PHYS410/510 Scientific Computing (Spring 2024)

Welcome to SciComp. Our goal is to introduce a series of tools and techniques to attack theory and data driven problems, allow you to build research papers in a fast, clear, efficient manner. A majority of your daily research tasks will involve doing various exploratory and visualization routines. Hopefully, the methods and examples we go over in this class will provide you a backbone to understand these techniques and begin building your own mental toolbox to apply to original problems.

The prerequisites for this course was PHYS391 and, thus, I am going to assume that everyone has taken the Foundations sequence and has a calculus-based understanding of basic physics. There will be some astronomy problems, but we will go over the details so that no astronomy background is needed.

We will not use Canvas, each class lecture will involve me going over some technique as a Jupyter notebook. If you miss class, each lecture will be stored at the class website which is located at

`https://pages.uoregon.edu/jschombe/sci_comp/`

All the homework assignments and weekly notebooks are stored there. There will be no exams, your grade will be based on homework's (complete 90% = A, 80% = B, 70% = C). The homework's will be announced by email with due dates at the top of every assignment. I'm liberal on deadlines, but if your submission pushes into the next deadline I will become irritated.

The TA for the course is Tom Gorordo (tgorordo@uoregon.edu). Email is best to contact us. I am usually only on campus before and after class, but email me and we can set-up a time to meet. Below is a rough outline of the course (I will adjust this as we explore the skill level of the class). Feel free to request topics you don't see here.

Outline

Week #1: python,panda,matplotlib basics

Week #2: numpy, scipy basics

Week #3: SDSS/Gaia examples

Week #4: Bayesian

Week #5: fitting

Week #6: PCA/Monte Carlo

Week #7: MCMC/max likelihood

Week #8: logistic regression/classification

Week #9: neutral nets

Week #10: machine learning