# A **flipped** classroom introduction to **Python** inspired by and for **life sciences**

Day 1 In-Class Assignment

✍ **Put your name here**

Using Python and Jupyter Notebooks to plan your next visit to the Gateway Arch National Park

HTML version

bit.ly/mooer2026

Course Materials

ejamezquita.github.io/plnt_sci2500

# PLNT_SCI 2500: Data Science for Life Sciences


Erik J. Amézquita

eah4d@missouri.edu

*Division of Plant Sciences & Technology, University of Missouri*

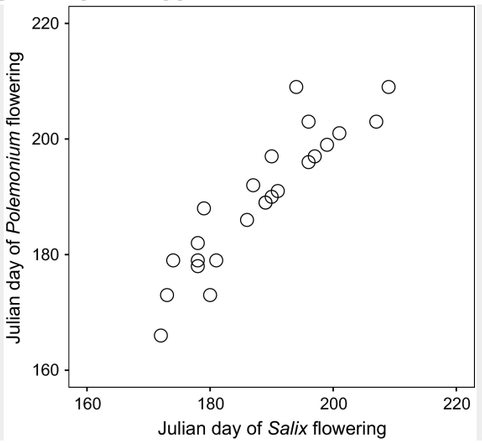

## Setting and Setup
## Python and Jupyter as license-free tools

- Course open to all undergrads across all majors.
- College Algebra (MAT 1100) is the only pre-requisite.
- No prior statistics or coding experience is assumed.
- Two 75-minute sessions per week through 16 weeks.
- Course fully based in **Python** with **Jupyter** Notebooks.

## Open-access, example-driven lessons

ORIGINAL RESEARCH | Open Access

**How shrub encroachment under climate change could threaten pollination services for alpine wildflowers: A case study using the alpine skypilot, *Polemonium viscosum***




Data and SAS Code for all statistical analyses are archived at Dryad… Digital Repository. doi:10.5061/dryad.2p2bh

- Python and data science as **means to an end**.
- Class discussion driven by biology-oriented **open-access** papers with **publicly available** data.
- Students associate content to **real-life** situations.
- Expose students to **data literacy** and visualization.
- Papers co-authored by **Mizzou's** faculty: promote the exciting research done on campus.

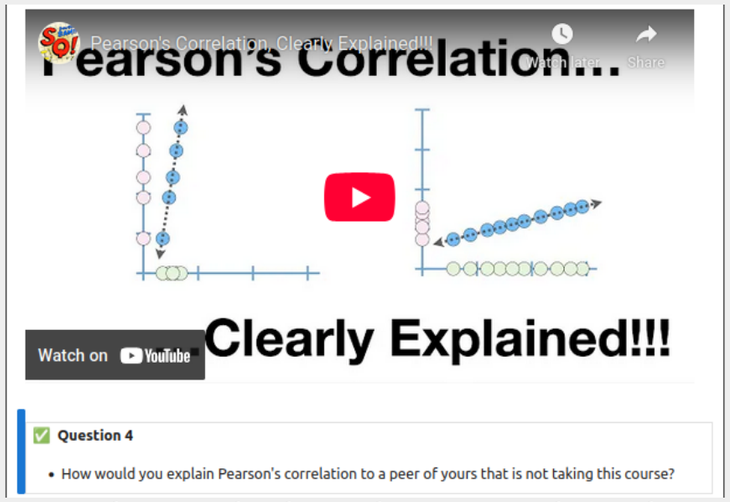

### Acknowledgements

The class materials are heavily inspired by those of CMSE 201 - Introduction to Computational Modeling at Michigan State University and by Plants & Python.


### References


Kettenbach JA, Miller-Struttmann N, Moffett Z, Galen C (2017). How shrub encroachment under climate change could threaten pollination services for alpine wildflowers. *Ecol Evol.* **7**: 6963–6971.

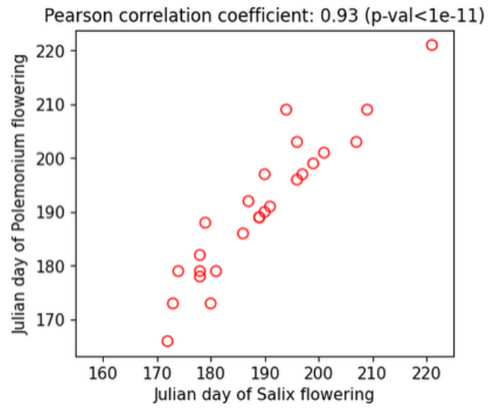

## Active Learning: Pre-Class Assignments




- Students watch videos and comment working code:
  - — Python programming and Python packages
  - — Data wrangling, analysis, and visualization
  - — Mathematical modeling and statistics
  - — Common statistical misconceptions and pitfalls

## Active Learning: In-Class Assignments

```
fig, ax = plt.subplots(1,1,figsize=(4.5,4.5), sharey=True)
ax.set_xlim(155,225);
ax.scatter(xvals, yvals, fc='none', ec='r', s=50)
ax.set_xlabel('Julian day of Salix flowering', fontsize=fs)
ax.set_ylabel('Julian day of Polemonium flowering', fontsize=fs)
ax.set_aspect('equal');
ax.set_title('Pearson correlation coefficient: {:.2f} (p-val<{:.0e})'.format(pears
ax.tick_params(labelsize=fs)
fig.tight_layout();
```




- Students apply the concepts to various datasets to reproduce **open-access** published results.
- Encourage them to work in groups and peer-learning.

## Conclusions and future directions

- No prior experience in biology, data science, or coding assumed, welcoming students from **every background**.
- Python and Jupyter are **open-source** technologies, with no licensing barriers and plenty of **free** support.
- Lessons are drawn from **open-access** papers, avoiding thus any paywalls and promoting open science.