Intro Programming/CS Essentials I
56:198:500/56:121:530 (Fall 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;
- 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.

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 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 **Tuesdays 2-3pm** and **Fridays 12:30pm - 1:30pm**. 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 500 points (#1 and #2 are worth 50 points each; #3, #4, #5, and #6 are worth 100 points each).
2. Ten quizzes (online on Canvas), worth 100 points.
3. Midterm exam, worth 200 points.
4. Final exam, worth 200 points.

Tentative dates for Assignments and Exams:

HW #1:	Out 9/12, Due 9/26	**HW #2**:	Out 9/26, Due 10/10
HW #3:	Out 10/10, Due 10/24	**HW #4**:	Out 10/24, Due 11/11
HW #5:	Out 11/11, 11/28	**HW #6**:	Out 11/28, Due 12/14
Midterm:	Wednesday, 10/26, in-class	**Final**:	TBD

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 to 18 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 must be reported to the Dean's office and I hope never to have to do this.

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
9/7, 9/12	Preliminaries: working in the Python ecosystem Variables, Expressions, Data types, Functions	Chs. 1,2,3 (TP2)
9/14, 9/19	Functions (deeper dive) Builtin modules like **math, random**	Ch. 4 (TP2), Ch. 2 (DIP3)
9/21, 9/26, 9/28	Conditionals and basic loops Developing functions that use loops and conditionals	Ch. 5 (TP2)
10/3, 10/5	More functions, Branching and loops	Chs. 7, 8 (TP2)
10/10, 10/12	Strings, String methods String processing	Ch. 4 (DIP3)
10/17, 10/19, 10/24	Builtin data structures for collections: Lists, Tuples, Dictionaries	Chs. 10, 11, 12 (TP2)
10/26	**In-class Midterm Exam**	All material covered upto 10/19
10/31	Dictionaries (continued)	Ch. 11 (TP2)
11/2, 11/7, 11/9	File processing, Data structure selection Recursion (briefly)	Chs. 13, 14 (TP2); Ch. 3 (DIP3) Ch. 5 (TP2)
11/14	Object-oriented programming	Ch. 15, 16 (TP2); Ch. 7.2-7.4 (DIP3)
11/16, 11/21	Classes: Methods, special methods, Operator overloading	Ch. 17 (TP2)
11/23	**No lecture**	Happy Thanksgiving!
11/28, 11/30	Anonymous functions: Lambda expressions `map` and `filter` functions	class notes
12/5, 12/7	Overloading the index operator, iterators Iteration contexts	Ch. 7 (DIP3)
12/12, 12/14	Exception handling Course review	class notes