

WILDLIFE 742
ECOLOGICAL DATA ANALYSIS
SPRING SEMESTER 2023, 3 CREDITS

Contact Info

Instructors: Christopher Yahnke and Benjamin Sedinger

Office Hours: TBD

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Classroom: TNR 252, Monday 2:00-4:50 PM

Communication

We communicate primarily through email and announcements in lecture which are usually subsequently posted to Canvas.

Learning Outcomes

This course will cover the principles of ecological data analysis using frequentist and Bayesian methodology. We will discuss experimental design and the foundations of statistics, and how these principles can be applied to the analysis of data commonly used to advance our understanding about wildlife ecology and management. There will also be opportunities for students to examine topics of their choosing.

Students satisfactorily completing this course should be able to:

- 1) Compare and contrast traditional hypothesis testing with model selection approaches.
- 2) Compare and contrast frequentist and Bayesian statistical paradigms.
- 3) Use statistical tools to address research questions and management challenges.

Textbooks

Primary textbook:

1. Kéry, M. Introduction to WinBUGS for ecologists. Academic Press. 2010. [see Canvas]

Optional text if you are interested in population ecology:

2. Kéry, M., Beissinger, Steven R, & Schaub, Michael. Bayesian population analysis using WinBUGS a hierarchical perspective. Academic Press. 2012.

Optional text if you are interested in more background on Bayesian methodology

3. Hobbs, N.T., and M.B. Hooten. Bayesian models: A statistical primer for ecologists. Princeton University Press. 2015.

Other Course Materials

We will periodically read from the peer reviewed literature. Announcements about reading and discussion will be made in class.

Assignments and grading

The most stressful part of a course for both the student and the teacher is grades and grading. What if we could all just focus on learning? What if you knew your grade before the semester even began? I've been rethinking how I assess learning since the Covid semester. Instead of accumulating points in the traditional way, we are going to use contract grading this semester in this course. Basically, how much work are you willing to put in for an A or for a B. A formal contract will be handed out on the first day.

REQUIREMENTS FOR A GRADE OF A

(1) Class Attendance/Discussion

Class attendance is required. For a grade of A, students will attend at least 12 classes. Professionals communicate with their teams and with their supervisors. If you need to miss a class because you are ill, attending a professional conference, or some other reason, please get into the habit of behaving professionally and letting us know. Each week there will be a series of readings. Students will come to class prepared to discuss these readings.

(2) Weekly challenges

We will be working through the WinBugs for Ecologists book, which includes exercises to work on and understand the weekly topics. For a grade of A, students are expected to bring their laptops, work through the exercises, and assist other students to foster a learning community.

(3) Chapter experts

Each student will be assigned a chapter in WinBugs to summarize and lead for the day. For a grade of A, students will come prepared to lead their assigned chapter.

(4) Final project

For a grade of A students will find a non-simulated data set to analyze based on their question of interest and report their finding to the class in the final class session.

CONTRACT FOR A GRADE OF A

By signing this contract for an A in this class, I agree to all the terms above.

A NOTE ON GRADES OTHER THAN AN A

Since a B is a C and a C an F in graduate school, we will refrain from contract guidelines for grades other than an A, with the understanding that breach of contract above can result in a grade lower than an A.

Discussions

We will periodically have student-led discussions during the semester about selected reading from peer-reviewed literature. Please keep up on the reading and come to class prepared for discussion (e.g. having already read and thought about the papers).

Consulting project

We will pair you up with undergraduate led research projects to provide consulting on study design and statistical analysis. On May 12th graduate students will present on these projects to the class.

Getting Help

Please do not be shy about asking for help! If you are having any trouble understanding something in class, then do not hesitate to schedule a time to meet outside of class or ask questions in class, as those problems will likely only get worse as the material becomes more complex and builds on itself.

Tentative Schedule

Date	Topic	Reading
1/23/2023	Introductions.	
1/30/2023	What are statistics?	Hurlbert 1984, Zuur et al. 2010
2/6/2023	Hypotheses vs. Models.	Romesburg 1981
2/13/2023	Frequentist vs. Bayesian Methodology.	Ellison 2004
2/20/2023	GLMs	Kery – chapter 6
2/27/2023	Normal linear regression	Kery – chapter 8
3/6/2023	ANOVA	Kery – chapters 9 and 10
3/13/2023	ANCOVA	Kery – chapter 11
3/20/2023	SPRING BREAK	
3/27/2023	Linear mixed-effects model	Kery – chapter 12
4/3/2023	GLM: Poisson “t-test”	Kery – chapters 13 and 14
4/10/2023	GLMM: Poisson mixed-effects model	Kery – chapter 15 and 16
4/17/2023	GLMM: Binomial mixed-effects model	Kery – chapter 19
4/24/2023	GLMM: Site occupancy SDM	Kery – chapter 20
5/1/2023	GLMM: Binomial mixture model of abundance	Kery – chapter 21
5/8/2023	Presentations, discussion, Schmeeckle fieldtrip??	
TBD	FINAL EXAM	

This is a tentative schedule and may be changed at any time at our discretion.

