CS 115 Introduction to Computer Science

Fall 2019

Instructor: Dr. Ravi Varadarajan
Meeting Times: MWF 11:00-11:50 am
Classroom Location: Burchard 118
Contact Info:
Email: rvarada2@stevens.edu
Office Hours: North Building 305, M F 2-3 pm and also by appointment

Required Labs and Lead Assistants:

This information will be posted in Canvas once available.

CA Office Hours:

The current location and hours will be posted in Canvas.

COURSE DESCRIPTION

This is an introduction to computer science, with an emphasis on programming (using the Python language). The topics include: design; algorithmic thinking; recursion; object- oriented programming; and some basics about computer systems: machine language, interpreters, compilers, and data representation.

COURSE OBJECTIVES

At a high level, the goals for this course are to introduce you to fundamental concepts of computer science and to help you develop your ability to design, implement, and test programs. Several skills are needed to successfully write programs, including analytical thinking, systematic experimentation, persistence and patience, organization and time management, interpersonal communication, and effective use of reference material (reading technical documentation, searching the web). We focus on algorithmic thinking and problem solving: Analyzing requirements, algorithm design, functions and procedural abstraction, pre- and post-conditions, data abstraction, and invariants. We will emphasize techniques for design, such as data driven programming and object orientation. We will touch briefly on topics that can be studied in

advanced courses, including, ranging from tools for testing and secure coding practices to the limits of what is computable.

STUDENT LEARNING OUTCOMES

After successful completion of this course, students will be able to acquire a stepwise refinement approach to problem solving using top-down algorithmic design methodology. They will be able to use python as a problem solving tool in their respective disciplines and adopt a functional and objected oriented approach to programming. They will also get a better understanding of computer system software architecture. Specifically with respect to programming the following are the desired course outcomes.

encoding - Explain binary encodings used by Python for integers, real numbers, characters, and images.

execution - Demonstrate the dynamic behavior of Python programs that include array access, conditional execution, looping, object reference, and method invocation (including recursive invocation), by showing successive states of a computation.

design – Given a problem description, able to sketch a design as pseudocode or flowchart.

coding – Given a design, can give a fairly efficient implementation in Python.

debugging – Resolve execution errors by using information provided by stack traces

resilient programming – Use exceptions to write programs that are resilient user input errors.

class - Write a non-trivial Python class that can be instantiated.

state - Explain the use of memory to implement static variables, instance variables, and local variables. Draw the state of the activation stack at any point in a computation.

inheritance - Given a Python class, write a non-trivial extended class.

testing – Unit test the module and determine proper test cases.

TENTATIVE COURSE SCHEDULE

Week	Topics Covered
1	Elementary concepts of computer programming
2	Simple Python data types, list concept
3	Definition of Python functions, if/then/else concept
4	Recursion on lists
5	Filtering, map/reduce

6	Functions as values
7	Hardware representation of basic data types
8	Assembly language programming using HMMM simulator
9	Iteration
10	Representation of data: atomic vs. composite, mutable vs. immutable
11	Sorting
12	Object oriented programming: class concept
13	Object oriented programming: inheritance
14	Fundamentals of data structures and algorithms

COURSE MATERIALS

Textbook(s):

CS For All (http://www.cs.hmc.edu/csforall/), by Christine Alvarado, Zachary Dodds, Geoff Kuenning, and Ran Libeskind-Hadas.

Other Readings:

Class lectures posted in Canvas.

Software:

During the first lab session you will download the Python programming environment. Be sure to use the latest version of Python 3.7. Both 2.7 and 3.7 are current branches of the language, but they have different feature sets. We will work out any bumps along the way.

Other resources:

1. The Python Tutorial (http://docs.python.org/tutorial/) is a good introduction to the language features, but not an introduction to programming. The Python Standard Library (http://docs.python.org/library/) page has comprehensive documentation.
2. *Think Python* by Allen B. Downey, 2nd edition. This is an open source book available in HTML and PDF formats at http://greenteapress.com/wp/think-python-2e/.

COURSE REQUIREMENTS AND GRADING

Computer science centers on programming, which is learned by doing. The main focus of your work will be programming assignments:

- In-class exercises, some of which will be graded (also known as pop quizzes).
- Labs, to be completed and graded during lab. Sometimes you will be required to work in pairs in the lab.
- Homework assignments, to be completed on your own time, usually due Wednesday just before midnight. The assignment, and your submission will be through Canvas.

The course score is a weighted average of the following categories.

- homework & in-class assignments 20%
  - Attendance, taken randomly, counts as 1 homework assignment.
- labs 20%
- first test 10%
- second test 15%
- third test 15%
- final exam 20%

The lowest lab score will be dropped. Homework may include a few extra-credit problems, which can compensate for occasionally missing a pop quiz. Letter grades, with plus and minus, are assigned using the standard scale in Canvas.

FINAL OPT–OUT: If your average on the first three tests is at least 85 (no less even by a point), you may skip the final exam and the test average will be used in place of your final exam score when calculating the course grade1. Otherwise, you MUST take the final exam. For this purpose, the first three tests (T1, T2, T3) will be weighted (25%, 37.5%, 37.5%) when calculating the average test score.

In the case when you take final exam, the grade recorded for the final exam will be the **max**(*final exam score*, *average score on first three tests*). So, it is always in your best interest to study and do as well as possible at all times.

Late Policy:

From time to time, all of us have trouble meeting deadlines, and as a near-beginning college student, you will be confronted with many difficult deadlines. But homework doesn't get easier to do if it's late, and falling behind can snowball. Hence, the following strict policy for homework will be put in place: 2% penalty for each hour past the deadline.

CS 115 General Policies and Expectations

- You, your instructor, and the teaching assistants are bound by the Stevens Honor System. Students are responsible for reading and understanding the course policies in these web pages and for announcements made in class and in the course email list.

- During lecture and lab sessions please refrain from talking on the phone, texting, or otherwise being impolite.
- You will be permitted to use the textbooks and course notes for programming assignments (homework and labs). During exams, you are not permitted to use notes, books, computing or communication devices unless a different policy is specifically announced by the instructor.
- Your full name and the Stevens pledge must appear on every submitted assignment.
- Each student will be assigned to a grader. If there is a problem with your grade, you must meet with your assigned grader.
- After grades are posted, you will have 3 days to inform your grader of a problem. If the problem cannot be resolved, contact the instructor. Do not try to request a grade change after three days, as you should learn from your mistakes in a timely fashion.

No make–up exams, labs, or quizzes

- You must go to your assigned lab session, unless given permission in advance by a TA.
- There are no make-ups for pop quizzes or exams with rare exceptions which may be considered case by case. Make-ups may be allowed for lab in case of documented illness.

Individual work

Except when groups are explicitly allowed, work must be done individually. You are encouraged to discuss the problems with your classmates but you must not share the details of the solutions. Not by email, not by text message, not by word of mouth, etc. If you are unsure whether you have shared too much, discuss the situation with the TA or instructor; it is your obligation to avoid even the appearance of cheating. We will use Moss (https://theory.stanford.edu/~aiken/moss/) on some assignments to verify your code is not too similar to that of other students in the class. If the system indicates a high likelihood of cheating, we will treat it as a violation of the Stevens Honor System.

Communication

- You are more than welcome to ask me questions as often as you want, and I will always be happy to help.
- The amount of help provided will be directly proportional to the amount of time left before the deadline. Please don't wait until the day before an assignment is due to see me; it'll be too late for me to provide help and too late for you to truly learn the material.
- Please do not ask me at the end of the semester to find creative ways to increase your grade. If you suspect that you are not doing well, come see me to rectify the situation as quickly as possible so that you will have a good grade at the end of the semester.

ACADEMIC INTEGRITY

Undergraduate Honor System

Enrollment into the undergraduate class of Stevens Institute of Technology signifies a student's commitment to the Honor System. Accordingly, the provisions of the Stevens Honor System apply to all undergraduate students in coursework and Honor Board proceedings. It is the responsibility of each student to become acquainted with and to uphold the ideals set forth in the Honor System Constitution. More information about the Honor System including the constitution, bylaws, investigative procedures, and the penalty matrix can be found online at http://web.stevens.edu/honor/

The following pledge shall be written in full and signed by every student on all submitted work (including, but not limited to, homework, projects, lab reports, code, quizzes and exams) that is assigned by the course instructor. No work shall be graded unless the pledge is written in full and signed.

"*I pledge my honor that I have abided by the Stevens Honor System*."

Reporting Honor System Violations
Students who believe a violation of the Honor System has been committed should report it within ten business days of the suspected violation. Students have the option to remain anonymous and can report violations online at www.stevens.edu/honor.

LEARNING ACCOMMODATIONS

Stevens Institute of Technology is dedicated to providing appropriate accommodations to students with documented disabilities. The Office of Disability Services (ODS) works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical disabilities, sensory impairments, psychiatric disorders, and other such disabilities in order to help students achieve their academic and personal potential. They facilitate equal access to the educational programs and opportunities offered at Stevens and coordinate reasonable accommodations for eligible students. These services are designed to encourage independence and self-advocacy with support from the ODS staff. The ODS staff will facilitate the provision of accommodations on a case-by-case basis.

Disability Services Confidentiality Policy

Student Disability Files are kept separate from academic files and are stored in a secure location within the Office of Disability Services. The Family Educational Rights Privacy Act (FERPA, 20 U.S.C. 1232g; 34CFR, Part 99) regulates disclosure of disability documentation and records maintained by Stevens Disability Services. According to this act, prior written consent by the student is required before our Disability Services office may release disability documentation or records to anyone. An exception is made in unusual circumstances, such as the case of health and safety emergencies.

For more information about Disability Services and the process to receive accommodations, visit https://www.stevens.edu/office-disability-services. If you have any questions please contact: Phillip Gehman, the Director of Disability Services Coordinator at Stevens Institute of Technology at pgehman@stevens.edu or by phone (201) 216-3748.

INCLUSIVITY

Name and Pronoun Usage

As this course includes group work and in-class discussion, it is vitally important for us to create an educational environment of inclusion and mutual respect. This includes the ability for all students to have their chosen gender pronoun(s) and chosen name affirmed. If the class roster does not align with your name and/or pronouns, please inform the instructor of the necessary changes.

Inclusion Statement

Stevens Institute of Technology believes that diversity and inclusiveness are essential to excellence in academic discourse and innovation. In this class, the perspective of people of all races, ethnicities, gender expressions and gender identities, religions, sexual orientations, disabilities, socioeconomic backgrounds, and nationalities will be respected and viewed as a resource and benefit throughout the semester. Suggestions to further diversify class materials and assignments are encouraged. If any course meetings conflict with your religious events, please do not hesitate to reach out to your instructor to make alternative arrangements.

You are expected to treat your instructor and all other participants in the course with courtesy and respect. Disrespectful conduct and harassing statements will not be tolerated and may result in disciplinary actions.

MENTAL HEALTH RESOURCES

Part of being successful in the classroom involves a focus on your whole self, including your mental health. While you are at Stevens, there are many resources to promote and support mental health. The Office of Counseling and Psychological Services (CAPS) offers free and confidential services to all enrolled students who are struggling to cope with personal issues (e.g., difficulty adjusting to college or trouble managing stress) or psychological difficulties (e.g., anxiety and depression). Appointments are strongly encouraged and can be made by phone (201-216-5177) or in-person (on the 7th floor of the Howe Center). CAPS is open from 9:00 am – 5:00 pm Mondays, Wednesdays, Thursdays and Fridays and from 9:00 am – 7:00 pm on Tuesdays during the Fall and Spring semesters.

EMERGENCY INFORMATION

In the event of an urgent or emergent concern about the safety of yourself or someone else in the Stevens community, please immediately call the Stevens Campus Police at 201-216-5105 or on their emergency line at 201-216-3911. These phone lines are staffed 24/7, year round. Other 24/7 resources for students dealing with mental health crises include the National Suicide Prevention Lifeline (1-800-273-8255) and the Crisis Text Line (text “Home” to 741-741). If you are concerned about the wellbeing of another Stevens student, and the matter is *not* urgent or time sensitive, please email the CARE Team at care@stevens.edu. A member of the CARE Team will respond to your concern as soon as possible.