PHY 546: Python for Scientific Computing

Instructor: Marivi Fernandez-Serra, PHY 139, maria.fernandez-serra@stonybrook.edu
Date/Location: Mondays, 4:25–5:20 pm Online using Zoom
Web: https://marivifs-teaching.github.io/python-class/

Learning Goals:
The learning goal of this course is to enhance scholarship in an area of active research, by learning how to apply python to problems in your field.

Format:
This course will mimic the original course developed by Professor Mike Zingale. The first few lectures will be delivered in a traditional format: the instructor demonstrating some concepts via slides / interactive examples. After that, we will operated in a "flipped" manner. Students will be expected to read and work through some basic notebooks on their own before class, and then, in class, we will work on projects together, sharing what we learn.

This class is *heavily* dependent on out-of-class discussion, managed via slack. All students are expected to participate in this online discussion.

Covid changes: The course is delivered in person, but if necessary we can move online at any time. Also, if students want to attend the lectures virtually i will allow it. We will use Slack for out of class communication. Lectures can be delivered using Zoom, but i will also use slack simultaneously, as we have done so far. I will record attendance and collect exercises with Slack

Credit:
This is a 1-credit course.

Contacting the Instructor:
e-mail: maria.fernandez-serrae@stonybrook.edu (add "PHY 546" to the start of the subject line of any e-mail).

Office Hours can be held online. A Zoom meeting will be organized upon request.

Texts:
There are no required textbooks for this class. Online information will be linked to from the course webpage.

A nice text for you to read along with the class, if desired, is *Effective Computation in Physics* by Scopatz & Huff.

Lecture Topics:
We will (try to) discuss the following topics in the course:

- *Introduction to python* (4 lectures)
  data structures and control statements, functions, classes, popular modules, Jupyter notebooks
- *Software engineering practices* (1 lecture)
  including `git` and github, and unit testing (with nose)
- *Introduction to the NumPy array library* (1 lecture)
- *Pandas and the data frame* (1 lecture)
- *matplotlib / bokeh / plot.ly for visualization* (1 lecture)
- *SciPy and numerical methods* (2 lectures)
- *Introduction to SymPy* (1 lecture)
- *GUIs* (1 lecture)
- *f2py and C extensions* (1.5 lectures)
- *Building applications / packaging* (1 lecture)

Time-permitting, we will also discuss:

- *MayaVi for 3-d visualization*

- *NetworkX*
- *Interacting with forms on a webpage*
- *Julia*

The actual course topics and time spent on each topic will depend on the interest and the participation level of the class.

Computers:
As we all use different systems for our research, we are not meeting in a computer lab. Instead, you should bring your own laptop to class. Information on how to install python on Windows, Mac OSX, and Linux will be posted on the class webpage.

If you don't have access to a computer that can run python, see me, and I can try to arrange something for the semester.

Slack:
We will use the slack team communication tool for all discussion. You will be added to the slack team at the start of the semester and then can join in on the conversation at: `https://sbu-phy546.slack.com`

Slack is organized into different channels, one for each major topic in class.

Evaluation:
Students are expected to attend the class and to contribute to the slack discussions (by asking questions, proposing examples, or providing demonstrations of their own). As we meet only one hour per week, students show plan on spending time outside of class reviewing and practicing the material we discussed.

The primary place for participation is the slack team chat. This is the place to interact with me and your classmates—ask anything, share examples, etc.

Letter grades will be based on the online participation. A rough guide is presented below:

- A : 10 (meaningful) postings to slack **plus** a short code example to our class git repo showing how you can apply what we've discussed in class to your field.

- A−: 10 (meaningful) postings to slack

- B+: 5 postings to the slack

- B : 3 postings to the slack

A post does not mean a "me to"-type post, but something either demonstrating a problem you don't understand (giving code), asking for some detail from the lecture to be explained, sharing a neat trick you found, answering a classmate's question, etc. ***Note that asking questions about the content counts just as much as providing answers***—the idea is to have a discussion outside of class on the material.

Covid Changes: The only change is that attendance to the lectures can occur via zoom. Everything else does not change because evaluation was already adapted for an online course

Americans with Disabilities Act:
If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, ECC (Educational Communications Center) Building, Room 128, (631) 632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.

Academic Integrity:
Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine)

and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at `http://www.stonybrook.edu/commcms/academic_integrity/`

Critical Incident Management:
Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures.

Electronic Communication:
Email to your University email account is an important way of communicating with you for this course. For most students the email address is '`firstname.lastname@stonybrook.edu`'. *It is your responsibility to read your email received at this account.* For instructions about how to verify your University email address see this:

`http://it.stonybrook.edu/help/kb/checking-or-changing-your-mail-forwarding-address-in-the-epo`

You can set up email forwarding using instructions here:

`http://it.stonybrook.edu/help/kb/setting-up-mail-forwarding-in-google-mail`

If you choose to forward your University email to another account, we are not responsible for any undeliverable messages.

Religious Observances:
See the policy statement regarding religious holidays at

`http://www.stonybrook.edu/registrar/forms/RelHolPol%20081612%20cr.pdf`

Students are expected to notify the course professors by email of their intention to take time out for religious observance. This should be done as soon as possible but definitely before the end of the 'add/drop' period. At that time they can discuss with the instructor(s) how they will be able to make up the work covered.