Welcome to NRES 470/670

Applied Population Ecology, Spring 2024

Instructor: Kevin Shoemaker
Office: Fleischmann Agriculture, room 220e
Phone: 775-682-7449
Email: kevinshoemaker_at_unr_dot_edu
Office hours: Mondays from 3 to 4pm in FA 220e
Course Website: https://kevintshoemaker.github.io/NRES-470/
Teaching Assistant Colton Irons (cirons_at_nevada_dot_unr_dot_edu)
TA Office hours: TBD

Course Meeting Times

Lecture & Discussion: M, W at 10am (50 mins) in OB (Orvis Building) 203
Lab: F at 1pm (2 hrs 45 mins) in FA 301

Course description

This class explores how concepts of population ecology can be used to inform the conservation and management of natural populations and ecosystems. We emphasize practical approaches to problem-solving in ecology, conservation, and wildlife management using simulation models and inferential statistics. Topics include Population Viability Analysis (PVA), limits to population growth, metapopulation ecology, species interactions (competition and predation), threats to wild populations, wildlife management and more. Laboratory exercises provide students with hands-on experience with wildlife population models and their practical applications in wildlife ecology and management.

Prerequisites

- BIOL 314 or NRES 217 (Ecology)
- NRES 310 (Wildlife Ecology and Management)

NOTE: this course is a prerequisite for NRES 488 (Dynamics and Management of Wildlife Populations) and is designed to complement NRES 421 (Conservation Biology).

Texts

- Gotelli, N. J. A primer of ecology
- Additional readings will be assigned for discussion periodically.

Software

- InsightMaker- web-based systems modeling tool(free, web-based, need account)
- R- software for statistical computing and graphics (free installation)
- Spreadsheet software (MS Excel, Google Sheets or equivalent)
- Top Hat (interactive classroom software- invitations should have been emailed to you)

Student Learning outcomes

SLO 1. Explain how and why simulation models are used by ecologists and wildlife professionals.
SLO 2. Apply tools such as population viability analysis (PVA) and metapopulation models

to address the conservation and management of wild populations.
SLO 3. Perform basic statistics, data visualization, simulation modeling and model validation with Excel, the statistical computing language 'R', and the web-based software, InsightMaker.
SLO 4. Critically evaluate the strength of inferences drawn from ecological simulation models using tools such as sensitivity analysis.
SLO 5. Explain how species interactions can influence population dynamics (e.g., predictions of species range shifts).
SLO 6. Communicate original research in applied population and community ecology via professional-style oral and written presentations.

Grading:
The course grade will be based on the following components:

- Lab exercises (7 total) 20%
- Lectures/participation 10%
- Group project 30%
- Midterm exam # 1 (date TBD) 10%
- Midterm exam # 2 (date TBD) 10%
- Final exam 20%

Grading scale: A (100 to 93), A- (92 to 90), B+ (89 to 87), B (86 to 83), B- (82 to 80), C+ (79 to 77), C (76 to 73), C- (72 to 70), D+ (69 to 67), D (66 to 63), D- (62 to 60), F (below 60).

Exams:
There will be two midterm exams and a final exam, all of which will be cumulative, covering all course material covered up to the week prior to the exam. These will consist of multiple-choice, short-answer questions, and essay questions requiring synthesis of key concepts.

Lectures
Lecture grades will be based primarily on participation and short in-class quizzes (via TopHat). Participation is essential to the learning process (and to our mutual enjoyment of this class). Learning is not a passive process; students are expected to engage with the material in class rather than simply listen and take notes. You should be prepared in class to ask questions, to answer questions, and to engage in problem-solving activities.

Labs
Lab exercises will focus on applying concepts and methods introduced in lectures, and will involve real-world problems in wildlife conservation and management wherever possible. Graded lab assignments will involve figures, tables, InsightMaker models and R code (when applicable) and responses to questions in short-answer format.

Final group project
Students will work in groups of 3-4 to perform a population viability analysis (PVA) to rank conservation or management actions for a species of conservation concern (species of your choice!). Grading will be based on finished products (written and oral presentations) as well as participation and peer evaluations.

Graduate credit (for students enrolled in NRES 670)

Graduate students will be subject to additional expectations in order to receive graduate credit for this course. In particular, graduate students will be expected to develop an original lecture and lead an original lab activity related to a topic relevant to wildlife population ecology. Graduate students will also be expected to achieve a deeper understanding of the course material, and therefore will be expected to participate as leaders in discussions and lab activities.

Make-up policy and late work:

Missed exams and labs cannot be made up, except in the case of emergencies. If you miss a class meeting, it is your responsibility to talk to one of your classmates about what you missed. If you miss a lab meeting, you are still responsible for completing the lab activities and write-up. Let me or your TA know in advance if you are going to miss class or lab.

Top Hat

We will be using the Top Hat interactive learning platform in class. You will be able to submit answers to in-class questions using Apple or Android smartphones and tablets, laptops, or through text message. Top Hat is free of charge for UNR students this year! You should all have received an invitation via email. You can also enroll using the join code 632462.

Provisional Course Schedule

Please check back for updates frequently!

Week	Dates	Topic	Readings	Due
Week 1	1/22/2024	LECTURE: Course overview; Intro to Systems Thinking		
	1/24/2024	LECTURE: Intro to Population Ecology; Exponential growth	Gotelli Chapter 1	
	1/26/2024	LAB 1: Introduction to population modeling in Excel, InsightMaker, and R		
Week 2	1/29/2024	LECTURE: Intro to Population Ecology; Exponential growth		
	1/31/2024	LECTURE: Malthus and exponential growth	Gotelli Chapter 2	
	2/2/2024	LAB 1 (cont'd)		
Week 3	2/5/2024	LECTURE: Density-dependent population growth	Gotelli Chapter 2	
	2/7/2024	LECTURE: Density-dependent population growth		

Week	Dates	Topic	Readings	Due
	2/9/2024	LAB 2: Density-dependent populations in InsightMaker; MSY		Lab 1
Week 4	2/12/2024	LECTURE: Passenger pigeon/Allee Effect	Gotelli Chapter 3	
	2/14/2024	LECTURE: Age-structured populations	Gotelli Chapter 3	
	2/16/2024	LAB 3: Age-structured populations in Excel and InsightMaker		Lab 2
Week 5	2/19/2024	President's Day (no class)		
	2/21/2024	LECTURE: Age-structured populations	Gotelli Chapter 3	
	2/23/2024	LAB 4: Matrix population models in R and InsightMaker		Lab 3
Week 6	2/26/2024	LECTURE: Matrix population models	Heppell 1998 (Optional)	
	2/28/2024	LECTURE: Matrix population models		Get in project groups
	3/1/2024	Work in final project groups: PVA proposals		
Week 7	3/4/2024	LECTURE: Matrix population models		
	3/6/2024	LECTURE: Stochasticity and uncertainty	Regan 2002	
	3/8/2024	LAB 5: Stochasticity and uncertainty		PVA proposals, Lab 4
Week 8	3/11/2024	Review for Midterm #1		
	3/13/2024	MIDTERM #1		
	3/15/2024	PVA projects: group meetings (or make alternate arrangements for a group meeting time)		
Week 9	3/18/2024	LECTURE: Stochasticity and uncertainty		
	3/20/2024	LECTURE: Small population paradigm	Caughley 1994	

Week	Dates	Topic	Readings	Due
	3/22/2024	Work on PVA projects (PVA models due Apr 10)		Lab 5
Week 10	3/25/2024	Spring Break (no class)		
	3/27/2024	Spring Break (no class)		
	3/29/2024	Spring Break (no class)		
Week 11	4/1/2024	LECTURE: Declining population paradigm	Caughley 1994	
	4/3/2024	LECTURE: Metapopulations	Gotelli Chapter 4	
	4/5/2024	LAB 6: Metapopulation modeling in InsightMaker		
Week 12	4/8/2024	LECTURE: Metapopulations	Gotelli Chapter 4	
	4/10/2024	LECTURE: Source-sink dynamics	Griffin et al	PVA models due
	4/12/2024	PVA projects: group meetings (working model and description)		
Week 13	4/15/2024	Review for Midterm #2		
	4/17/2024	MIDTERM #2		
	4/19/2024	LAB 7 (optional-no assignment): Parameter estimation: mark-recapture data		Lab 6
Week 14	4/22/2024	LECTURE: Species interactions: competition	Gotelli Chapter 5	Complete PVA drafts
	4/24/2024	LECTURE: Species interactions: competition	Gotelli Chapter 5	
	4/26/2024	LAB: Final Project Peer Review (submit peer review)		
Week 15	4/29/2024	LECTURE: Species interactions: predator-prey	Gotelli Chapter 6	
	5/1/2024	LECTURE: STUDENT PRESENTATIONS		
	5/3/2024	LAB: STUDENT PRESENTATIONS		

Week	Dates	Topic	Readings	Due
Week 16	5/6/2024	LECTURE: Parameter estimation		
	5/8/2024	NO CLASS: Prep Day		
Week 17	5/13/2024	FINAL EXAM (10:15am to 12:15pm)		
	5/15/2024	FINAL PAPERS DUE		Final PVA write-up, Extra credit assignments

Statement on Academic Dishonesty

The University Academic Standards Policy defines academic dishonesty, and mandates specific sanctions for violations. See the University Academic Standards policy: UAM 6,502.

Statment on Disabilities Services

Any student with a disability needing academic adjustments or accommodations is requested to speak with me or the Disability Resource Center (Pennington Achievement Center Suite 230) as soon as possible to arrange for appropriate accommodations.

Statement on Student Compliance with University Policies

In accordance with section 6,502 of the University Administrative Manual, a student may receive academic and disciplinary sanctions for failure to comply with policy, including this syllabus, for failure to comply with the directions of a University Official, for disruptive behavior in the classroom, or any other prohibited action. "Disruptive behavior" is defined in part as behavior, including but not limited to failure to follow course, laboratory or safety rules, or endangering the health of others. A student may be dropped from class at any time for misconduct or disruptive behavior in the classroom upon recommendation of the instructor and with approval of the college dean. A student may also receive disciplinary sanctions through the Office of Student Conduct for misconduct or disruptive behavior, including endangering the health of others, in the classroom. The student shall not receive a refund for course fees or tuition.

Statement on Audio and Video Recording

Student-created Recordings

Surreptitious or covert video-taping of class or unauthorized audio recording of class is prohibited by law and by Board of Regents policy. This class may be videotaped, or audio recorded only with the written permission of the instructor. In order to accommodate students with disabilities, some students may have been given permission to record class lectures and discussions. Therefore, students should understand that their comments during class may be recorded.

Instructor-created Recordings

Class sessions may be audio-visually recorded for students in the class to review and for enrolled students who are unable to attend live to view. Students who participate with

their camera on or who use a profile image are consenting to have their video or image recorded. If you do not consent to have your profile or video image recorded, keep your camera off and do not use a profile image. Students who un-mute during class and participate orally are consenting to have their voices recorded. If you do not consent to have your voice recorded during class, keep your mute button activated and only communicate by using the "chat" feature, which allows you to type questions and comments live.

Statement for Academic Success Services

Your student fees cover usage of the University Math Center [(775) 784-4433], University Tutoring Center [(775) 784-6801], and [University Writing Center (775) 784-6030]. These centers support your classroom learning; it is your responsibility to take advantage of their services.

Statement on Maintaining a Safe Learning and Work Environment

The University of Nevada, Reno is committed to providing a safe learning and work environment for all. If you believe you have experienced discrimination, sexual harassment, sexual assault, domestic/dating violence, or stalking, whether on or off campus, or need information related to immigration concerns, please contact the University's Equal Opportunity & Title IX office at 775-784-1547. Resources and interim measures are available to assist you. For more information, please visit the Equal Opportunity and Title IX page.

Statement on COVID-19 Policies

Face Coverings

Pursuant to Nevada law, NSHE employees, students and members of the public are not required to wear face coverings while inside NSHE buildings irrespective of vaccination status. However, students may elect wear face coverings if they choose.

Disinfecting Your Learning Space

Disinfecting supplies are provided for your convenience to disinfect your learning space. You may also use your own disinfecting supplies.

Testing Positive for COVID-19 or Exhibiting COVID-19 Symptoms

Students testing positive for COVID 19 or exhibiting COVID 19 symptoms will not be allowed to attend in-person instructional activities and must leave the venue immediately. Students should contact the Student Health Center or their health care provider to receive care and information pertaining to the latest COVID 19 quarantine and self-isolation protocols. If you are required to quarantine or self-isolate, you must contact your instructor immediately to make instructional and learning arrangements.

Accommodations for COVID 19 Quarantined Students

For students who are required to quarantine or self-isolate due to testing positive for COVID or exhibiting COVID 19 symptoms, instructors must provide opportunities to make-up missed course work, including assignments, quizzes or exams. In courses with mandatory attendance policies, instructors shall not penalize students for missing classes while quarantined.

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6030. These centers support your classroom learning; it is your responsibility to take advantage of their services. Keep in mind that seeking help outside of class is the sign of a responsible and successful student.