

NEUR 265

January 23rd, 2023

What is this class?

- Introduction to **Neural Data** Analysis
- **Neural** = Brain stuff!
- **Data** = Brain attributes
- This is an introduction to programming course – with some statistics sprinkled in

My background

- Undergraduate Psychology major – no coding experience (used SPSS or EXCEL)
- Graduate student – started to learn MATLAB (self-taught)
- Post-doc – mostly MATLAB, started to learn R
- Assistant Prof. – MATLAB, R, starting to learn Python

Questions

- What is your coding background?
- How confident are you in your coding ability?
- Why are you taking this course?
- What do you hope to gain from this course?

Syllabus

- By the end of the course, you will be able to:
 - Understand** your data
 - Organize** your data
 - Construct a plan** for analyzing your data
 - Write** relatively clean and efficient code in python
 - Visualize** your data

What is this course *not*

- This course is not a math course

What does math have to do with coding?

- This course is not a theoretical neuroscience course

We'll build simple predictive models, but nothing too crazy

See point one above

Assessments



Mondays: Lecture, maybe some coding

Wednesdays: In-class coding assignments (technical challenge)

Due on Fridays by midnight (see Course Schedule and Assessment Plan): At-home coding homework (signature bake)

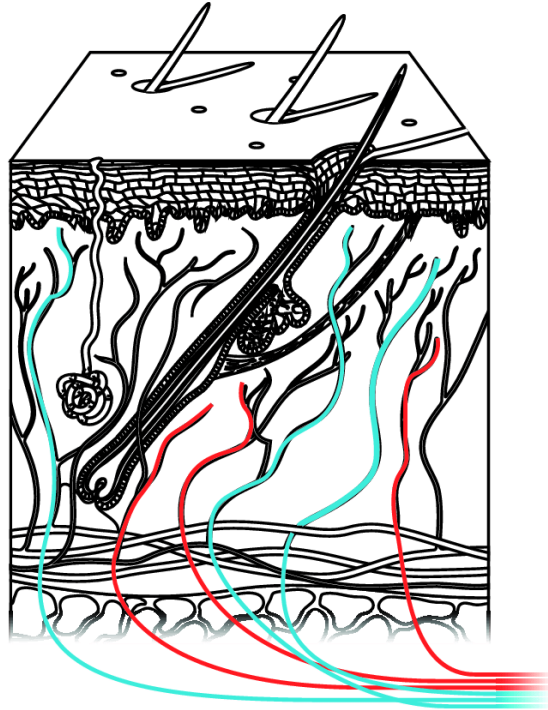
End of semester: Final project (showstopper poster presentation)

Two short essays – one due this Friday, and one due in the middle of the semester

Syllabus Questions?

What is a measurement?

- Let's take temperature as an example

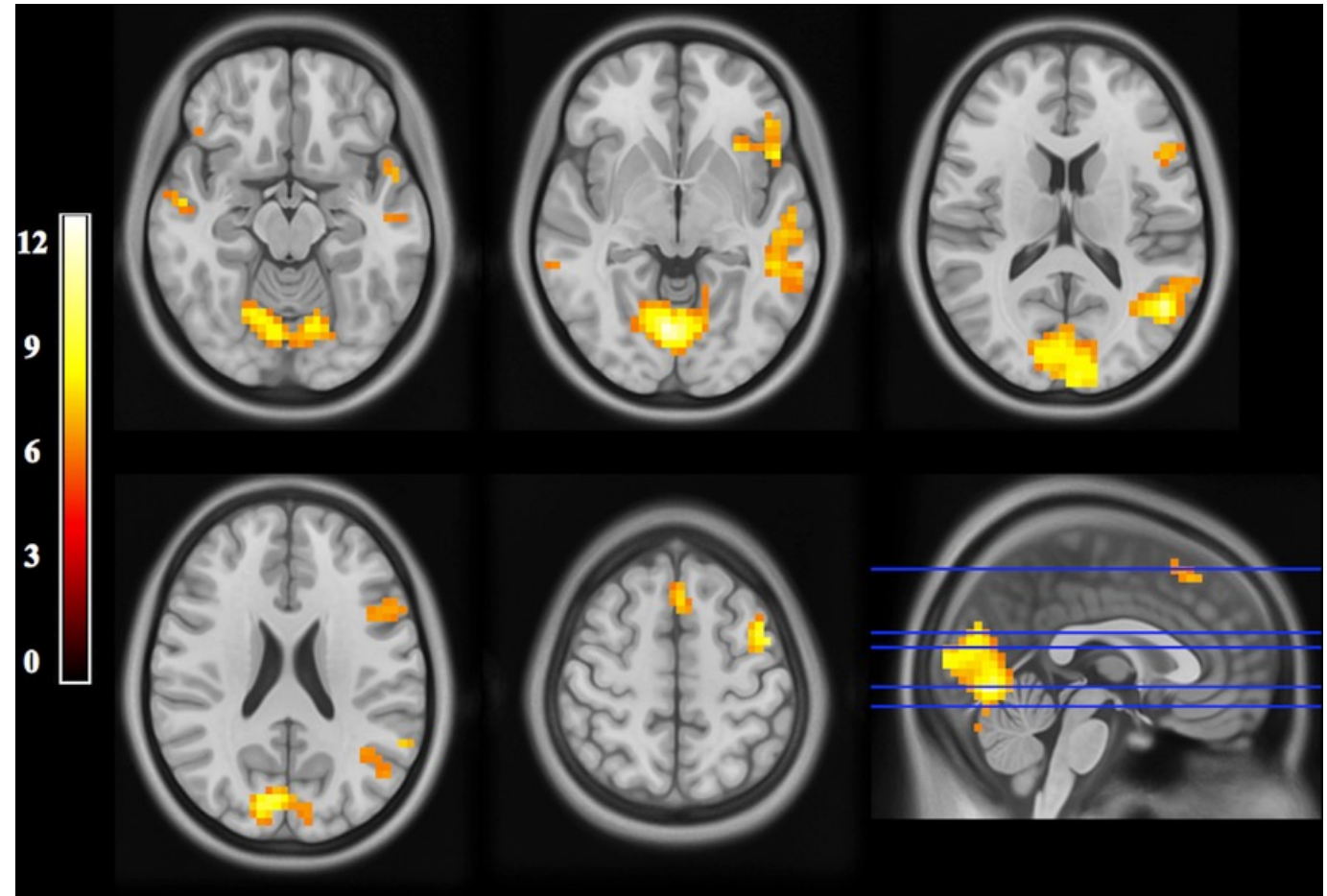
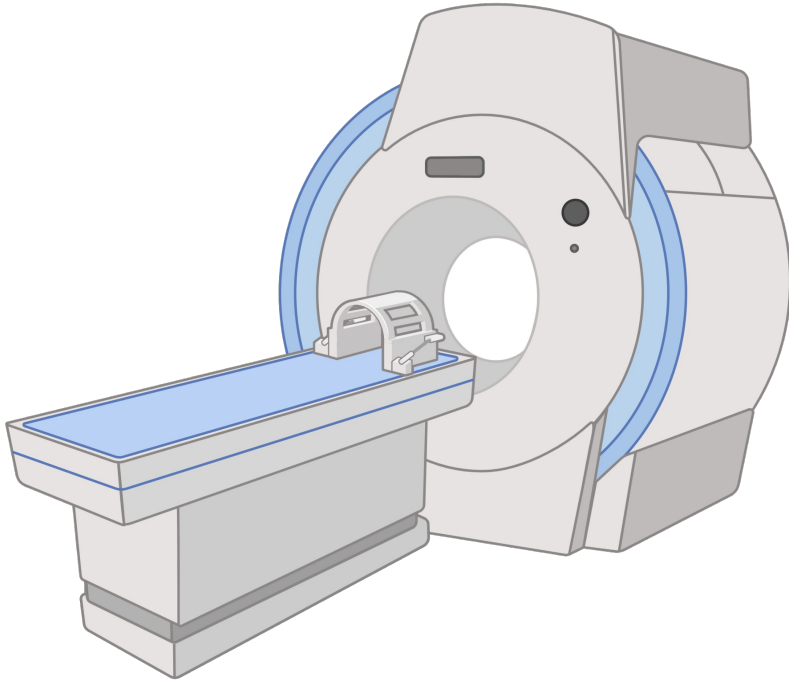


Measuring the brain: Where do we start?



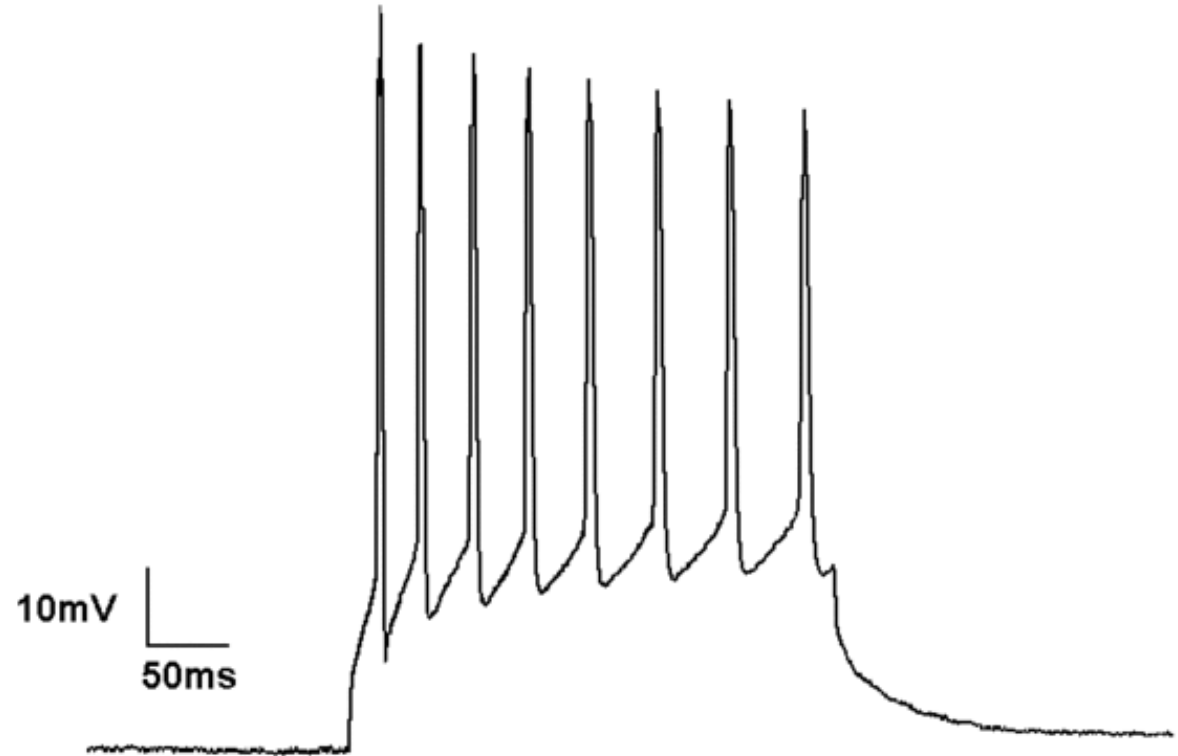
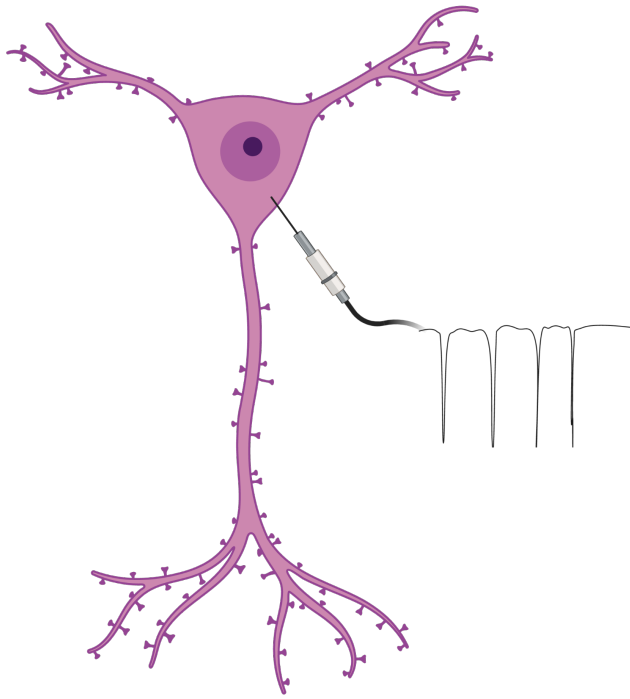
We could start big

- At the systems level



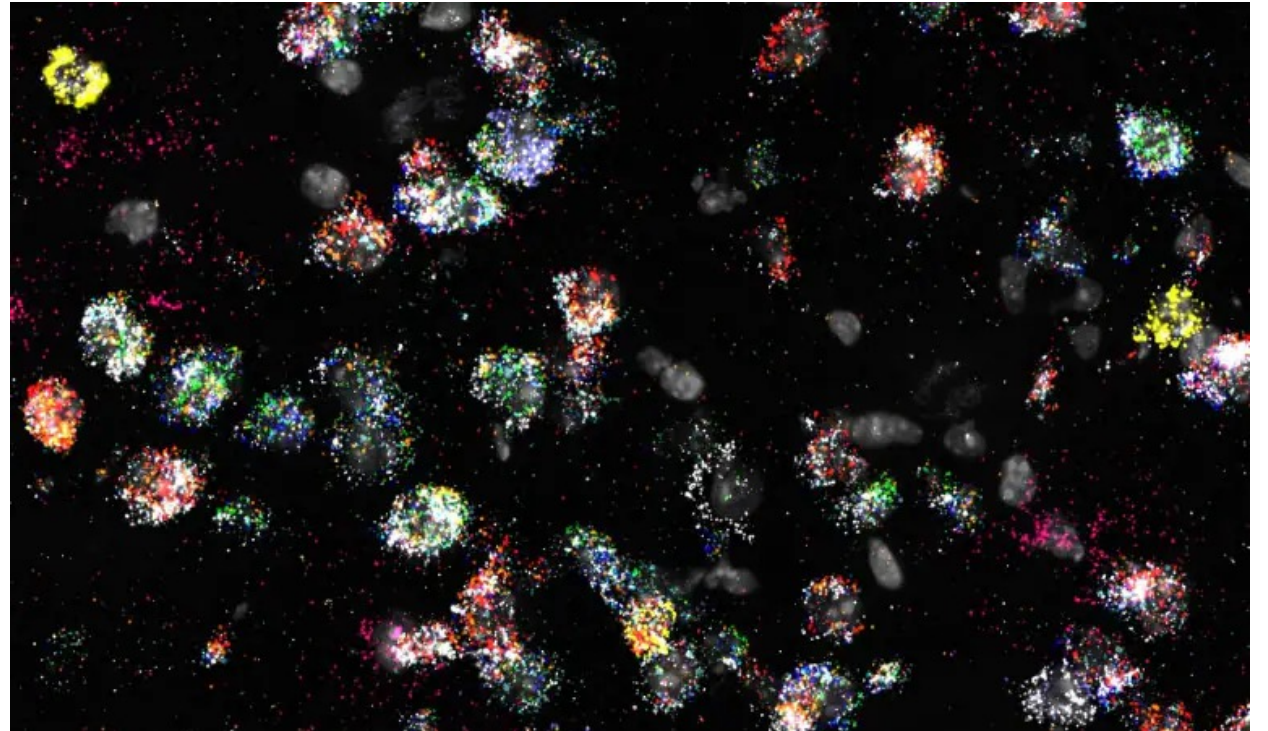
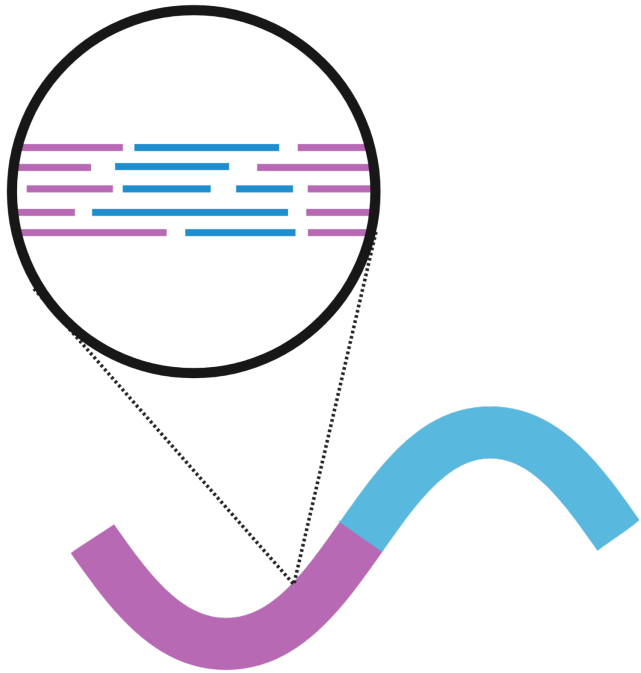
We could start small!

- At the cellular level



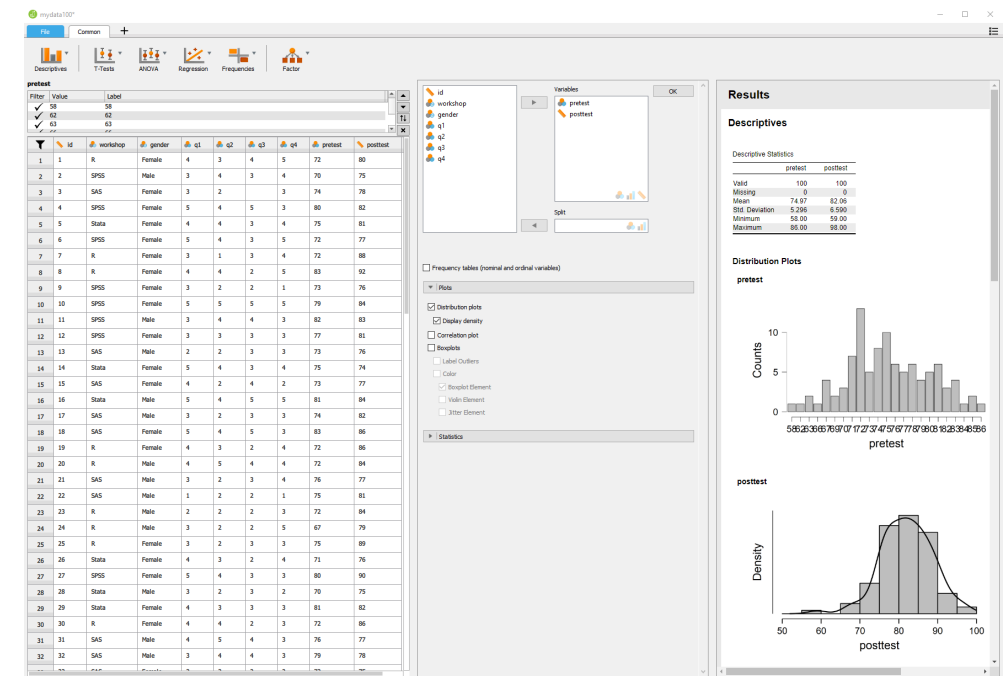
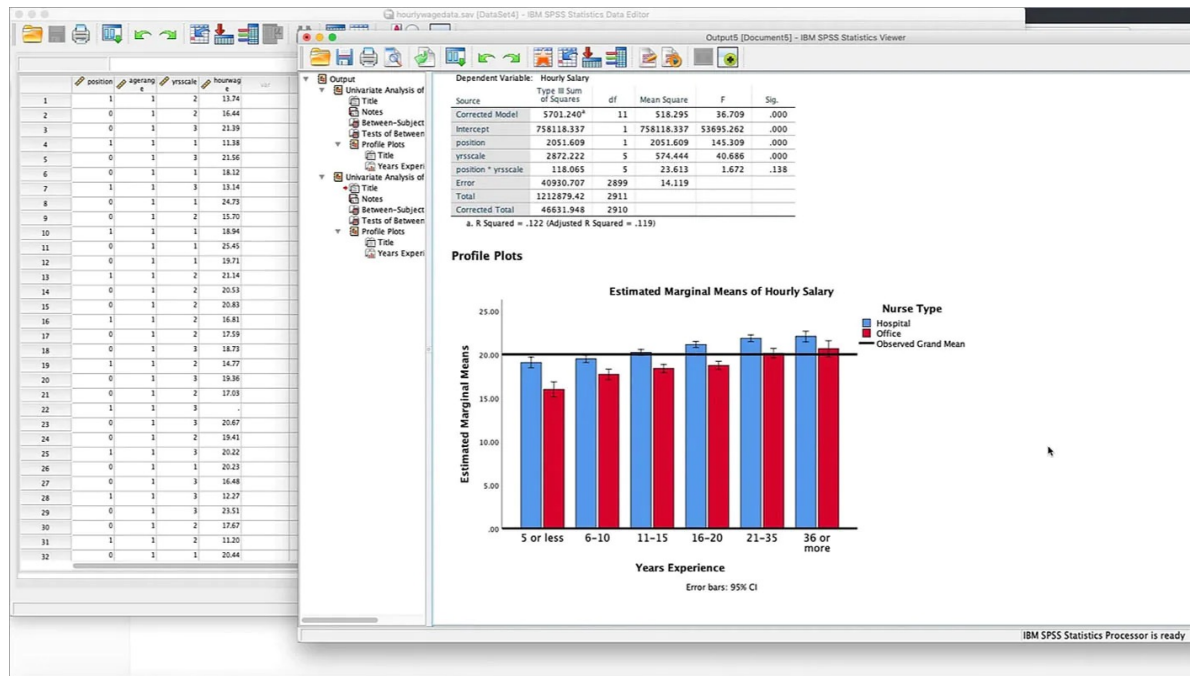
We could go even smaller

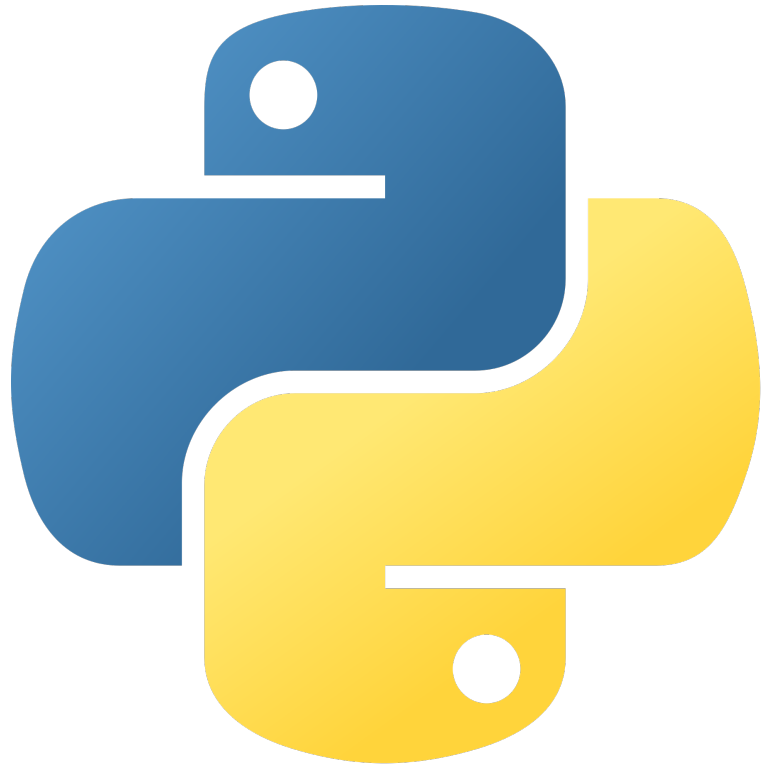
- To the molecular level



You've got some numbers – now what?

- If you've taken Quantitative Methods (or another statistics class) – what did you use?





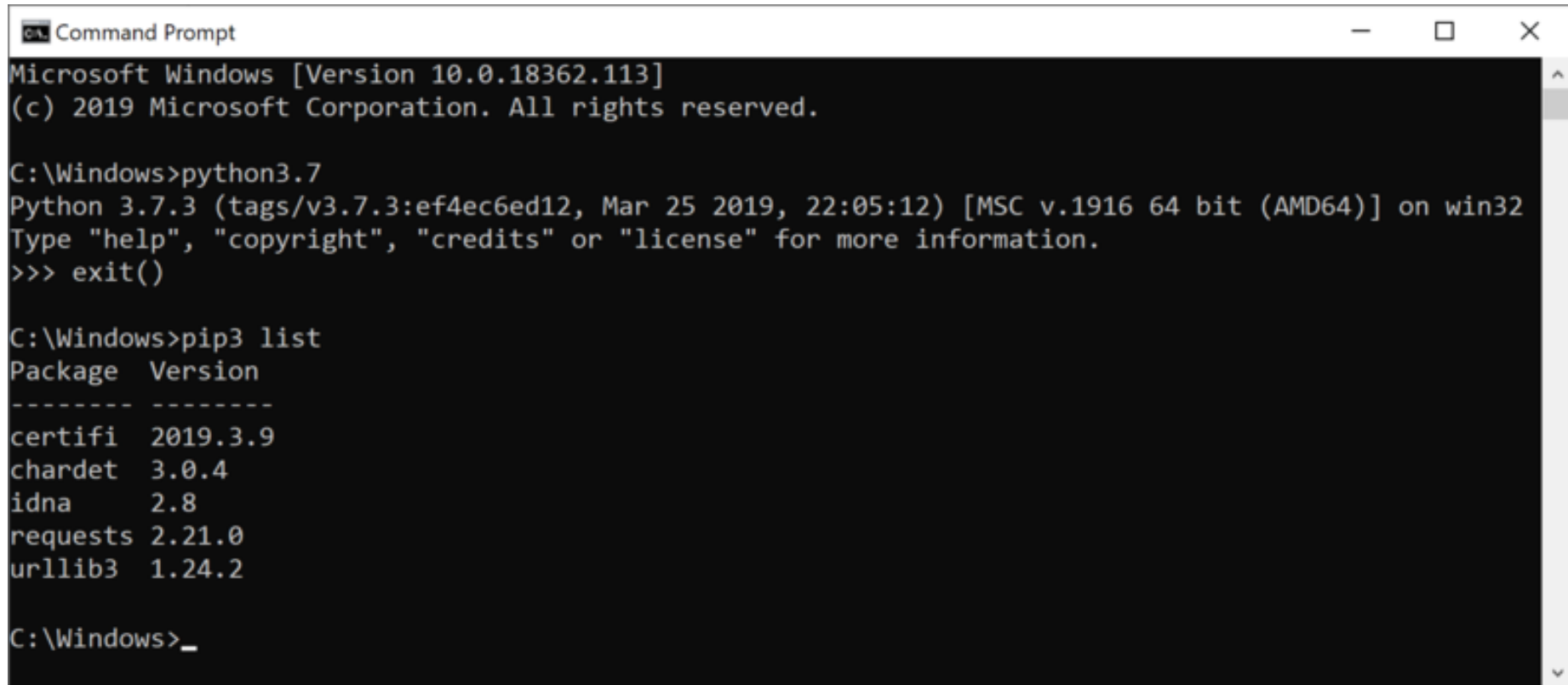
What is Python?

A high-level programming language

Why use Python?

- Flexibility
- Open source
- Logical syntax
- Lots of support / packages available

The Python command prompt looks something like this



```
Command Prompt
Microsoft Windows [Version 10.0.18362.113]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\Windows>python3.7
Python 3.7.3 (tags/v3.7.3:ef4ec6ed12, Mar 25 2019, 22:05:12) [MSC v.1916 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license" for more information.
>>> exit()

C:\Windows>pip3 list
Package Version
-----
certifi 2019.3.9
chardet 3.0.4
idna 2.8
requests 2.21.0
urllib3 1.24.2

C:\Windows>_
```


We will run our python code in interactive environments called Jupyter notebooks

Jupyter notebooks will let you organize your code in a visually appealing and intuitive way

We will run our Jupyter notebooks through Google Colaboratory



Managing Jupyter Notebooks



All Colab projects will be saved as Jupyter notebooks and uploaded to a GitHub page

GitHub is a website that stores and organizes code