BIOL 659 – Fall 2019
Topics in Evolutionary Biology: Phylogenetic Comparative Methods
Dr. Todd Vision

Course Description: The course will focus on the body of statistical methods for exploring phylogenetic patterns and testing phylogenetic hypotheses collectively known as phylogenetic comparative methods. Analyses will focus on tree visualization and interpretation, trait evolution and lineage diversification. Students will have the opportunity to replicate analyses from the literature using published data, including a final project based on a paper of their choosing. In addition, the course will give students the chance to hone skills in data visualization (primarily using ggplot2), data manipulation (primarily with the 'R tidyverse') and literate programming (using R markdown).

Meeting time and place: Monday 2:30-3:20pm & 3:35-4:25 pm, in GSB 4101

Instructor contact: Todd Vision, Assoc. Prof., Dept. of Biology, Genome Sciences 3155, tjv@unc.edu, 919.962.4479, office hours Tue & Thu 1:30-4:30 or by appt.

Eligibility: For undergraduates, Biol 201 or equivalent and permission of the instructor. One or more advanced courses in evolution and some familiarity with R will be helpful. Can count as BIOL elective credit in the major if combined with other 600-level courses for a total of three credit hours. May be repeated for credit; may be repeated in the same term for different topics; 12 total credits. 6 total completions.

Credit hours: 2

Class format
The first hour of class will be seminar format, typically based on a reading. The second hour will be a hands-on tutorial / problem set using R or other phylogenetic software. A number of class periods will be devoted to student presentations of midterm and final projects.

Assignments and Grading
Problem sets associated with the weekly computer labs will be due the following week and graded for completion. The midterm project will consist of a short class led by the student on a method or application relevant to the class and matching their interests. The final project will be based on a replication of a published paper, chosen by the student with feedback from the instructor. The project will consist of an oral report during the final class periods and a peer review submitted in lieu of a final paper (pending approval from the chair). The instructor will work with each student on their proposals for both the midterm and final projects to find topics that are both feasible, relevant and match the student's interests. Participation in class discussions will also contribute to the final grade, and students should aim to contribute at least one question or discussion point about each reading.

Final grades will be on the A-F scale for undergraduate, H-F for graduates. Assignments count toward the final grade according to the following percentages:

- Participation in class discussions – 20
- Problem sets associated with weekly computer labs (graded for completion) – 30
- Midterm project (student-led lesson)- 25
- Final project (presentation of a replication attempt and a written peer review) - 25

Rubrics will be provided for each of the assignments.

Readings

Readings and other class materials will be made available online unless otherwise indicated. Relevant books include:

- L. Harmon "Phylogenetic Comparative Methods: Learning from Trees"
- H. Wickham "R for Data Science"
- C. Wilke "Fundamentals of data visualization"
- J. Felsenstein "Inferring Phylogenies"
- DA Baum & SD Smith "Tree Thinking"

Attendance and preparation

Attendance and full participation are critical for a class of this nature. Please inform Dr. Vision about unavoidable absences. Repeated unexcused absences will count against class participation. Readings need to be completed before the assigned class, and failure to do so will count against class participation.

Key dates

- Aug 26 – FDOC
- Sep 2 – Labor Day, no class
- Sep 23 – Midterm project proposal due
- Oct 14 – First day of midterm project presentations
- Nov 4 – Final project proposal due
- Nov 25 & Dec 2 – Final project presentations
- Dec 2 – LDOC
- Dec 6, 4pm - Final paper due

Honor Code

Students are expected to know and abide by the UNC Honor Code. This syllabus is subject to change.