

Python with Applications II

PIC 16B, Winter 2024

Logistics

Course website: <https://bruinlearn.ucla.edu/courses/176870>

Lecture 1: MWF 12-12:50pm Geology 6704

Discussion 1A: TR 12-12:50pm MS 5117

Instructor: Seyoon Ko (kose@math.ucla.edu).

Office hours: M 2-3:30pm MS 6324

Teaching assistant: Alex Sietsema (alexsietsema@math.ucla.edu)

TA Office hours: TBD

The office hours are subject to change, so please always check the [Bruin Learn course website](#) for the latest office hours.

Waitlist policy: PIC doesn't use PTEs. Please see the relevant policy posted on [this website](#). If you're on the waitlist, you can expect to be enrolled after the waitlist period is over (week 2).

Course prerequisites: PIC 16A (enforced)

Textbook: None! Often, a nice step to take when you face an error is reading the error messages → official documentation → Stack Overflow → other resources in Google.

Official documentation: <https://docs.python.org/3/library/index.html>

Official tutorial: <https://docs.python.org/3/tutorial/index.html>

Overview

In-depth application of Python programming language to problems arising in a variety of areas of current interest, such as machine learning, computer vision, statistical analysis, numerical analysis, and data acquisition. Advanced Python programming techniques to improve computational efficiency.

Course objectives: Students will create complex Python programs to solve problems of interest in science and industry. Students will effectively deploy a range of Python packages to approach specialized tasks and develop an intuitive understanding of how these packages operate. Students will analyze and revise Python programs to improve clarity, robustness, and performance. Upon completion of this course, students will be able to write, analyze, and communicate about Python programs that accomplish a variety of complex computational tasks, including:

- Acquiring data sets via databases or web-scrapers.
- Analyzing data using complex manipulation and visualizations.
- Constructing complex machine learning pipelines for structured, image, and text data sets.
- Solving problems in computational mathematics, including systems of linear equations, eigenvalue problems and singular value decomposition, optimization, differential equations, and simulations.
- Enhancing program performance using multithreading.

Additionally, students will be able to identify and install Python modules to achieve a wider variety of tasks than those directly covered in the course.

Topics (tentative):

- Version control with Git and GitHub
- Documentation using Quarto
- Advanced data processing and interactive visualization
- Web scraping with Scrapy
- Web Development with Flask
- Overview of computational mathematics
- Just-in-time (JIT) compilation, parallel computing, and automatic differentiation for scientific computing with JAX
- Deep learning with Keras

Grades

This class has **7 homework assignments** and a **group project**. Homework 40%, Project 60%.

- A+: Earn credit for 6.5 homework assignments + outstanding project and participation
- A: Earn credit for 5.5 homework assignments + all project assignments
- A-: Earn credit for 5 homework assignments + all project assignments
- B+: Earn credit for 4 homework assignments + all project assignments

- B: Earn credit for 3 homework assignments + all project assignments

All of these homework and project assignments will be graded on completion, meaning that you will earn full credit as long as you meet a set of “specs”. You’ll have an opportunity to resubmit your work if you want to. But please note that you need to get credit for all project assignments in order to get a grade above C in this class. Please review grading information on BruinLearn for the full details.

Attendance

Lecture attendance is expected. Most lectures will not be recorded unless there is an absolute need. Discussion attendance is recommended but not required. There may be some discussion sessions where the TA presents info that is particularly useful for your group project. I will do my best to highlight those days. Project presentation attendance is mandatory, and will count as a project assignment.

Other Information

Our inclusive learning environment: UCLA values diversity and inclusion. We expect everyone in this class to contribute to a respectful, welcoming, and inclusive environment to support the learning of all other members of the class. If there are aspects of the instruction or design of this course that result in barriers to your inclusion or accurate assessment or achievement, please notify us.

Notice about academic integrity: From the office of the Dean of Students:

“With its status as a world-class research institution, it is critical that the University uphold the highest standards of integrity both inside and outside the classroom. As a student and member of the UCLA community, you are expected to demonstrate integrity in all of your academic endeavors. Accordingly, when accusations of academic dishonesty occur, The Office of the Dean of Students is charged with investigating and adjudicating suspected violations. Academic dishonesty includes, but is not limited to, cheating, fabrication, plagiarism, multiple submissions, or facilitating academic misconduct.”

Students are expected to be aware of the University policy on academic integrity in the UCLA Student Conduct Code:

<https://www.deanofstudents.ucla.edu/Individual-Student-Code>

Please note the sections on (1) cheating, (2) plagiarism, and (3) unauthorized study aids.