Computational Physics / PHYS-UA 210

This course teaches computational physics at a level appropriate for undergraduate physics majors. Classes meet Tuesday and Thursday 12:30am to 1:45pm, in **TBD**. The textbook is *Computational Physics*, by Mark Newman. I will also ask you sometimes to look online at the Python Data Science Handbook (PDSH) by Jake Van Der Plas.

If you have never programmed in Python before then Chapter 2 of the book will require your special attention. There are also many online resources for learning the basics of Python. I can recommend Software Carpentry.

Prof. Blanton's office is Room 941 of 726 Broadway, and his email is `blanton@nyu.edu`. Office hours are Tuesdays 11:00am to 12:15pm.

The teaching assistant is **TBD** (`TBD@nyu.edu`) Recitation is **TBD**. This time will primarily consist in working on homework assignments.

The class will be participatory. Please read the assignments *before* attending class; you will be expected at certain points to follow along with calculations on your computer.

There will be no exams in this course, but there will be a pretty heavy load of assignments:

- You will complete roughly weekly homeworks. You may consult with each other about the homeworks, but you must write your own individual code and report. This report will be in the form of rendered Jupyter notebooks and/or LaTeX documents, submitted to the TA in a manner she prescribes.
- The second major assignment is a large project performed in groups of two or three students each, culminating in a presentation in December. You will hand in a report written using LaTeX, a standard format for physics research that you might as well become familiar with (the homeworks will introduce this format). Two intermediate drafts are due of this large project, which I will comment on. The projects are designed so that you can complete parts of them during the course of the semester based on material already covered.

Grades are based on problem sets (65%), the large project and presentation (25%), and class participation (10%).

The classes will proceed as follows (subject to revision!). The problem sets will be due on each Friday of the indicated weeks.

Date	*Topic*	*Reading*	*Problem Sets*
2017-09-03 (T)	Numbers on computers	Ch. 1, 2, 3	
2017-09-05 (R)	Arrays	PDSH, Ch. 1 & 2	PS#1
2017-09-10 (T)	Numerics	Ch. 4	
2017-09-12 (R)	Numerics	Ch. 4	PS#2
2017-09-17 (T)	Random Numbers	Ch. 10.1	Teams Determined
2017-09-19 (R)	Random Numbers	Ch. 10.2	PS#3
2017-09-24 (T)	Integration	Ch. 5.1–5.3	—
2017-09-26 (R)	Integration	Ch. 5.4–5.6	PS#4
2017-10-01 (T)	Integration	Ch. 5.7–5.9	
2017-10-03 (R)	Differentiation	Ch. 5.10–5.11	PS#5
2017-10-08 (T)	Linear Algebra	Ch. 6.1	
2017-10-10 (R)	Linear Algebra	Ch. 6.1	PS#6
2017-10-15 (T)	Eigensystems	Ch. 6.2	
2017-10-17 (R)	Eigensystems	Ch. 6.2	PS#7
2017-10-22 (T)	Eigensystems	Ch. 6.2	
2017-10-24 (R)	Root-finding	Ch. 6.3	PS#8
2017-10-29 (T)	Minimization	Ch. 6.4	
2017-10-31 (R)	Fourier Analysis	Ch. 7.1–7.2	PS#9
2017-11-05 (T)	Fourier Analysis	Ch. 7.3–7.4	
2017-11-07 (R)	Ordinary DEs	Ch. 8.1	Project draft due
2017-11-12 (T)	Ordinary DEs	Ch. 8.2–8.3	—
2017-11-14 (R)	Ordinary DEs	Ch. 8.4–8.5	PS#10
2017-11-19 (T)	Ordinary DEs	Ch. 8.6	
2017-11-21 (R)	**Thanksgiving, no class**		
2017-11-26 (T)	Partial DEs	Ch. 9.1–9.2	
2017-11-28 (R)	Partial DEs	Ch. 9.3	PS#11
2017-12-03 (T)	Partial DEs	Ch. 9.3	
2017-12-05 (R)	Project presentations	—	PS#12
2017-12-10 (T)	**Legislative Day, no class**		
2017-12-12 (R)	Project presentations	—	Final project due