KIN 482E “Programming and Data Science for Kinesiology”

Class introduction

Hyosub Kim, DPT, PhD / Assistant Professor / School of Kinesiology

Land Acknowledgment

UBC's Vancouver Campus is located on the traditional, ancestral, and unceded territory of the Musqueam people. The land we are on now has been a place of learning for the Musqueam for thousands of years. We, as teachers and learners, have an obligation to uphold the best of that educational context here in the classroom and in our work.

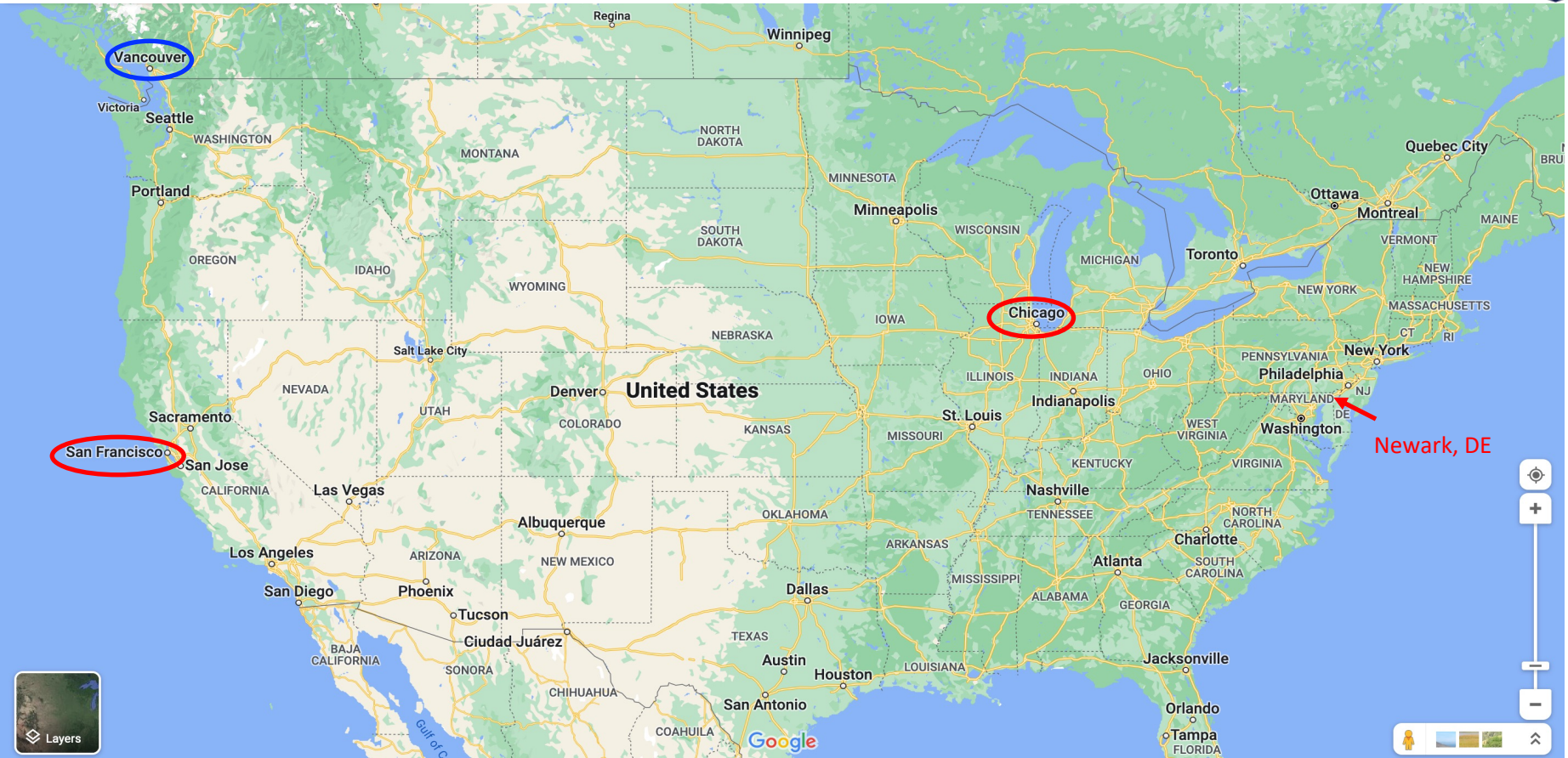
Today’s agenda

- Why this course?
- What will you learn this semester?
- Syllabus highlights
- Intro to course tech stack and some active learning!

Who is your instructor?

- Started at UBC in July 2023
- Director of Computation, Cognition, and Movement Lab (ccmlab.org)
- Use computational modeling and behavioral experiments to better understand motor control and learning
- Using Python for past several years (and lovin' it!); Matlab for longer (also great)
- Most enjoy teaching quantitative and skill-based topics: math/programming/modeling

“New” to Canada



Why this course?

Programming (coding) and data science are two of the most important skills a student can learn

- Generalizable - will help you no matter what area of science/industry/healthcare you enter
- You can immediately start contributing to your lab or team
- Helps to hone other skills (e.g., modeling, math, experimental design)
- Lots of testimonials from last year's students re: how useful these skills have become

Bridges the gap between "traditional" computer science and data science courses

- Focus on practical computing skills
- Foundational coding skills (not always emphasized in introductory data science courses)
- Will learn to use the most popular data science packages (e.g., NumPy, pandas, matplotlib, and seaborn)

Will prepare you for next stage of development

- Machine learning
- Computational modeling
- Statistics

Motivating example

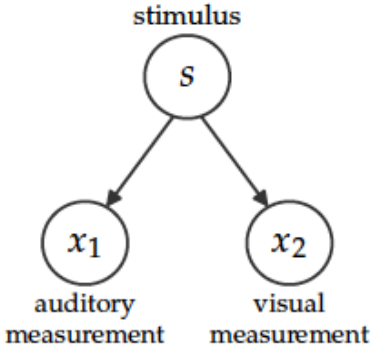
Parkinson's study of motor control

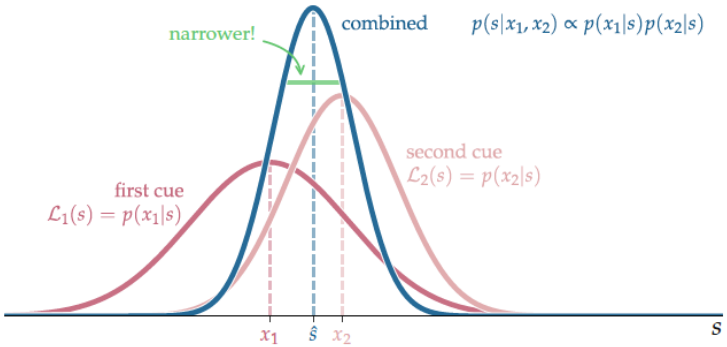
- We'll look at "raw" data first – painful!
- Making sense of tables of strings and numbers with Python and Jupyter notebook
    - Show off skills you'll learn in this course

Shameless plug for next semester

KIN 482D: Computational Modeling of Sensorimotor Learning

- Bayesian modeling of perception and action (foundational framework)
- Computer simulation and parameter estimation
- Focus on gaining mathematical intuitions through computation
- How do we make sense of the world and move successfully through it when incoming sensory information and our motor outputs are noisy?
- Tell your classmates who enrolled in 482D that they will not be able to take course without first knowing how to code
- Impress your friends/family ☺





Syllabus and textbook

- Walk through syllabus – course structure, course breakdown, and pair programming

- Online textbook: https://hyosubkim.github.io/datasci-for-kin
    - Learning Objectives for this Course
    - Academic Integrity
    - Coding Tools:
        - Python – high-level language (i.e., more like natural language), free(!), open-source, must-know for data science/machine learning positions
        - DataCamp – more practice
        - **JupyterHub and Jupyter notebooks**

Course format

- Flipped classroom
- Only short (~10-15 min) mini-lectures
- Rest of the time is devoted to problems and practice
- Teaching team act as guides

A word about the assignments…

- All assignments will be autograded, which means you ***must*** follow instructions carefully
  - E.g.: If instructions say to "Assign your answer to *answer_1*" and you assign your answer to "*Answer_1*", you will receive zero credit
  - Python follows your *exact* instructions and does not infer what you meant to write
  - Good practice for coding "in the wild"

- Good code is readable, organized, and precise

Why [blank] data?

- Data come from everywhere, in life and in this course
- Examples will include GDP, choice, neural, kinematic, physiological, [blank] data…*why?*
  - **(Realistic)** See first bullet point
  - **(Practical)** Being a good data scientist means you can approach any data set
  - **(Idealistic)** If you only work with data you are already familiar with, you will not grow as much
  - Also, you will likely get a chance to work with data of your choice as well

Intro to course tech stack

- Go to Canvas page – access JupyterHub accounts through course page link
- I suggest using Firefox or Chrome as your default browser for this course—known issues with Safari
- Access JupyterHub and work through “lecture-00.ipynb” together – take 10 minutes to read on your own
- Make sure everyone can access Assignment 0
- **Jupyter notebook versions of the textbooks are in your JupyterHub**
- Through Canvas: Send me your UBC email address for DataCamp exercises

For next class session (Mon, 9/9)

- Read syllabus
- Read first two chapters of textbook (“About this course”, “Introduction to Data Science”)
- Complete A0 by Sunday 11:59 pm
- Start going through Chapter 3 (“Intro to Python”)

The Zen of Python

Beautiful is better than ugly.
Explicit is better than implicit.
Simple is better than complex.
Complex is better than complicated…
Readability counts…
In the face of ambiguity, refuse the temptation to guess…
If the implementation is hard to explain, it's a bad idea.
If the implementation is easy to explain, it may be a good idea.

- Tim Peters

(type “import this” in a code cell to read the whole poem)