, part II due on 11/1** |                                                 |
| 9    | 11/2, 11/4, 11/6 | 2-D lists  
Object-oriented programming  
File processing  
Classes: creating your own types of objects  
*11/6: last day to drop a class with a 'W' or to designate a class Pass/Fail*  
**Problem Set 7, part I due on 11/5**  
**Problem Set 7, part II due on 11/8** |                                                 |
| 10   | 11/9, 11/11, 11/13 | Classes: creating your own types of objects (cont.)  
Dictionaries  
**Midterm 2 on 11/11 or 11/12** (see page 2 above)  
**Problem Set 8 (all) due on 11/15** |                                                 |
| 11   | 11/16, 11/18, 11/20 | Games and AI; inheritance  
Overview of the final project  
**Problem Set 9, part I due on 11/19**  
**Problem Set 9, part II due on 11/22** |                                                 |
| 12   | 11/23 | Finite-state machines  
*No lecture on 11/25 or 11/27 (Thanksgiving)*  
*No labs this week* |                                                 |
| 13   | 11/30, 12/2, 12/4 | Finite-state machines (cont.)  
Algorithm efficiency and problem "hardness"  
**Problem Set 10 (all) due on 12/3** |                                                 |
| 14   | 12/7, 12/9 | Problem "hardness" (cont.)  
Wrap-up  
**Final project due on 12/9**  
12/11-14: Study period |                                                 |
|   | Final exam: dates and times TBD  
|   | Please wait until your instructor informs you of the date. The initial exam info. posted by the Registrar is likely to be incorrect. 
|   | Make sure that you are available for the entire exam period – up to and including Saturday evening, December 19! |