



PHYS 165: Programming for the Physical Sciences

Spring 2020
MWF 11:00-11:50PM, CHE 2108



Prof. James Williams
jwilliams@physics.umd.edu
PSC 2160
Office Hours: Anytime
(301) 314-2161

Course Description: Introduction to programming using examples in the physical sciences. This course will focus on the use of the object oriented programming technique *Python* to enhance the understanding of physical phenomena. Topics covered will be

- basic programming like variables, arrays, conditional statements, loops, functions, strings
- advanced programming techniques like data structures, recursion, graphics (plots, animations, etc.)
- Numerical methods: integration, root finding, ODE's (Euler's method and built-in Python methods)
- Monte Carlo methods
- Simulation of physical phenomena

Prerequisites: PHYS171, PHYS141, or PHYS161; or must have scored 3 or higher on AP PHYS exam.

Credit Hours: 3

Text(s): None required. You may find this book useful, it covers some of the topics we will discuss in greater detail: *Computational Physics*, 4th Edition, by Mark Newman. **ISBN-13:** 978-1480145511.

Grade Distribution:

Homework	30%
Quizzes	10%
Group Labs	30%
Final Project	30%

Course Materials: The course material will all be available through ELMS

ELMS/E-mail: I will use ELMS to communicate with the class. However, if you wish to communicate directly with me, use the email address above rather than through ELMS .

Lectures and Course Content: The course will be taught using a combined lecture/laboratory approach. The class will be divided into three parts: lectures by me, lectures given by predetermined groups and lab work within groups. My lectures will focus mainly on the physics that we will tackle using computational methods and some of the overarching programming themes used to accomplish this and on the details of programming in Python. The in-class lab work will allow you to practice the various programming techniques we learn in class with your group.

Homework: The purpose of the homework is for you to engage with the material. This is how you will master it, and it will help you discover what you don't yet fully understand. Discussing physics helps understanding. You are encouraged to discuss the homework with fellow students, with our grader, or with Prof. Williams. However, what you turn in should be your own answers.

1. Usually assigned once every week.
2. Must be turned in at the beginning of class on the due date (not to the grader).
3. Please make sure you **include your name and the homework and course numbers, and staple the pages together.**
4. **Late homework accepted only under dire circumstances:** if you know it will be impossible to turn in an assignment on time you must discuss this with me in advance of the due date.

Religious Observances: Students are responsible for notifying the instructor of any intended absences for religious observances within the first two weeks of the semester.

Tips for doing well:

1. Attend class.
2. Freely ask questions both in and out of class.
3. Read the textbook before and after class.
4. Do all of the homework problems. This is mostly where you learn, and there is a strong correlation between homework and exam grades.
5. Seek help immediately if you don't understand the material. Find me for help outside of class *anytime*.

Academic honesty: The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit <http://www.shc.umd.edu>. The University has adopted an Honor Pledge, which is a statement undergraduate and graduate students are asked to write by hand and sign on examinations, papers, or other academic assignments not specifically exempted by the instructor. The Pledge reads: "I pledge on my honor that I have not given or received any unauthorized assistance on this assignment/examination." In this course it is assumed that all students have entered the University agreeing to the honor principle which would apply in general to all campus activities, so usually no specific statement is required.