Course: ESM 211 Applied Population Ecology
Winter Quarter 2025
Time: Tuesdays and Thursdays 3:30-4:45
Locations: Bren Hall 1424
Prerequisites **ESM201** and **ESM206;** or approval of the instructor

Instructor Information:
Dr. Christopher Jerde, Research Scientist & Lecturer
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Office hours: **TBD** and by appointment

Brief Bio: I am a quantitative ecologist and MSI Researcher who works broadly in environmental science. I received my B.Sc. (Biological Sciences) and M.Sc. (Ecology) from Montana State University and Ph.D. from the Centre for Mathematical Biology at the University of Alberta, Canada. My postdoctoral training was conducted at the University of Notre Dame at the Center for Aquatic Conservation. For the last 15 years, I have focused on using environmental DNA to detect invasive species and measure biodiversity

Course Description (from course catalog): Examination of the application of population ecology to conservation of rare species and management of harvested populations. Topics include population regulation, population viability analysis, fisheries management, metapopulation dynamics, and population monitoring.

Learning outcomes for this course. After taking this course, a successful student should:
1. Be versed in interpreting population models used in conservation management of threatened and endangered, managed, indicator, and invasive species.
2. Be versed in introductory concepts of theoretical ecology, which includes single-species population dynamics and structured population dynamics
3. Be able to build, analyze, and present ecological population models using the R programming language.

Diversity, Equity, Inclusion, and Belonging: Applied population biology is more than mathematical models of population growth or decline. The interface of science, policy, and management has many perspectives, motivations, experiences, and education levels that may or may not align with your own. Learning respect for these differences will make you a better steward of natural resources and an effective scientist. We will emphasize this respect for D, E, I, and B in the classroom. If you ever have DEI & B concerns about the material presented, then please share that concern and work with me to improve the content and effectiveness of this course.

Recommended Materials: No textbook is **required** for this course, but we will draw extensively from the PDF posted on Canvas to the book: Murray, D. L., & Sandercock, B. K. (Eds.). (2020). *Population ecology in practice*. John Wiley & Sons. Other information will be drawn from the primary literature and will be posted on Canvas. You will be expected to use the R programming language, and packages for population analyses will be identified during the course.

How to succeed in this course:
1. Attend class & participate.
2. Keep current with the portfolio and presentations.
3. Work collaboratively and actively with your classmates.
4. Contact me.

Grading criteria

Class discussion of population ecology papers (20%)
Quiz on population ecology papers (10%)
R package teaching session (20%)
Small project data (10%)
Small project presentation (10%)
Portfolio (30%)

Course evaluation

Participation: I will keep attendance and assess participation each class period. Students must read all the background materials and be ready to discuss these overviews and papers on designated days. Readings will come from the Nature Education project here: https://www.nature.com/scitable/knowledge/population-ecology-13228167/

Additional readings will be posted to Canvas.

Quiz: A 10-question take-home quiz will assess understanding of background material.

R package teaching session: Part of working in population biology is working with quantitative approaches often addressed by specific R packages. In groups of 2-3, you will teach a half-class period dedicated to a package. The instruction must include a peer-reviewed paper that uses the approach (class reading), an overview of the key functions in the R package, a demonstration of the package's application, and a portfolio assignment for the class. More details and an example will be provided.

Small projects: The project for this course can be in a group (2-3 students) or solo. Students working on their dissertation data cannot work in a group. The project should use unpublished population data or, if published, cannot use the modeling approach taken in the publication(s). The purpose is to apply and present what you have learned and demonstrate applications beyond what has been presented in class (dig deeper into

applications and approaches and share with your colleagues). The project's novelty will be rewarded, as will practical application to a pressing conservation need. Small projects will be evaluated using a 10-minute presentation on the last day of class. You will submit three products: 1. a PDF of the presentation slides; 2. the commented R code used to conduct all analyses; and 3. The data and metadata used for the small project (*.csv file). The presentation is 10%, and the data with metadata are 10%.

Portfolios: Throughout the course, we will emphasize "learning by doing." This means that assignments will be added to your portfolio at the end of every R package session. I encourage you to write code and compile notes into a file that can be accessed quickly for your future use. At the end of the quarter, I will inspect your portfolio for completeness. You must compile the portfolio as a single PDF.

Calendar of activities: This is a tentative schedule of topics, activities, and readings.

Dates	Topic(s)
1/7	• Intro, expectations, & discussion. • Portfolio assignment 1 (Set up) • Investigate R packages for populations
1/9- 1/23	• Readings on key population ecology concepts • R package investigations (Chris will provide an teaching session example using mark-recapture methods). • Take home quiz
1/28	• Small project discussion
1/30 -2/18	• R package teaching sessions • Portfolio work
2/20	• Small project selection and group formation
2/25-3/11	• Working on small projects
3/13	• Small project presentations • Portfolios due (3/14)

Policies (Taken and slightly modified from UCSB suggested policies):

Schedule changes: The schedule is subject to change depending on the progress of the course.

Due dates: All portfolios are due by March 14. No exceptions.

Class participation: In this course, we will work and learn *together*. That means you need to be in class for the learning to happen. I understand that you may encounter

situations where you can't attend class. Work with your classmates or me to get copies of notes and the information presented. Lectures will not be recorded.

Plagiarism and academic integrity: All students are expected to understand and comply with university policies regarding plagiarism and the originality of work. **Plagiarism** occurs when a writer deliberately passes off another's words or ideas without acknowledging their source. For example, turning another's work as your own is plagiarism. Plagiarized assessments will receive a grade of 0 and may result in additional disciplinary action. You can view the university's policy on student conduct at http://www.sa.ucsb.edu/Regulations/student_conduct.aspx.

Plagiarism is different from **misuse of sources**, occasions when a writer does not properly cite a source, misuses quotations, includes too much of an original source in a paraphrase or summary, or commits similar *unintentional* violations of academic protocol. If you misuse sources, we will work together on appropriately incorporating and/or citing the sources. Note that some audiences/instructors will consider misuse of sources to be plagiarism; for this reason, it is *extremely* important for you to identify the conventions associated with source use and citations in any class.

Grade appeals If you have a dispute with a grade you have received, you have the right to request a review by the instructor. Please keep in mind that an appeal will invoke a review of the full assignment and could result in a lower grade.

Intellectual property and course materials: All course materials (class lectures and discussions, handouts, examinations, web materials) and the intellectual content of the course itself are protected by United States Federal Copyright Law and the California Civil Code. UC Policy 102.23 expressly prohibits students (and all other persons) from recording lectures or discussions and from distributing or selling course materials without the prior written permission of the instructor (See http://policy.ucop.edu/doc/2710530/PACAOS-100). Students are permitted to make notes solely for their own private educational use. Exceptions to accommodate students with disabilities may be granted with appropriate documentation.

Students with disabilities: If you are a student with a documented disability (registered with the DSP program: 893-2668, www.sa.ucsb.edu/dsp) and would like to arrange accommodations, please contact me after class and I will be happy to discuss alternative arrangements.

General academic support: Campus Learning Assistance Services (CLAS) offers instructional groups, drop-in tutoring, writing and ESL services, skills workshops and one-on-one consultations. CLAS is located on the third floor of the Student Resource Building.

Mandatory Reporting As an instructor, one of my responsibilities is to help create a safe learning environment on our campus. I want to ensure that students feel they can speak to me, but I also want students to be informed that I have a mandatory reporting responsibility related to my role as a professor. I am **required** to share information regarding sexual misconduct or information about a crime that may have occurred on UCSB's campus or in the community. A result of my mandated report will be that students will receive outreach and resources from the campus Title IX office. Students may speak to someone confidentially by contacting CARE, Campus Advocacy, Resources & Education at the 24/7 advocacy line at (805) 893-4613 or visit them in person at the Student Resource Building.

Possible R package teaching modules:

'adehabitatHR' https://cran.r-project.org/web/packages/adehabitatHR/index.html

'demography' https://cran.r-project.org/web/packages/demography/index.html

'FSA' https://cran.r-project.org/web/packages/FSA/index.html

'forecast' https://cran.r-project.org/web/packages/forecast/index.html

'glarma' https://cran.r-project.org/web/packages/glarma/index.html

'Growthrates' https://cran.r-project.org/web/packages/growthrates/index.html

'Marked' https://cran.r-project.org/web/packages/marked/

'Popdemo' https://cran.r-project.org/web/packages/popdemo/index.html

'Survival' https://cran.r-project.org/web/packages/survival/index.html