Programming With Data (Fall 2021)

DCS 1300/CSCI 1103 Programming with Data Syllabus

Course Description

This course will provide an introduction to computational thinking, programming, and the field of computer science in general. Computer science is fundamentally a study of *problem solving*, not simply computers (or computer programs) themselves. We will consider questions such as (1) what defines computer science, (2) how do we design an algorithm to solve a problem, and (3) how do we translate an algorithm into a computer program?

Over the course of the semester, students will learn the fundamentals of programming using the Python programming language and write a variety of programs during weekly lab assignments and larger projects. Labs will reinforce concepts presented in class that are fundamental to computer science and computation across many fields. Specific topics covered include variables, functions, conditionals, loops, arrays, recursion, and object-oriented programming, but then we will cover more advanced Python programming.

The course comes in two basic parts. In the first part we will be doing a very fast introduction to Python. Essentially we will cover the material from CSCI 1101 over the course of about six to eight weeks. In the second part of the course we will focus on more advanced parts of Python, such as visualization, especially in the service of analyzing data.

Prerequisites: Previous programming experience.

Distribution: This course fulfills the **MCSR** distribution requirement by teaching students to employ programming and algorithmic problem solving. These skills are broadly applicable across many fields of study.

Instructor: Eric Chown

Course Requirements

Attendance during class and lab sessions, completion of weekly short lab assignments and longer projects, and one exam. Evaluation will be as follows:

- Lab Assignments: 30%
- Programming Projects: 40%
- Exams: 30%

Regular class participation will contribute positively towards your grade, particularly in borderline cases.

Most labs and and all projects are not designed to be completed during scheduled lab meetings and will require significant work outside of class to complete. Labs are to be submitted using the **CodeRunner** system. Projects will be submitted using GitHub or Blackboard.

Late Policy: As concepts covered in the course are highly cumulative, it is crucial that you do not fall behind on assignments. In general, late submissions are not accepted unless an extension is granted by the instructor well in advance of the due date (not the night of the deadline!). Plan ahead and don't wait until the last minute to start working!

Discussion Forum

We will use Piazza to facilitate discussion outside of class. In general, you should prefer posting to Piazza over sending me email, as it will allow your classmates to both see and answer your questions (though you can also post privately such that only instructors can see your question).

Textbook (optional)

P. Gries, J. Campbell, and J. Montojo. **Practical Programming: An Introduction to Computer Science Using Python 3**, 2nd edition (2013). Available at Amazon or elsewhere.

The textbook is optional but will roughly follow the schedule for the first half of the course.

Class Information

This course meets three times a week. While one meeting is officially designated a 'lab', regular class sessions may be used as labs or vice versa.

All classes (lab or otherwise) meet in Searles 128.

Class Times:

Tuesday, Thursday 10:05 AM - 11:30 AM

Friday 11:40 AM - 1:05 AM

Final Exam

None. The last project will be due on the final exam date, Dec 18.

Electronic Device Policy

Computers will be extensively used for in-class exercises, labs, and exams. Use of personal laptops is permitted for these or other class-related purposes. Cell phones should be silenced and put away during class to avoid disruptions.

No electronic devices, including computers, phones, or calculators, are permitted during exams unless specifically indicated by the instructor.

Collaboration Policy and Honor Code

Please review the Bowdoin Computer Science Collaboration Policy. You are responsible for understanding and adhering to this policy! We will discuss specifics as they apply to this course in class, but generally Labs are Level 1, Projects are Level 2, and Exams are Level 3.

Class Meetings

Schedule

Date	Topic	Work Due
	Part I: Python Basics	
Sep. 2	Introduction to Programming With Data	
Sep 3	Expressions, variables and functions	Lab 0
Sep 7	Strings	Lab 1
Sep 9	Conditionals	Lab 2
Sep 10	Objects and Methods	Lab 3
Sep 14	Lists	Lab 4
Sep 16	Lists	
Sep 17	Iteration	Lab 5
Sep 17	Iteration	
Sep 23	More Iteration, Files	Lab 6
Sep 24	More Iteration, Files	
Sep 28	Sets, Dictionaries	Lab 7
Sep 30	Sets, Dictionaries	
Oct 1	Exceptions, More Dictionaries	Lab 8
Oct 5	Exceptions, More Dictionaries	
Oct 7	Exam Review	Lab 9
Oct 8	Exam 1	
Fall Break		
	Part II: Advanced Python	
Oct 14	Object Oriented Programming	
Oct 15	Object Oriented Programming	
Oct 19	Regular Expressions	
Oct 21	Regular Expressions	
Oct 22	Regular Expressions	Lab 10
Oct 26	Recursion	
Oct 28	Recursion	
Oct 29	Recursion	Lab 11, Project 1
Nov 4	Exam 2 Review	
Nov 5	Exam 2	Lab 12
	Part III: Data, Visualization, Projects	
Nov 9	Work Day	
Nov 11	Gray codes	Project 2
Nov 12	CSV Files	
Nov 16	Data and Visualization	Project 3
	Thanksgiving break	
Nov 30	Advanced Object Oriented Programming	
Dec 2	Drawing Plots	
Dec 3	JSON	Project 4
Dec 7	Work	
Dec 18	Work/Dangling Topics	Project 5

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