Intro Programming/CS Essentials I
56:198:500/56:121:530 (Spring 2022)

Handout:	**1**	**Professor:**	**Suneeta Ramaswami**
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Course Outline

Course Description:

The course will provide a intensive introduction to programming in Python (as a representative language widely used by scientists and engineers). Specific programming topics that we will cover during the course will include: control statements; lists and dictionaries; classes, objects and methods; inheritance; polymorphism; exception handling; file streams and serialization; recursion; searching and sorting.

Learning Outcomes:

Students completing this course successfully can expect to develop a solid foundation in the following:

- using programming constructs in Python such as built-in data types; function specifications and implementation; iterative computation (loops); conditional evaluation of code; data input and output with files; and structured code with modules and functional abstraction.
- fluency with program development; debugging and testing code; and using basic version control with command line tools.
- exposure to programming paradigms such as imperative, object-oriented and functional programming.

Course Material and Lectures:

All course-related material such as the syllabus, programs covered during lectures, homework assignments, solutions to homework, and any announcements, will be available on the Canvas site for this course. **Lectures will take place on Mondays and Wednesdays from 3:45 to 5:05pm on Zoom until January 31.** Please use the Zoom tab on the course Canvas page to attend lectures. It is expected that we will switch to in-person instruction after January 31, which will be held on campus in BSB 416.

Face Mask Requirement:

All students are required to wear face masks when attending class, per university policy due to Covid-19. Please remember to wear a mask in the building and the classroom at all times.

Textbooks:

We will be using the following books/online sites as primary references for the course: the books are available for free (in PDF form, online) or can be purchased online from Amazon, Google Play Books, or the Apple Books Store.

- Think Python, 2nd Edition by Allen B. Downey, Green Tea Press, 2015. Abbreviated as TP2 below in the schedule for assigned readings. This book has short chapters and is really a beginner-level book.

- Dive Into Python 3 by Mark Pilgrim, APress, 2009. Abbreviated as DIP3 below in the schedule for assigned readings. This book is more advanced and has several interesting examples and case studies.

Office hours:

Regularly scheduled office hours will be held via Zoom on **Fridays 12:30pm - 2:30pm**. Use the Zoom link on Canvas to come to office hours. If you want to meet with me at a time other than the scheduled office hours (either in person in my office or on Zoom), please send email to set up an appointment.

Course Work:

1. Six programming assignments, worth a total of 400 points (#1 and #2 are worth 50 points each; #3, #4, #5, and #6 are worth 75 points each).
2. Ten quizzes (online on Canvas), worth 100 points.
3. Midterm exam, worth 200 points.
4. Final exam, worth 200 points.
5. Final programming project, worth 100 points.

Tentative dates for Assignments and Exams:

HW #1:	Out 1/24, Due 2/7	**HW #2**:	Out 2/7, Due 2/21
HW #3:	Out 2/21, Due 3/7	**HW #4**:	Out 3/11, Due 3/25
HW #5:	Out 3/25, Due 4/8	**HW #6**:	Out 4/8, Due 4/22
Midterm:	Wednesday, 3/9, in-class	**Final**:	Wednesday, 5/11, 2:45 - 4:45pm
Final project:	Out 4/6, Due 5/6		

Homework and Collaboration Policy: As an intensive introductory programming course for graduate students, this course is designed to be a hands-on course in which you spend a substantial amount of time writing and debugging programs. The depth and amount of material covered is substantial. Just reading the textbook will not be sufficient to understand the material. **Come to every lecture!** The lectures will be interactive: we will write and run programs in class, and you will be expected to ask (and answer) questions.

It is especially important that you start your assignment early enough in order to complete it by the deadline. I fully expect you to need the time you are given (14 days) to complete each assignment, so do not start working on your homework assignments at the last minute!! If you do, chances are high that your programs will not work correctly, or at all. Homework assignments **must** be submitted on the due date. Late hand-ins will be subject to a 50% deduction per day after the due date. There will be no incomplete grades handed out for this course (unless there is a compelling reason such as a certified health problem).

Academic Integrity: General discussion of course material with fellow students is allowed and encouraged. However, *all work on the homework assignments must be done independently.* Please respect this policy. Violations will be dealt with harshly and consequences of such violations are especially severe for graduate students.

Piazza: This term we will be using Piazza for class discussion. The system is highly catered to getting you help fast and efficiently from classmates and myself. Rather than emailing questions

to the teaching staff, I encourage you to post your questions on Piazza. You will find the link to Piazza on the navigation menu on the left hand side of the course Canvas page.

Please note that Piazza is meant to be a place to get help with questions about class material and homework assignments. It is not meant to be a place to share solutions to homework assignments or quizzes. Consistent with the homework and collaboration policy above, any student that shares solutions to homework assignments or quizzes is violating academic integrity and the matter will be dealt with as such.

Tentative Schedule of Topics to be Covered

To get the maximum benefit from lectures, it is strongly recommended that you make an initial reading of the chapter(s) indicated for each week *prior* to the lecture.

Dates	Topics	Reading
1/19, 1/24	Preliminaries: working in the Python ecosystem Variables, Expressions, Data types, Functions	Chs. 1,2,3 (TP2)
1/26, 1/31	Functions (deeper dive) Builtin modules like **math, random**	Ch. 2 (DIP3)
2/2, 2/7, 2/9	Conditionals and basic loops Developing functions that use loops and conditionals	Ch. 5 (TP2)
2/14, 2/16	Branching and loops, Strings	Chs. 7, 8 (TP2); Ch. 4 (DIP3)
2/21, 2/23	Builtin data structures for collections: Lists, Dictionaries, Tuples	Chs. 10, 11, 12 (TP2)
2/28, 3/2, 3/7	File processing, Data structure selection Regular expressions Ch. 5 (DIP3)	Chs. 13, 14 (TP2); Ch. 3 (DIP3)
3/9	**In-class Midterm Exam**	All material covered upto 3/2
3/14, 3/16	*Spring break*	
3/21, 3/23	Object-oriented programming	Ch. 15, 16 (TP2); Ch. 7.2-7.4 (DIP3)
3/28, 3/30	Classes: Methods, special methods, Operator overloading	Ch. 17 (TP2)
4/4, 4/6	Inheritance	Ch. 18 (TP2)
4/11, 4/13, 4/18	Iterators; Functional programming; the **itertools** and **functools** modules	Ch. 7.5-7.6, 8 (DIP3)
4/20, 4/25	Files (revisited); Exception handling; Unit testing	Ch. 9, 10, 11 (DIP3)
4/27, 5/2	Sorting and searching	Sorting Algorithms in Python