Analytical Methods for Ecology, Evolution, and Natural Resources

11:372:369; 11:216:369
Fall (3 credits)

When T-Th 2:15 – 3:35
Where: Hickman Hall, Room 216

Instructor: John Wiedenmann
Email: john.wiedenmann@rutgers.edu
Office ENR 125
Office hours: Tuesdays / Thursdays 12:30 – 1:30
I am also available to meet by appointment. . Send me an email to schedule a meeting
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Objectives

Students in this course will learn concepts related to understanding the collection, processing, analyzing and visualization of data in problems ecology, evolution, and natural resource management. This course is not a comprehensive course in statistics. Rather, students will be exposed to a wide range of analytical tools, providing a foundation of quantitative reasoning skills to be built upon throughout their academic or professional careers.

Grading
Class Participation 10%
Homework 50%
Takehome Exam 20%
Final Project 20%

Half of the course grade will be based on semi-weekly homework assignments. Homework will be due one week from the date it is given, and there is no credit for late assignments (unless special permission has been given by the instructor). The remainder of the course grade will be based on one take home exam, and a final project where students analyze a dataset of their choosing and summarize findings in a final report.

Learning Goals

• Develop a comprehensive understanding of the analytical tools, including the software and commonly used statistical and modeling techniques, used in ecology, evolution, and natural resources management.
• Demonstrate the ability to design experiments and interpret numeric and graphical data.
• Solve problems using evidence-based reasoning.
• Communicate effectively orally and through written text and graphics.

Tentative schedule, subject to change

Date	Topic
Tu 9/4	Introduction; course objectives
Th 9/6	Understanding data, data visualization
Tu 9/11	Summary statistics (mean, median, mode, variance, standard error)
Th 9/13	Introduction to Excel
Tu 9/18	Critical thinking, deceptive statistics, ethics in data collection / analysis
Tu 9/25	**Randomness in Nature**
Th 9/27	Probability
Tu 10/2	Introduction to R (part 1)
Th 10/4	Discrete random variables
Tue 10/9	Continuous random variables
	Models in Ecology, Evolution, and Natural Resources
Th 10/11	An overview of models in ecology, evolution and natural resources
Tu 10/16	Sampling design (1), random sampling
Th 10/18	Sampling design (2), stratified random sampling, cluster sampling
Tu 10/23	Null models, Chi-squared and t-tests
Th 10/25	ANOVA
Tu 10/30	Linear regression
Th 11/1	Multiple regression
Tu 11/6	Model fitting (1)
Tu 11/13	Model fitting (2); dealing with outliers and other issues
Th 11/15	Models of population dynamics, exponential and densitiy-dependent growth
Tu 11/20	Mark recapture models
Th 11/22	No Class, Thanksgiving Break
Tu 11/27	Allometric relationships
Th 11/29	Simulation models
	Spatial Analysis
Tu 12/4	Spatial data
Th 12/6	Inerpolation, Kriging
Tu 12/11	Kriging cont., Variograms