

# STATS 21 - Python and Other Technologies

Spring 2023

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<b>Instructor:</b>	Vivian Lew	<b>Time:</b>	MWF 4:00 - 4:50pm
<b>E-mail:</b>	(1) use BruinLearn (2) <a href="mailto:vlew@stat.ucla.edu">vlew@stat.ucla.edu</a>	<b>Room:</b>	Kaplan 169
<b>Office Hours:</b>	M, W & F after class until we're done, M 1pm - 3pm (my office) & by appointment	<b>Office:</b>	MS 8923

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## Course description:

This class covers using Python and other technologies for data analysis and data science. We will focus on programming with Python and a selection of its libraries: NumPy, pandas, Matplotlib, and others for the purpose of data processing, data cleaning, data analysis, etc. Other technologies covered will include Jupyter lab, PyCharm and Git. This course is intended for Data Theory majors as an introduction to the Python language and libraries most frequently used in data science. No prior experience with Python is assumed.

**Announcements, notes, assignments will be posted to BruinLearn.** <https://bruinlearn.ucla.edu/courses/164459>

## Tech Requirements:

- Python 3.10 (<https://www.python.org/downloads/>) minor version differences (e.g., 3.11, 3.9) are fine.
- JupyterLab (<https://jupyter.org/install>) but Google Colab is fine.
- pip (visit ChatGPT and ask it something like 'How can I check if I have pip installed on my computer?')
- [PyCharm](#) (community edition, not required, I like it, you might too)
- A GitHub account (free) if you do not already have one and you should probably (not required) also download and install git: <https://git-scm.com/downloads> on your local computer

## Discussion: .

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<b>TA:</b> José Toledo Luna	<b>Time:</b> T 4-4:50p (1A), 5-5:50p (1B)
<b>E-mail:</b> TBA	<b>Room:</b> Boelter Hall 5436

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## Learning Outcomes:

Upon completion of this course, students

- will be comfortable with some of the software tools associated with Python
- will be able to read, write, and improve intermediate level code in Python
- will be able to create, load, transform, and analyze data with Python
- will be able to create and publish data visualizations in Python

### Grading policy:

- 10% A 5 (min) - 15 minute (max) meeting with your professor before Week 4 (in-person preferred, Zoom with video on is OK)
- 20% Attending and participating in team activities on Mondays and Wednesdays during Lecture
- 10% Attending and participating during section (TA will determine the specifics)
- 10% Mid-quarter Exam (end of Week 4 or start of Week 5, TBD)
- 10% Programming Homework (10 assignments - drop your two lowest scores)
- 10% Reflective Thinking (10 exercises - graded complete/incomplete - no drops)
- 20% Final Team Mini Project & Presentation Video (less than 10 minutes due Finals Week)
- 10% Either attending and participating in team activities in lecture on Fridays **OR (not and)** Final 15 minute (max) exam modeled on a technical job interview with your professor (in-person only, no notes, no electronic devices allowed and no internet access, schedule it anytime during Finals week)

If you are planning to miss a lot of class or not turn in assignments, please let me know during your in-person interview so we can discuss it. Two missed lectures (from the Monday/Wednesday portion) are allowed before deductions begin. There is one less Monday lecture (Week 9) due to a holiday and one less Friday lecture before that holiday (Week 8).

### Grades:

Letter grades are assigned on a straight scale as follows:

- 50 and below: F
- 51.0 - 76.9: C, 77.0 - 79.9: C+
- 80.0 - 82.9: B-, 83.0 - 86.9: B, 87.0 - 89.9: B+
- 90.0 - 92.9: A-, 93.0 and up A

I do not assign C-, D+, D, or D-. If you are a Data Theory major or Stats major or minor please take the class for a letter grade. Taking the course pass/no-pass will not fulfill the requirements for completing the major or minor.

### Class attendance and participation:

The learning process of this class is based on in-person discussion and participation during lecture and attending and participating during discussion section with your TA on Tuesdays. The lecture is not broadcast (please check with your TA about section) instead a weekly recorded recap lecture will be uploaded to Bruin Learn. If you are unable to attend lecture, for example, illness, jury duty, please let me know via e-mail sent from BruinLearn so we can make other arrangements.

**Accommodations for students with disabilities**

Students needing academic accommodations based on a disability must contact the Center for Accessible Education (CAE) at (310) 825-1501 or present in person at Murphy Hall A255. As the professionals delegated authority from the campus to determine reasonable disability accommodations, CAE will assess all requested accommodations and communicate appropriately with faculty. In the event that a student has approval for proctoring arrangements during exams, please inform your respective professors and/or Teaching Assistant before date of exams. When possible, students should contact the CAE within the first two weeks of the term as reasonable notice is needed to coordinate accommodations. For more information visit <http://www.cae.ucla.edu>

**Course Grade Changes**

After course grades have been submitted to the registrar, grades are final. Grade changes will only be considered if there has been a clerical or procedural mistake. Students have one quarter to make requests for a grade change. Graded exams and other materials are kept for one quarter. After one quarter, course grade changes cannot be made.

**Tentative Outline of topics:**

**Week 1:** Prep: Shell, Python Install, pip, Git, PyCharm, Jupyter,

**Week 2:** Python Basics: data types, conditionals, data structures.

**Week 3:** More basics: more flow control, more data structures, functions

**Week 4:** Writing functions, algorithms, problem solving, even more data

**Week 5:** Midquarter Exam, Modules and Libraries, Pandas intro

**Week 6:** Pandas: Wrangling and Analysis

**Week 7:** Numpy and SciPy

**Week 8:** Data Visualization: Matplotlib, Seaborn, Plotly

**Week 9:** Python OOP: Classes and objects, methods, inheritance

**Week 10:** Work on Final Team Project and TBD

**Finals Week:** Final Exam (if necessary), turn in Final Team Project

## **Textbooks (available for free online)**

### **How to Think Like a Computer Scientist: Learning with Python 3**

**By:** Peter Wentworth, Jeffrey Elkner, Allen B. Downey, and Chris Meyers

**Publisher:** Green Tea Press and O'Reilly Media, Inc.

The textbook is available free to all at the publisher's website:

<https://openbookproject.net/thinkcs/python/english3e/index.html#>

### **Python for Data Analysis, 3rd Edition (2022)**

**By:** Wes McKinney

**Publisher:** O'Reilly Media, Inc.

**Print ISBN-13:** 978-1-098-10403-0

UCLA students can read the textbook in their web browser at the following site:

<https://learning.oreilly.com/library/view/python-for-data/9781098104023/copyright-page01.html>

Start at the library page <https://www.oreilly.com/library-access/> Select "University of California, Los Angeles" and choose "Sign In with my Institution" – The print version is also available for purchase at any retailer of your choice.

## **Useful Websites**

- <https://www.python.org/>
- <http://stackoverflow.com/questions/tagged/python>
- <https://github.com/vinta/awesome-python>
- ChatGPT

## **Copyright Policy**

All course materials posted on the course website or distributed in class (including but not limited to lecture slides, homework assignments, lecture videos, quizzes, exams) are intended for personal use only by students enrolled in Stats 21 Lecture 1. It is a violation of course policy to post, share, or distribute any course material electronically or physically without permission from the instructor, even after the course is over.

## **Academic Integrity**

As a student and member of the University community, you are here to get an education and are, therefore, expected to demonstrate integrity in your academic endeavors. All students must uphold University of California Standards of Student Conduct as administered by the Office of the Dean of Students. Students are

subject to disciplinary action for several types of misconduct, including but not limited to: cheating, multiple submissions, plagiarism, prohibited collaboration, facilitating academic dishonesty, or knowingly furnishing false information.

- In addition, each student is the sole owner of their own code and work and must NOT:
  - Submit work that is not original.
  - Publish code or solutions online.
  - Submit someone else's work or a modification of that work, with or without that person's knowledge.
  - Allow someone else to submit their work or a modification of their work for your work.
  - Pay others to do your course work.
  - Plan or execute with another student some form of cheating during an exam.
  - Make use of unauthorized material during an exam.
- For more information about academic integrity and student conduct code, please go to <http://www.deanofstudents.ucla.edu/Student-Conduct>

## **COVID-19 health and safety**

In compliance with Los Angeles County policies effective August 2022, UCLA strongly recommends the use of masks indoors for everyone, regardless of vaccination status (please see the [12/19/2022 revision](#)).

In addition, some of us might feel more comfortable social distancing even when not required, for example, during teamwork in class or section even while masked. All of our preferences are reasonable, and it is important that we treat each others' preferences with respect and care. You can find the most current policies on campus masking requirements on the UCLA COVID-19 resources site <https://covid-19.ucla.edu/>.

## **Resources for Students Dealing with Financial Stress**

Life is unpredictable and can create financial emergencies. If you find yourself in this situation, please seek assistance:

- Bruin Shelter: <http://www.bruinshelter.org/> Provides a safe, supportive environment for fellow college students experiencing homelessness by fostering a collaborative effort between universities, community-based organizations, and service providers.
- The CPO Food Shelter: <http://www.cpo.ucla.edu/cpo/foodcloset/> Provides free food for any UCLA student who may be experiencing hunger and/or struggling to attain food due to financial hardships.

## 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.

- **CONFIDENTIAL RESOURCES:** 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.
- **NON-CONFIDENTIAL RESOURCES:** 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.

## Resources for Psychological Health, Well-Being and Resilience
















UCLA is renowned for academic excellence, and yet we know that many students feel overwhelmed at times by demands to succeed academically, socially and personally. Our campus community is committed to helping all students thrive, learn to cope with stress, and build resilience. Remember, self-care is a skill that is critical to your long-term success. Here are some of the many resources available at UCLA to support you:

- Counseling and Psychological Services (CAPS): <https://www.counseling.ucla.edu/> Provides counseling and other psychological/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.
- Ashe Student Health and Wellness Center: <http://www.studenthealth.ucla.edu> Provides high quality and accessible ambulatory healthcare and education by caring professionals to support the academic success and personal development of all UCLA students.
- Healthy Campus Initiative (HCI): <https://healthy.ucla.edu> 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.
- Campus and Student Resilience: <https://www.resilience.ucla.edu/> Provides programs to promote resilience and trains students to help support their peers.
- UCLA Recreation: <https://www.recreation.ucla.edu/> Offers a broad array of services and programs including fitness, yoga, dance, martial arts, meditation, sports, and much more.
- Equity, Diversity and Inclusion: <https://equity.ucla.edu/> Committed to providing an equal learning, working and living environment at UCLA and supports a range of programs to promote these goals campus-wide.

## Emergency Preparedness/Course Continuity in a Crisis

In case of a declared emergency that may affect your safety, please proceed immediately to a safe place and do not concern yourself with the course until the emergency has ended. We will address any course related issues afterwards and will try to be as flexible as possible.

## For your consideration

<div>  <div> <a href="#">About us</a> <a href="#">Join TIOBE</a> <a href="#">News</a> <a href="#">Coding Standards</a> <a href="#">TIOBE Index</a> <a href="#">Contact</a> </div> </div> <div> <a href="#">Products</a> <a href="#">Quality Models</a> <a href="#">Markets</a> <a href="#">Schedule a demo</a> </div>					
Feb 2023	Feb 2022	Change	Programming Language	Ratings	Change
1	1		 Python	15.49%	+0.16%
2	2		 C	15.39%	+1.31%
3	4	▲	 C++	13.94%	+5.93%
4	3	▼	 Java	13.21%	+1.07%
5	5		 C#	6.38%	+1.01%
6	6		 Visual Basic	4.14%	-1.09%
7	7		 JavaScript	2.52%	+0.70%
8	10	▲	 SQL	2.12%	+0.58%
9	9		 Assembly language	1.38%	-0.21%
10	8	▼	 PHP	1.29%	-0.49%
11	11		 Go	1.11%	-0.12%
12	13	▲	 R	1.08%	-0.04%
13	14	▲	 MATLAB	0.99%	-0.04%
14	15	▲	 Delphi/Object Pascal	0.95%	+0.05%

### PYPL Popularity of Programming Language

Worldwide, Feb 2023 compared to a year ago:

Rank	Change	Language	Share	Trend
1		Python	27.7 %	-0.7 %
2		Java	16.79 %	-1.3 %
3		JavaScript	9.65 %	+0.6 %
4	▲	C#	6.97 %	-0.5 %
5	▼	C/C++	6.87 %	-0.6 %
6		PHP	5.23 %	-0.8 %
7		R	4.11 %	-0.1 %
8	▲▲	TypeScript	2.83 %	+0.8 %
9		Swift	2.27 %	+0.3 %
10	▼▼	Objective-C	2.25 %	-0.1 %
11	▲▲	Go	1.95 %	+0.7 %
12	▲▲	Rust	1.91 %	+0.9 %
13	▼	Kotlin	1.85 %	+0.2 %

The PYPL Popularity of Programming Language Index is created by analyzing how often language tutorials are searched on Google.

The more a language tutorial is searched, the more popular the language is assumed to be. It is a leading indicator. The raw data comes from Google Trends.

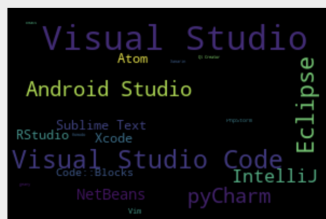
If you believe in collective wisdom, the PYPL Popularity of Programming Language index can help you decide which language to study, or which one to use in a new software project.

## Top IDE index

The Top IDE Index is created by analyzing how often IDEs' download page are searched on Google

The more an IDE is searched, the more popular the IDE is assumed to be. The raw data comes from Google Trends.

If you believe in collective wisdom, the Top IDE index can help you decide which IDE to use for your software development project.



Worldwide, Feb 2023 compared to a year ago:

Rank	Change	IDE	Share	Trend
1		Visual Studio	28.1 %	-1.2 %
2	↑	Visual Studio Code	13.73 %	+1.7 %
3	↓	Eclipse	12.07 %	-1.4 %
4		pyCharm	8.58 %	+0.6 %
5		Android Studio	8.38 %	+0.4 %
6		IntelliJ	6.8 %	+0.8 %
7		NetBeans	4.59 %	-0.7 %
8		Sublime Text	3.54 %	-0.0 %
9	↑↑	RStudio	3.3 %	+0.7 %
10		Atom	3.06 %	+0.2 %
11	↓↓	Xcode	2.87 %	-0.5 %
12		Code::Blocks	1.88 %	-0.5 %
13		Vim	0.88 %	+0.1 %