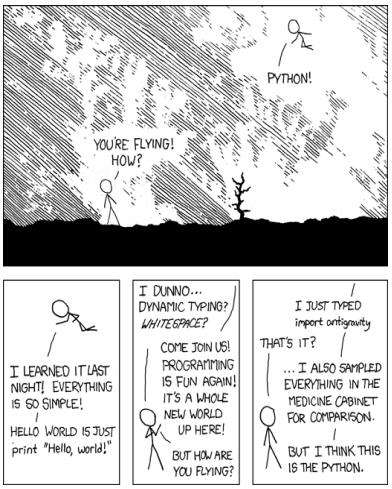

EEB C177

Practical Computing for Evolutionary Biologists and Ecologists

Tuesday/Thursday, 9:30-10:45 AM

Royce Hall 160

Professor Alfaro

Lab Section Monday
8-10:50am (1A, MS 5233) and 11am-1:50pm (1B, Young 1044)
TA: Shawn Schwartz (shawnschwartz@ucla.edu)
Shawn's Office Hours: Tuesday 11am-1pm (Terasaki 2154)

Michael Alfaro

michaelalfaro@ucla.edu
https://michaelalfaro.github.io/alfaro-lab/
Terasaki 2147
Office Hours: TBD
(510) 794-5019

Course contents are tentative and may be updated to reflect class interests and guest lecturers.

Course Description: A general trend within nearly all fields of biology has been an explosion in the availability of data. As a result, biology is becoming increasingly computational. The goals of this course are to provide you with the tools you need to manipulate and analyze common sources of biological information such as such as text output from computer programs and electronic data bases. You will learn the basics of shell operations, regulation expressions, and the fundamentals of python programming including control statements, reading and writing of files, and scripting. You will also learn specialized libraries for programming in ecology and evolutionary biology.

Prerequisite(s): LS 1 or LS 7B.
Units: 4

Text(s): Allesina, S. and Wilmes, M., 2019. *Computing Skills for Biologists: A Toolbox.* Princeton University Press. Available on **Amazon here**.

The following books are available on the UCLA Network or with the UCLA VPN at http://proquest.safaribooksonline.com/:

1. Grus, J. (2019). *Data science from scratch: first principles with python, 2nd Edition.* O'Reilly Media.

2. Lubanovic, B. (2019). *Introducing Python, 2nd Edition: Modern Computing in Simple Packages.* O'Reilly Media.

3. Géron, A. (2019). *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, 2nd Edition.* O'Reilly Media.

Course Objectives:

By taking this course, students will gain experience in:

1. working from the shell
2. using regular expressions
3. writing documents in latex
4. programming in Python
5. understanding of machine learning and its applications
6. visualizing data in R

Grades

1. Participation 20%
2. Homework 20%
3. Lab assignments 30%
4. Final Project 30%

Your grade in this course will be determined by participation, homework assignments, lab assignments, and projects.

- Your **participation** grade will include team exercises and unannounced in class challenges and quizzes. Regular class attendance is essential to earn a high participation score.
- **Homework** will be assigned regularly to get you using the tools we cover in lecture. You will be introduced to many new languages, packages, and programs in this course. The best way to learn this material and develop your skills is through immersion and repetition. The motivation behind the homework (and final project) assignments is to give you reasons to fire up a terminal and start hacking.
- **Lab Assignments** will provide an opportunity to apply skills we cover in lecture with practical examples and will help prepare you for your final project.
- **Final Project** The bulk of your course grade will be determined by a class project. The project will require you to integrate all of the tools that you learn over the quarter to manipulate and analyze data. All code written for final projects must be well commented/documented to demonstrate understanding of implemented code and algorithms. The final project grade will be divided into the following stages and due dates:
  - Project idea submitted to CCLE **with potential data sets** by Friday Week 2: Jan 17th (1%).
  - An exploration of a data set using bash and a shell script uploaded to GitHub by Friday Week 3: Jan 24th (4%).
  - Final Project Assignments for Weeks 4-9 will be announced throughout the quarter on the course website (25%).
  - Lightning Presentation (details to follow) during Week 10 (20%).
  - Completed Projects (reports, working code, everything) due Friday, March 20th (Finals Week) by 5PM (50%).

Course Policies:

General

- Bring a laptop to class! We will be working through programming examples in every lecture.
- In class challenges and exercises must be turned in during class. Make up assignments will not be given but the two lowest in-class assignment scores will be dropped before calculating your participation grade.
- Homework assignments should be submitted electronically to the CCLE or posted to your repository as instructed.

Grading Scale

>= 93.00	A	73.00 - 76.99	C
90.00 - 92.99	A-	70.00 - 72.99	C-
87.00 - 89.99	B+	67.00 - 69.99	D+
83.00 - 86.99	B	63.00 - 66.99	D
80.00 - 82.99	B-	60.00 - 62.99	D-
77.00 - 79.99	C+	<= 59.99	F

Attendance Policy

Attendance is mandatory to receive credit for participation and in-class assignments. Students may be excused from one lecture with approved documentation. Additional absences will result in loss of participation points for that day. There is no makeup for missed participation.

Late Assignment Policy

Late homework will be penalized 10% per day late up to 2 days after the deadline. After this any assignments handed in will be given a 0.

Academic Integrity and Honesty

Students are required to comply with the university policy on academic integrity. This includes plagiarism and cheating on in-class exercises, exams, and other assignments. The UCLA student guide on academic integrity is here.

Accommodations for Disabilities

Reasonable accommodations for students with verified disabilities will be made in coordination with the UCLA Center for Accessible Education (CAE).

Sharing of Course Materials

Please remember that you are not allowed to upload or share any class content not created by you onto third-party sites and/or with anyone not enrolled in the course. The unauthorized redistribution which includes, but is not limited to, providing course materials such as the course syllabus, homework, examinations, course Power Points, and course notes, to online websites, commercial entities, and test banks without the consent of the course instructor may be considered a violation of Section 102.23/102:23a of the UCLA Student Conduct Code, and may result in

Tentative Course Outline:
The weekly coverage and readings will change depending on progress of the class and student interests.

Week	Content
Week 1	• Preliminaries, introduction to version control, Unix • Reading assignment: Allesina & Wilmes (2019): Chapters 0, 2.
Week 2	• The Shell, Unix, Text Editors, Regular Expressions • Reading assignment: Allesina & Wilmes (2019): Chapters 1, 5.
Week 3	• Python Programming I • Reading assignment: Allesina & Wilmes (2019): Chapter 3;
Week 4	• Python Programming II • Reading assignment: Allesina & Wilmes (2019): Chapter 4;
Week 5	• Scientific Typesetting (Markdown) • Reading assignment: Allesina & Wilmes (2019): Chapter 7
Week 6	• Python Programming III: • Reading assignment: Allesina & Wilmes (2019): Chapter 6
Week 7	• Machine Learning: • Reading assignment: TBA
Week 8	• Statistical computing and Data visualization in R; • Reading assignment: Allesina & Wilmes (2019): Chapter 8
Week 9	• Scientific Typesetting (LaTeX) • • Reading assignment: Allesina & Wilmes (2019): Chapter 9.
Week 10	• Project Presentations • Reading assignment: TBA