

Python for Social Science Syllabus

Fall 2024

Course Description

This class is an introduction to data science in the social sciences with an emphasis on the Python programming language. Students with no prior experience in programming and data science will learn about reading, manipulating, and analyzing data. The class also offers students the opportunity to learn about methods used to analyze quantitative data, textual data, and spatial data using real-world data sets.

Instructor

Professor Name (pronouns)

Contact:

Office Hours: - via Zoom and by appointment.

Teaching Assistant

Name (pronouns)

Contact

Office Hours:

Learning Goals

At the end of this course, students will be able to

1. Use Python to perform basic mathematical operations, open and write files, and write functions.
2. Perform data manipulation and analysis with the Pandas library.
3. Understand how to perform basic quantitative, qualitative, and spatial analysis.

This course is four credits, which entails four hours per credit. We will spend two hours per week in class, and I expect most students will spend another two hours per week communicating with the instructional team. Another four hours for readings and videos, and eight hours of writing Python code for the weekly problem sets.

Textbooks

The following textbooks are available for free online and through the UCLA library. They are used to provide supplementary reading when appropriate.

1. [Python for Everybody: Exploring Data Using Python 3](#)
2. [Pandas for Everyone: Python Data Analysis, 2nd Edition](#). The UCLA library provides free digital access.

Data Sets

This course uses three datasets to motivate the programming concepts.

1. [Armed Conflict, Location, and Events Database \(ACLED\)](#)
2. [American Community Survey \(ACS\)](#)
3. [Housing data from California's open data portal](#)
4. [Databanks International Cross-National Time-Series Data \(CNTS\)](#)

Assignments

Problem Sets

Each week you will turn in a homework assignment based on the previous week's topics. The problem sets are available to download on BruinLearn. They are in the Jupyter notebook format (*.ipynb files) which you can open with Jupyter Lab inside your Anaconda development environment.

You may work in teams or individually. Problem sets are due by 11:59 pm on Thursdays (or day of the second weekly lecture) on BruinLearn. Problem sets need to be rendered into .pdf or .html.

Exams

The midterm exam is in class. The final exam takes place during the scheduled exam time. They are both open notes.

Class Structure

The class will meet twice per week. Each meeting consists of the professor introducing programming concepts, showing how they are used in Python, and live coding. Each week includes a lab section after the second lecture where the teaching assistant will help with programming.

Grading

- Problem Sets, $9 \times 5\% = 45\%$
- Midterm exam, 25%
- Final exam, 30%

Class Schedule

Week 0 — Installing Anaconda Navigator

- A. We will provide you with tutorials to help get Python installed and running on your computer.
- B. Take some time to get familiar with the programming environment: how to launch the program, open and save a script, and run an example script to make sure the code compiles successfully.
- C. Contact the professor or TA if you run into issues so that we can start programming right away starting week 1.

Week 1 — Introduction to computing, computers, programs, and programming

- A. Computer basics - directories versus files, working directory, opening and saving scripts.
- B. Project management – File and folder structure, common data files and extensions, proprietary versus open file standards, IDEs versus text editors.

Read: Python for Everybody, Chapter 1

Week 2 — Dataframes

- A. Data as columns and rows. Pandas package. Load and save dataframes. Build dataframes from objects.
- B. Inspect data. Subset. Sort. Manipulate variables (make new, clean).

Read: Pandas for Everyone, Chapters 1, 2, 8.1

Week 3 — Dataframes II: browsing and describing your data

- A. Summarizing data – tables, descriptive summary statistics, mean, median, standard deviation.
- B. Merge data sets. Aggregate.

Read: Pandas for Everyone, Chapters 3.5, 6

Week 4 — Introduction to Python

- A. Data structures: dictionary, list, tuple, and arrays. Data types: integer, float, string.
- B. Objects. Functions. Math operations and package management.

Read: Python for Everybody, Chapters 2, 8, 9, & 10.

Week 5 — Control structures

- A. Control structures – Loops: for and while, (list comprehension), break and continue, nesting. Conditional statements: if, else, elif.
- B. Errors - logs, try-catch, debugging.

Read: Python for Everybody, Chapters 3 & 5

Week 6 — Data visualization

- A. Midterm exam
- B. Pivot table. Histogram. Scatterplots.

Week 7 — Data vis (continued) and quantitative data analysis

- A. Time series. Multiple groups. More than two variables.

Read: Pandas for Everyone, Chapter 3

- B. Basic inference – Continuous and ordinal variables, correlation, linear regression, predicted outcomes.

Week 8 — Working with text data

- A. Strings: remove white space, split, find matches, regular expressions.
- B. Strings to date, date formatting.

Read: Python for Everybody, Chapter 6

Read: Pandas for Everyone, Chapters 11 and 12

Week 9 — Spatial data analysis

- A. Common coordinate systems: longitude latitude, geohashes, any three words.
Aggregated location: zip code, Census tracts. Spatial joins.
- B. Shapefiles. Visualization.

Week 10 — Application programming interfaces (APIs)

- A. Motivation and examples (US Census). Documentation. Rate limits.
- B. Acquire data. Process. Analyze.

This is a DataX Course

UCLA DataX is a strategic initiative focused on strengthening research and education in data science and critical data studies across more than 40 different schools, divisions, departments, programs, institutes, centers and initiatives. Its aim is to amplify civic engagement and transform education at UCLA by bringing together a robust and highly collaborative community of people working across data science and data studies, which include, but are not limited to: humanists, social scientists, artists, legal scholars, researchers in health and medicine, math, data theory, statistics, computer science and engineering. Many in our UCLA research community understand the limits and opportunities afforded by data science and are increasingly working together on complex data-driven problems. DataX is designed to bring together scientists, humanists, engineers and scholars from each UCLA division in the College and the UCLA professional schools. At UCLA, we believe that data is transforming the world, and we are producing cutting-edge research and pedagogy that contends with and solves difficult data problems.

Academic Policies

Academic Accommodations — [Center for Accessible Education \(CAE\)](#)

Students needing academic accommodations based on a disability should contact the Center for Accessible Education (CAE) at (310) 825-1501 or in person at Murphy Hall A255. In order to ensure accommodations, students need to contact the CAE within the first two weeks of the term. Students requiring additional accommodations with the Center for Accessible Education (CAE), please request your Letter of Accommodation on the Student Portal. If you are seeking registration with the CAE, please submit your request for accommodations via the CAE website. Please note that the CAE does not send accommodation letters to instructors – you must request that I view the letter in the online Faculty Portal.

Students requiring academic accommodations should notify the professor and the Center for Accessible Education (CAE) of their needs within the first two weeks of the course. CAE contact information is provided at the end of the document.

Students requiring accommodations for exams will take their exams through CAE's testing center.

Academic Honesty Neither the University nor I tolerate cheating or plagiarism. If caught, you will face punishment under the guidelines provided by the University of California. I expect you to be familiar with and understand the university's policies on academic honesty for this course. Please consult the [Student Conduct Code](#) for more information.

BruinLearn BruinLearn is the course's digital home, and its basic organizational structure is the module. Each concept has its own module where I post relevant material. Datasets, guides, and assignments have their own modules.

Additional Resources for Students

[Ashe Student Health and Wellness Center](#)

Provides high. quality and accessible ambulatory healthcare and education by caring professionals to support the academic success and personal development of all UCLA students.

[Be Well Bruin](#)

Be Well Bruin is committed to increasing students' access to health and well-being resources. As a large university community, it's easy to feel overwhelmed with the number of resources available to you. Be Well Bruin provides access to the right resources, at the right time. Use the robust search and filtering features to find a specific resource or take the Be Well Bruin Assessment to better understand the areas where we can support you to be the best you.

[Bruin Resource Center](#)

The mission of the UCLA Bruin Resource Center (BRC) is to support students' development, well-being, and academic success and to foster an inclusive and socially just campus community. Their programs include Bruin Guardian Scholars, Bruin Guardian Scholars Academy, Collegiate Recovery Program, Intergroup Relations Program, Students with Dependents Program, Transfer Student Center. Phone number: 310.825.3945.

Bruin Shelter

Provides a safe, supportive environment for fellow college students experiencing homelessness by fostering a collaborative effort between universities, community-based organizations, and service providers.

Campus Assault Resources & Education (CARE)

CARE is committed to the eradication of sexual and gender-based violence through creating and sustaining a safe, healthy, and equitable community for all people. CARE strives to achieve this through provision of comprehensive prevention education, individual support and advocacy, and holistic healing programs for all members of the UCLA community. Phone: 310.206.2465.

Campus and Student Resilience

Provides programs to promote resilience and trains students to help support their peers.

Community Programs Office (CPO)

The UCLA Community Programs Office serves as an umbrella department for the Student Initiated Outreach Center, Student Retention Center, and twenty five student-initiated community service projects. The CPO strives to increase students from underserved communities' access to higher education, retention in the university, and graduation rates while also serving as a conscious effort in the community, working toward the empowerment of all people. Phone: 310.825.5969.

CPO Food Shelter

Provides free food for any UCLA student who may be experiencing hunger or struggling to attain food due to financial hardships.

Counseling and Psychological Services (CAPS)

Provides counseling and other psychological and mental health services to students. Walk-in hours are Monday-Thursday 8am-4:30pm and Friday 9am-4:30pm in John Wooden Center West. Crisis counseling is also available 24 hours/day at (310) 825-0768.

Dashew Center for International Students & Scholars

UCLA is home for more than 12,000 international students and scholars away from home. The Dashew Center is the place where domestic and international students and scholars meet. We enhance the UCLA experience for international students and scholars with our multicultural programs and services. We assist UCLA academic departments with visa services. We serve as a resource and learning center for the entire UCLA community to

promote global connection, international understanding and cultural sensitivity. Phone: 310.825.1681.

Data Squad

As part of the [UCLA Library Data Science Center](#), the UCLA Library DataSquad is a team of undergraduate students who support data-related projects at UCLA. The DataSquad aims to facilitate data processes for sustainable, replicable, reproducible research, teaching and workflows.

Dean of Students Office

The Mission of the Dean of Students Office is to serve as a portal to understanding the UCLA experience, and we are committed to the personal and intellectual growth and development of our students. Whether we are the first office you come to for assistance or the last place you think to call, our staff is here to help you enjoy your UCLA experience. Phone: 310.825.3894.

Equity, Diversity and Inclusion

Committed to providing an equal learning, working and living environment at UCLA and supports a range of programs to promote these goals campus-wide.

Healthy Campus Initiative (HCI)

Provides links to a wide variety of resources for enhancing physical and psychological well-being, positive social interactions, healthy sleep, healthy eating, healthy physical activity and more.

LGBT Campus Resource Center

The UCLA LGBT Campus Resource Center has proudly been serving the UCLA community for 20 years. We provide a comprehensive range of education and advocacy services supporting intersectional identity development as well as fostering unity, wellness, and an open, safe, and inclusive environment for UCLA's LGBTQ community. Phone: 310.206.3628.

Students with Dependents

The Students with Dependents (SwD) Program within the Bruin Resource Center offers support to UCLA undergraduate, graduate, and professional students who have taken on the role of parent, guardian, or caregiver and have continued their academic careers. Through partnerships with parenting student organizations at UCLA, the SwD Program can direct students with dependents to organizations and resources that would support scholars and their families throughout their educational journey.

Title IX Resources

UCLA prohibits gender discrimination, including sexual harassment, domestic and dating violence, sexual assault, and stalking. If you have experienced sexual harassment or sexual violence, there are a variety of resources to assist you. You can receive confidential support and advocacy at the CARE Advocacy Office for Sexual and Gender Based Violence, 1st Floor Wooden Center West, CAREadvocate@careprogram.ucla.edu, (310) 206-2465. Counseling

and Psychological Services (CAPS) also provides confidential counseling to all students and can be reached 24/7 at (310) 825-0768. Faculty and TAs are required under the UC Policy on Sexual Violence and Sexual Harassment to inform the Title IX Coordinator should they become aware that you or any other student has experienced sexual violence or sexual harassment. You can also report sexual violence or sexual harassment directly to the University's Title IX Coordinator, 2241 Murphy Hall, titleix@conet.ucla.edu, (310) 206-3417. Reports to law enforcement can be made to UCPD at (310) 825-1491. These offices may be required to pursue an official investigation.

UCLA GRIT

Coaching Program GRIT stands for Guidance, Resilience, Integrity and Transformation. In this program, UCLA students receive individualized support from trained peer coaches to manage stress, fostering positive social connections, set goals, and navigate campus resources.

UCLA Police Department

UCLA PD sets a standard of excellence in law enforcement and serves a multicultural, educational environment of over 75,000 faculty, staff and students in Los Angeles. It is a part of the statewide UC Police system of about 410 sworn personnel. We take pride in our cultural and ethnic diversity and strive to employ a broad cross-section of the community. The department employs about 64 sworn officers, 42 civilians and 130 students. Phone: 310.825.1491.

UCLA Student Legal Services

We provide confidential legal counseling and assistance regarding a wide range of legal issues to all currently registered and enrolled UCLA students. Phone: 310.825.9894.