11:670:212 Computational Methods for Meteorology
Course Syllabus
Spring 2022

Instructors: Dr. Enrique N. Curchitser
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Office Hours: W 11–12:30

Textbooks: Required- *Learning Scientific Programming with Python*, by C. Hill, 2nd Ed. (**H**)

Supplemental- *A Hands-On Introduction to Using Python in the Atmospheric and Oceanic Sciences*, by J. W.-B. Lin (PDF on Canvas)

Learning Goals

Upon completion of this class, students will be able to:

1. Effectively communicate scientific information orally and in writing, including by electronic means, at an appropriate level for their audience. (PLG 4)
2. Demonstrate mastery of the mathematical and physical foundations of meteorology and climatology as well as key atmospheric processes that occur at a variety of spatial and temporal scales. (PLG 5)

Grading:			
	Notebooks	10%	
	Homework	40%	
	Midterm Exam	20%	(Thursday, March 24)
	Final Project	30%	

Assignments:

Much of the class will use a "flipped" approach, where material is first introduced in computational notebooks which you will reproduce for points. Programming practice is also an essential part of the class. Ten homework assignments will be given, each worth 4% of your grade. These assignments will be announced on Mondays, due the following weekend, and pass/fail in nature. A second chance will be provided for any homework assignments graded "fail". Details on the mechanics of receiving credit for these assignments will be discussed in class. Additionally, one class period will be devoted to an in-class, open-book midterm exam in which you will solve programming problems similar to those assigned as part of your homework. The course culminates in a final project, to be submitted via Canvas no later than May 4, in which you will carry out a small research project that involves the computational tools learned in this class. The instructors will provide suggestions, or you may choose your own.

Schedule

Date	Subject	Reading
1/20	Course overview; Introduction to Computational Environment	**H** 1, 5.2
1/24*	Variables	**H** 2.2.1–2.2.3
1/27		
1/31*	Logic	**H** 2.2.4–2.2.5
2/3		
2/7*	Strings	**H** 2.3
2/10		
2/14*	Lists and Loops	**H** 2.4
2/17		
2/21*	Controlling the Flow of Your Program	**H** 2.5
2/24		
2/28*	I/O; Working with netCDF Data	**H** 2.6
3/3		
3/7*	Functions	**H** 2.7
3/10		
3/21	Simple Plots	**H** 3
3/24	**Midterm Exam**	
3/28*	Dealing with Errors and Using Dictionaries	**H** 4.1–4.2
3/31		
4/4*	Arrays with NumPy and Xarray	**H** 6.1–6.3
4/7		
4/11*	More Complicated Plots	**H** 7
4/14		
4/18	MetPy / Start of Final Projects	
4/21		
4/25	Work on Final Projects	
4/28		
5/2		
5/4	Final Projects Due (no final exam)	

* Homework will be assigned on this date.