

Python and Other Technologies for Data Science

Stats 21

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Week 0 Friday



Section 1

Welcome!

Syllabus Stuff

Please review syllabus

What we'll cover

- 1) Week 1: Git, GitHub, conda, Jupyter
- 2) Week 2: Python Basics: variables, expressions, statements
- 3) Week 3: Python Functions: encapsulation, recursion, return values, iteration
- 4) Week 4: Python Data types: strings, lists, dictionaries, tuples
- 5) Week 5: Python OOP: Classes and objects, methods, inheritance
- 6) Week 6: Pythonic code: List comprehensions, kwargs; Numpy
- 7) Week 7: Pandas: Importing, reshaping, and cleaning data
- 8) Week 8: Pandas: Wrangling, and Aggregation
- 9) Week 9: Data Visualization
- 10) Week 10: Fitting models with scikit-learn

Section 2

AI: Artificial Intelligence and Academic Integrity

Artificial Intelligence and Academic Integrity

Some truths:

- AI tools like ChatGPT, Gemini, Claude, etc. are powerful enough to do all of the tasks I assign and even the final project.
- There's nothing in this introductory class that truly goes beyond what AI is currently capable of doing.
- Also, if you search hard enough, you can probably find the answers to the homework problems somewhere online.
- However, the goal of this class is not to get you to accomplish some task or even to complete the homework. The goal is that you learn.

No Pain, No Gain

Think of the gym. The goal of lifting weights at the gym is not to lift weights. Lifting weights is a means to the real goal of gaining strength.

“No Pain, No Gain”: if your weight training does not result in some muscle soreness, you probably did not exert enough effort to expect muscle gain. Experiencing muscle soreness is a sign that your muscles will go through repairs and get stronger.

Your brain is similar: if your brain does not struggle when writing code, then it has no reason to create additional neuron connections that will improve your abilities as a coder. On the other hand, if your brain struggles with writing code, then your brain will try to create new connections between neurons so the next time will not be as hard. And thus you become a better coder.

No Pain, No Gain

Having the AI solve a difficult assignment (or copying a solution) is like having a stronger person lift the weights that are too heavy for you.

This would a good solution if the goal of lifting weights was to lift the weights. But this does not help for the goal of gaining strength.

Using AI is only good if the sole goal is to finish the task. It does not help towards the goal of challenging you so your brain actually learns.

Course Goals

I believe students resort to AI and plagiarism because they have confused the goals of the course.

Students who use AI believe the goal for them is to get a good grade (or avoid a bad grade) in the class. For these students, the goal of learning is secondary to the goal of getting the desired grade.

But this is wrong! The goal of the course is your learning.

I will admit, a major conflicting issue here is that I am not able to create individualized grading schemas that evaluate exactly how much each student learned over the course. All students are graded on the same criteria and evaluated on what they turn in for the assignments.

That said, I hope you can judge your performance in a class based on what you learned and not your letter grade.

My expectations

When you face a challenging homework assignment, I expect

- you work hard
- you will not seek out solutions from AI or another student or some other resource
- if you are not able to complete everything required by the assignment by the deadline
 - ▶ you submit what you have and accept a grade that is less than 100%
 - ▶ you view this not as a failure of your coding abilities, but as a indication of areas for growth and improvement

I (and the statistics department) take issues of plagiarism seriously and will escalate cases to the Dean of Students. Full details regarding academic integrity are in the syllabus.

AI Collaboration Policy

Read the course policies on AI and collaboration and be sure you understand it.

You are encouraged to discuss code that is not part of an assignment!

This is a coding class! As long as the code is not part of a homework assignment, you can post and discuss code with each other and also on Campuswire.

You can always post and discuss code that appears in lecture. You are encouraged to modify the examples the appear in lecture and discuss the effect of each change you make.

You can post and discuss code that is for the purpose of learning a particular concept or how a function works.

If AI can do everything in this class ...

Is this class worth anything if AI can do everything?

If AI can do Data Science ... will there be Data Science jobs?

... Yes! This class is worth learning!

... Yes! There will still be Data Science jobs!

AI can't do everything

There's a lot that AI still can't do. AI can handle a lot of basic data science tasks, but can't do more advanced thinking (yet).

Knowledge builds on previous knowledge.

This class helps you learn foundational concepts so you can later learn the more advanced things that AI can't do.

Section 3

Grades and Life

Your grades do not define you

You are here at UCLA. One of the reasons you got into UCLA was because you had good grades in high school and/or at community college. While you are in school, a lot of your energy is poured into your classes and I can understand why grades feel so important. That said,

Your grades do not define you

It feels good to get good grades. Grades do play a role in graduate school admissions. But they are not the most important thing in life. No one on their death bed looks back and says "I wish I got an A- instead of a B+ in that one college class."

Work - Life Balance

I like to split where we put our energies of life into three broad categories:

- Work
 - ▶ Jobs and internships
 - ▶ School and academics
 - ▶ Other professional obligations
- Relationships
 - ▶ Family
 - ▶ Friends
 - ▶ Romantic partner
 - ▶ Other social obligations
- Self
 - ▶ Care of physical health (food, sleep, exercise)
 - ▶ Care of mental health (sleep, play, entertainment)
 - ▶ Care of spiritual health (if you are spiritual/religious)

There are 24 hours in a day. It is not possible to give 100% to all categories

Work - Life Balance

Work-Life balance is achieved by consciously choosing what is important to you and devoting your time and energies accordingly.

In general, the more you put in, the more you get out.

Satisfaction can be found by accepting the natural consequences of what you have chosen to deprioritize.

Work - Life Balance

Let's say you are part of a group of friends. Let's say that one day you become involved with a romantic partner.

If you choose to invest all of your relationship hours into your romantic partner, you will likely develop a very strong relationship with your romantic partner. However, because you now invest much less into your original group of friends, those relationships will naturally become more distant. When you see distance forming, it can initially feel hostile. This is not (necessarily) the result of your friends being angry that you have a romantic partner but the natural consequence of having less time to spend with them.

As people, we have to make a choice about what is important to us.

When you accept the natural consequences of investing less time into something, you can reduce your own feelings of bitterness and jealousy.

Work - Life Balance

In the corporate and professional world, people who devote a lot of energy into the goals of the company are rewarded. The company is not necessarily punishing people who choose to have families and a life outside of work.

From the company's perspective, who would they rather promote?

- the person who did everything asked of them and then continued to stay at work and did even more
- the person who did everything asked of them and then immediately left to spend time with their family/friends/romantic partner

You have to choose what is important to you. If climbing the ranks within the company is more important, then you will spend your time accordingly. If spending time with your family/friends/romantic partner is more important, then spend your time accordingly.

Self care is important

You must not neglect taking care of your physical and mental health.

If you neglect care of self, you will likely operate at less than 100% efficiency and the time you invest in work/school/relationships will not be as productive.

Examples:

- You don't get enough sleep. A friend invites you out. You choose to accept your friend's invitation instead of sleep, but you are a bit 'out of it' and are a drag to hang around. Maybe it would have been better to decline your friend's invitation and get sleep.
- Exams are coming up. You choose to skip a meal and minimize sleep to study. You end up getting sick. Your performance on the exam suffers. Maybe it would have been better to eat properly, sleep well, and study a bit less.

Self care is important

When I tell you that your physical and mental health is important, I'm encouraging you to choose to invest your time into activities like exercise, sleep, and relaxation that will boost your physical and mental health.

Sometimes this means choosing not to complete your homework to 100%.

The natural consequence of this is a homework grade that is less than 100%.

When you can readily embrace this natural consequence of prioritizing your own physical and mental health over your homework grade, you can enjoy the quarter with less bitterness, more joy and better health.

Beware of “fruitless” entertainment

Entertainment and fun activities are important for your mental well being. It's important to have fun.

I love hanging out with people I like, watching TV, movies, sports, playing board games, video games, going on hikes, browsing the Internet, reading a book, listening to podcasts, etc.

Participating in an entertainment activity should be a break from work and should give you mental energy so you can return to your work in a good mood.

Some activities can have the opposite effect - they drain you. Some video games, apps, and social media sites are designed to be addictive - giving your brain immediate dopamine pleasure hits while you use them so you play round after round or continue scrolling forever (and keep coming back) . . . but after spending hours of doing the activity, you don't feel good about yourself.

Be mindful and selective about your entertainment activities.

Section 4

Shell Basics

Opening Terminal on MacOS

Probably the quickest: Open spotlight with Command + space. Start typing “Terminal”. Terminal will appear as the top hit after you type the first few letters. Hit Enter to start.

Another method: You can open Launchpad from the dock. Click “Other”. Click “Terminal”.

I suggest adding the terminal to the dock.

Getting Help

Windows PowerShell

```
help commandname
```

Mac OS and git bash

```
commandname --help
```

Type q to exit help. Hit the space bar to scroll to the next page.

Shell Basics: Navigation

`~` is your home directory.

`pwd` will tell you where you are currently located. (present working directory)

`cd` is the command to change your directory

Wherever you are, you can switch to your home directory with `cd ~`

Shell Basics: Navigation

Directories are listed in a hierarchy. For example, you may decide to store content for this class in:

```
home/classes/stats21
```

Let's say this is your present working directory.

`cd homework` will change to the directory `homework` if it is available in your current directory. If there is a `homework` folder inside the `stats21` folder, it will take you to `home/classes/stats21/homework`

`cd ..` will take you to the parent directory. If you are currently in `stats21`, `cd ..` will take you to `home/classes`

`cd ../../` will take you two levels up.

Shell support tab completion. If you have the folder `homework` inside `stats21`, you can begin by typing `cd ho` and then hit TAB. Shell will try to complete what you are typing. If there are multiple items that start with `ho` then you can hit TAB multiple times until it finds the item you are looking for.

`ls` will list the contents of your current directory.

`mkdir name` will create a new directory called `name` inside your current working directory.

`clear` will clear the screen.