

Tentative topic & activity schedule for:

"Phylogenetic Comparative Methods in R"

Overview of anticipated daily schedule:

Day 1: Unit 1 (Basics) & Unit 2 (BM & phylogenetic regression) + TAKE GROUP PHOTO

Day 2: Unit 3 (Discrete characters) & Unit 4 (Ancestral state reconstruction)

Day 3: Unit 5 (Diversification) & Project time

Day 4: Unit 6 (Phylogenetic community ecology) & Unit 7 (Visualization) & Final presentations

Detailed schedule:

Introduction of instructors & students

— UNIT 1: Basics of working with trees in R —

Lecture 1: Introduction to the phylogenetic comparative method

Exercise 1: Introduction to reading, writing, manipulating, and visualizing phylogenies and comparative data in R (R&H Chapter 1)

Challenge 1: Simple challenge problem on reading & managing phylogenetic trees & data (Practice Problems 1.1 to 1.3)

Time to work on the challenge problem

— UNIT 2: Brownian motion, phylogenetic regression, & phylogenetic signal —

Lecture 2: Brownian motion, PICs, and PGLS

Exercise 2A: Phylogenetic generalized least squares regression (R&H Chapter 3)

Challenge 2: PGLS (Practice Problem 3.3)

Time to work on challenge problem

Exercise 2B: Brownian motion evolution & phylogenetic signal (R&H Chapter 4)

— UNIT 3: Discrete character evolution —

Lecture 3: Discrete character evolution on phylogenies

Exercise 3A: Fitting discrete character evolution models to phylogenetic data in R (R&H Chapter 6)

Challenge 3: The extended M_k model (Practice Problems 6.1 & 6.2)

Time to work on challenge problem

Exercise 3B: Pagel's model for studying the evolutionary correlation of discrete characters (R&H Chapter 7)

Challenge 3B: Correlated evolution (Practice Problem 7.3)

— UNIT 4: Ancestral state reconstruction —

Lecture 4: Ancestral state reconstruction for discrete & continuous characters

Exercise 4: Ancestral state reconstruction (R&H Chapter 8)

— UNIT 5: Speciation and extinction —

Lecture 5: Using reconstructed phylogenies to study the dynamics of species diversification

Exercise 5A: Introduction to studying diversification on phylogenies (R&H Chapter 9)

Challenge 5: Calculating diversification rates (Practice Problem 9.3)

Time to work on challenge problem

Exercise 5B: Fitting state-dependent diversification models in R (R&H Chapter 11)

— UNIT 6: Phylogenetic community ecology & biogeography —

Lecture 6: Introduction to phylogenetic community ecology

Exercise 6: Phylogenetic community ecology & biogeography in R (R&H Chapter 12)

Challenge 6: Analyzing phylogenetic community structure (Practice Problem 12.1)

— UNIT 7: Plotting phylogenies and comparative data —

Exercise 7: Plotting phylogenies and comparative data (R&H Chapter 13)

Challenge 7: Visualizing comparative data & models