

# **Introduction to Phylogenetics: Building and Using Trees**

EEB 8990 (section 002; Systematics Discussion Group)

Fall 2017 (1 credit)  
Monday 4-5 pm, Ecology 200  
Course Webpage: canvas.umn.edu

## **Course Description**

This seminar is an introduction to modern phylogenetics theory and practice. The material is appropriate for upper level undergraduates and graduate students who have taken an introductory course in evolution. No prior knowledge of programming is assumed.

Course coordinators: Ya Yang ([yangya@umn.edu](mailto:yangya@umn.edu)), Keith Barker ([barke042@umn.edu](mailto:barke042@umn.edu))

## **Course Objectives**

1. Become familiar with phylogenetic methods
2. Understand how trees are used to study character evolution (comparative analyses), infer selection (molecular evolutionary analyses), and other evolutionary questions
3. Become conversant in analytical issues and methods for phylogenetic data and learn to critique papers rely on phylogenies for comparative studies

## **Course Evaluation**

In class participation: 50%  
Completion of out of class practical: 50%  
Student can choose either A-F or Pass-Fail.

Students will be expected to come to class having read the assigned material and prepared to discuss the issues addressed. Individual students or pairs of students will lead each discussion.

In addition to readings and in class discussions, students will be provided with brief applied phylogenetics assignments that will require use of computational tools. These assignments will be completed out of class time (aided by consultation with other students and the instructors) and turned in for evaluation.

## **Course Materials**

Readings will be uploaded to course website by Tuesday prior to class.

## **Topics**

- 11-Sep Phylogenetic Trees and Tree Thinking
- 18-Sep Types of Data
- 25-Sep Sequence Alignment
- 2-Oct Parsimony and Tree Searches
- 9-Oct Distance Trees
- 16-Oct Models of Molecular Evolution and Maximum Likelihood
- 23-Oct Bayesian Inference
- 30-Oct Molecular Clocks
- 6-Nov Tree Support, Consensus, and Hypothesis Testing
- 13-Nov Orthology, Paralogy, Gene Trees and Species Trees
- 20-Nov Species Tree Inference
- 27-Nov Molecular Evolution and Inference of Selection
- 4-Dec Phylogenetic Comparative Methods
- 11-Dec Something fun here...