

# PHY 546: Python for Scientific Computing

Spring 2025

*Instructor:* Michael Zingale, ESS 452, michael.zingale@stonybrook.edu

*Date/Location:* Mondays, 2:00–2:55 pm in Humanities 3018

*Web:* <https://sbu-python-class.github.io/python-science>

## 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:

The class will be interactive throughout, with students working through Jupyter notebooks together with the instructor during the class. 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.

## Credit:

This is a 1-credit course.

## Contacting the Instructor:

*e-mail:* michael.zingale@stonybrook.edu (add “PHY 546” to the start of the subject line of any e-mail).

## 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 `pytest`)
- *Introduction to the NumPy array library* (2 lecture)
- *matplotlib / bokeh / plot.ly for visualization* (1 lecture)
- *SciPy and numerical methods* (2 lectures)
- *Introduction to SymPy* (1 lecture)
- *Machine learning* (1 lecture)
- *Building applications / packaging* (1 lecture)

Time-permitting, we will also discuss:

- *NetworkX*
- *Pandas and the data frame* (1 lecture)
- *Cython / Numba / extensions*

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, then you will be able to follow along for most of the course content using a cloud platform.

## 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: phy546-S25

## 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.

## Student Accessibility Support Center Statement

If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact the Student Accessibility Support Center, Stony Brook Union Suite 107, (631) 632-6748, or at [sasc@stonybrook.edu](mailto:sasc@stonybrook.edu). They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and the Student Accessibility Support Center. For procedures and information go to the following website:

<https://ehs.stonybrook.edu//programs/fire-safety/emergency-evacuation/evacuation-guide-disabilities> and search Fire Safety and Evacuation and Disabilities.

## 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 is required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Professions, 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/](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 Student Conduct and Community Standards 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. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.

## **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>

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

## **Religious Observances**

See the policy statement regarding religious holidays at

[https://www.stonybrook.edu/commcms/registrar/calendars/religious\\_holidays.php#2022](https://www.stonybrook.edu/commcms/registrar/calendars/religious_holidays.php#2022)

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.