

Systematics Lab

April Wright

Spring, 2020

E-mail: april.wright@selu.edu

Office Hours: M 9:15-11:15am, W 9:15-11:15am, Th 1-4pm and by appointment

Class Hours: M 1-4 pm

Office: Biology Building 403

Class Room: BB 412

Course Description

This course will introduce you to the fundamentals of computing a phylogenetic tree. Topics will include making a phylogenetic matrix, models of sequence and morphological evolution and divergence time estimation.

Required Materials

- Course notes available on the course website.

Course Structure

Homework

Each week, there will be a homework due at 5 pm Friday worth 10 points. Each homework will be worth ten points. Because these are posted a week in advance, and cover the prior week's material, these cannot be made up without speaking to me first.

Final Project

To follow along with the project in the lecture course, you will also be expected to carry out a computational analysis to be included in your talk.

Grading Policy

The typical Southeastern biology grading scale will be used. I reserve the right to curve the scale dependent on overall class scores at the end of the semester. Any curve will only ever make it easier to obtain a certain letter grade.

Schedule and weekly learning goals

The schedule is tentative and subject to change. The learning goals below should be viewed as the key concepts you should grasp after each week

Week 01, 02/03 - 02/07: Set-Up and Introduction to R

- Course Policies
- Starting R

Week 02, 02/10 - 02/14: Homology Assessment

- How is homology assigned in morphological data
- How does multiple sequence alignment work
- How do we assess homology in modern sequence data sources, such as ddRAD

Week 03, 02/17 - 02/21: Homology Assessment II

- How do we assess homology in modern sequence data sources, such as ddRAD

Week 04, 02/24 - 02/28: Models of Evolution I

- What are different models of sequence evolution?

Week 05, 03/02 - 03/06: Mardi Gras

Week 06, 03/09 - 03/13: Bayesian Estimation

- How is a tree computed in a model?
- What is a prior?

Week 07, 03/16 - 03/20: Models of Evolution II

- How can we compare models of sequence evolution?

Week 08, 03/23 - 03/27: Morphology

- Invertebrates

Week 09, 03/30 - 04/03: Divergence Time Estimation I

- What is a clock model?
- Why do we need one?

Week 10, 04/06 - 04/10: Divergence time estimation II

- How do fossils figure in?
- Where do we get fossil information?

Week 11, 04/13 - 04/17: Divergence time III

- Putting it all together into a model

Week 12, 04/20 - 04/24: Spring Break**Week 13, 04/27 - 05/01:** Biogeography

- How can a phylogeny be used to inform biogeographic analysis?

Week 14, 05/04 - 05/08: Comparative Methods

- How can we model discrete traits on a phylogeny?
- What methods exist for continuous traits?