WIS 6455 - WILDLIFE POPULATION ECOLOGY (CLASS # 25351)
Spring, 2026
In-person, 3 Credits

Instructor:

Madan K. Oli, Ph.D.
324 Newins-Ziegler Hall
(352) 846-0561; olim@ufl.edu
Office hours: Tuesdays, 11:00 am-12:00 pm (Zoom or in-person by appointment)

Lectures and Labs:

Location: NRN 1037 (1037 Norman Hall)
Time: Monday Period 7 (1:55 – 2:45pm); Wednesday Periods 7-8 (1:55 – 3:50 pm)

Course Learning Objectives

This course is designed to expose students to concepts and models in population ecology, and their applications to conservation and management of wildlife populations. By the end of the semester, students will:

- Have a thorough understanding of concepts and models of population dynamics and species interactions;
- Become familiar with topics such as matrix population models, population viability analysis, infectious disease dynamics and life history theory; and
- Become familiar with the application of ecological theories and models to conservation and management of wildlife populations.

Course Prerequisites

- There are no specific prerequisites for this course. However, familiarity with basic ecological concepts and models, and R software and basic mathematics (calculus, linear algebra) would be helpful. Students lacking background should contact instructors at the beginning of the semester.

Textbooks, Learning Materials, and Supply Fees

1. **Lecture outlines and discussion papers:** Lecture outlines, discussion papers, and other reading materials will be available through the Canvas e-Learning site (http://elearning.ufl.edu/). Please note that lecture outlines are not designed to replace lectures. You must be present in the class to take notes and participate. You are responsible for keeping up to date on all announcements and material covered during class.

   To login to the Canvas e-Learning system, go to the e-Learning (http://elearning.ufl.edu/), and use your GatorLink username and password. You must have an active GatorLink ID to access e-Learning. Should you encounter problems with your GatorLink account or need assistance, contact the GatorLink website (http://gatorlink.ufl.edu) or UF Computing Help Desk: The Hub, 392-HELP. If you need

assistance with the e-Learning system, please visit e-Learning Support Services home page or contact the e-Learning Support Team (UF Helpdesk HUB 132; Phone: (352) 392-HELP (4357) and select option 2; Email: learning-support@ufl.edu.

2. **Lab manual and write-ups**
   To facilitate students' learning, I have developed a self-guided lab manual for each section of the course. This document is meant to serve as a self-guided instruction manual on the implementation of population models and other analyses relevant to ecology and management of wildlife populations. For each modeling section of the course, we will: (1) briefly review the relevant concepts and models; (2) provide step-by-step instructions on how to implement relevant models, along with R code and the results they produce; and (3) provide data and code that complement the laboratory material. It would be helpful if you read through the lab manual/exercises and work through the code before coming to the class. These exercises are for learning purposes only, and will not be graded.

   We will use R for lab exercises and model implementation, so it is critical that you are comfortable with the program. If you are new to R, I strongly encourage you to explore it on your own - this is often the best and most efficient way to learn R. Fortunately, there are many online resources that can help you; a quick google search provides links to many documents – use what you like (https://www.google.com/search?q=R+manuals&ie=utf-8&oe=utf-8). There are also several online books designed to help you learn R programming that can be downloaded free of cost (e.g., https://intro2r.com). Use resources that you like

3. **Required textbook:** There is no required textbook for this course. I will provide the lecture outlines and reading materials via Canvas. The Lab Manual (also on Canvas) contains summary of relevant concepts and code that may be useful for completing lab assignments.

Required Technology & How to Obtain the Technology

A laptop computer for Friday's classes. We will extensively use the program R and R Rtudio, both of which are available for download free of charge (https://cran.r-project.org/; https://posit.co/downloads/).

Class Demeanor/Expectations

Students are expected to attend all classes and fully engage themselves in all aspects of the class. Full participation in computer exercises and discussion sessions is required and expected. For Wednesday's classes, students will need to bring a laptop computer. Students are strongly encouraged to meet with the instructor periodically, especially if they need assistance.

Caution: We expect you to complete all assignments, quizzes, and term papers independently.

Technical Support

UF Computing Help Desk & Ticket Number: All technical issues require a UF Helpdesk Ticket Number. The UF Helpdesk is available 24 hours a day, 7 days a week. https://helpdesk.ufl.edu/ | 352-392-4357.

Course Outline

Section	Topic
Part I. Introduction	1. Population ecology: what and why? 2. Population ecology as a science
Part II. Unstructured population Growth Models	1. Models in population ecology 2. Exponential population growth models 3. Density dependence 4. Logistic population growth models
Part III. Structured Population Growth Models	1. Life tables: construction and analysis a. Age structure: why it matters b. Methods of compiling life tables/fecundity tables c. Life table analysis (generation times, net reproductive rates, population growth rates, etc.) 2. Age- and stage-structured matrix population models a. Age-structured (Leslie) matrix models b. Matrix algebra review c. Population projection, population growth rate, stable age distribution and reproductive values d. Sensitivity/elasticity analysis e. Life-cycle graphs and stage-structured models f. Analysis of stage-structured models g. Model modification and limitations
Part IV. Metapopulation Dynamics	1. Spatial structure of populations; why spatial structure matters 2. Metapopulations and extinction risk 3. Models of metapopulation dynamics a. Classic metapopulation (Levin's) model b. Spatially realistic metapopulation theory c. Overview of incidence function model (IFM) and stochastic patch occupancy model (SPOM)
Part V. Population Viability Analysis (PVA)	1. Introduction to PVA: what, why and how? 2. Components of PVA 3. Evaluating PVA quality 4. Overview of PVA modeling approaches
Part VI. Species Interactions	1. Dynamics of infectious diseases a. Why disease matters in ecology and conservation b. SIR model and its variations 2. Competition a. Nature of competition b. Lotka-Volterra competition model 3. Predation a. Nature of predation

Section	Topic
	b. Lotka-Volterra predation model
Part VII. Wildlife Harvest	1. Maximum sustained yield 2. Introduction to harvest models
Part VIII. Population Cycles and Population Regulation	1. What are population cycles? 2. Hypotheses of population cycles; empirical evidence 3. Population regulation vs. population limitation
Part IX. Life-History	1. Life-history and life-history traits 2. Life history trade-offs, and evolution of life-history traits 3. Cole's dilemma: semelparity or iteroparity?

Grading Policy

Course grading is consistent with UF grading policies.

Course Grading Structure

	Points	Percent
Quizzes 4@25	100	20
In-class presentation/lead discussion	100	20
Online discussion (Perusall)	100	15
Term paper	100	30
Project presentation	100	15

Grade	Percentage
A	> 92
A-	90-92
B+	85-90
B	83-85
B-	80-83
C+	75-80
C	73-75
C-	70-73
D+	65-70
D	63-65
D-	60-63
S	<60

Cumulative (mastery) quizzes

There will be five **quizzes** (20 points per quiz; 100 points total) assigned via Canvas. **Each quiz will be comprehensive** and will include questions from the lectures/lab exercises and assigned reading materials covered until that day. For each quiz, you are allowed two attempts; higher of the two grades will be recorded. Please see the course schedule for the quiz due dates.

Lab exercises

Implementation of models of population dynamics, species interaction and disease dynamics using R software is an important part of this course. We have developed an e-book (available via Canvas), which will serve as a self-guided workbook. Details regarding the computer exercises will be determined in consultation with the students.

Class leadership and discussion

Each student will lead discussion of 2 topics (or published papers) directly relevant to the course during the semester. All students will read the paper(s) assigned by the discussion leader, but the discussion leader will be responsible for summarizing the topics (or papers) being covered, critically evaluating it and leading the discussion. It may be necessary for the discussion leader to read additional papers, reanalyze the data or propose/demonstrate alternative analytical methods.

We will use Perusall AI (integrated within Canvas) for online discussion of important topics in population ecology.

The term paper project

The purpose of the term paper project is to encourage students to thoroughly explore the chosen topic, and by doing so, become an expert in that particular topic in population ecology. It will allow students to go well beyond what is covered in the class, and synthesize and critically evaluate the information on the chosen topic.

The project can involve: (1) a critical review of recent literature regarding one of the topics covered in class; (2) critical evaluation of a theory or development of a new theory; (3) simulation or theoretical studies to address specific population ecological/conservation questions; or (3) analysis and modeling of real-life data to address specific population ecological questions. Many students use their own or their colleagues' data to address specific population ecological questions. Additional data sources may include publicly available databases such as COMPADRE (which contains >8,000 population projection matrices for plants), COMADRE (which contains >3,000 population projection matrices for animals). If interested, explore the user guide, FAQs and R-based tools for using these databases to see if these databases are useful for you. Many papers have been published utilizing data from these databases (here is one example, and there are 100's). Additionally, most high-profile ecological journals (e.g., Journal of Animal Ecology, Ecology, Ecological Monographs, PNAS) now require authors to make data publicly available – just search and see if you can find the kind of data you are looking for.

Please note that the project must be directly related to one of the topics covered in the class. A project that does not directly deal with some aspects of population ecology (see the course outline) will not be accepted. For example, review of topics such as food habits of black bears, home ranges of white-tailed deer, effects of lighting on sea turtle nesting, although interesting, do not directly deal with a topic in population ecology and thus are not acceptable.

Please submit a 1-page term paper proposal by 5 pm, March 22nd using the Assignment feature of Canvas.

Format of the term paper:
The paper should be approximately 15-20 pages (double-spaced) including literature cited, tables, and figures. The paper should be prepared using the format for one of the following journals: ***Ecology***, ***Journal of Animal Ecology***, ***Trends in Ecology & Evolution***, ***Journal of Wildlife Management*** or ***Conservation Biology*** **(indicate the chosen journal on the cover page**). You should strictly follow the ***Instructions for Authors*** for the journal selected for everything, including reference citation in the text, list of references, and section headings (representing major "themes"). Supplementary material (e.g., large datasets or code) can be included in an Appendix.

Term paper grading:

Term paper proposal	10%
Format (strict adherence to the format of the chosen journal)	30%
Scientific content, quality, presentation and writing style	60%

Submission of the term paper:
Please submit your term paper proposal as a word document using the Assignment feature of Canvas by ***5pm, March 13th*** and the final term paper by ***5pm, April 30th.*** Canvas will not accept term papers or proposals submitted after that deadline.

Your class presentation/leadership and term paper presentation will be evaluated by your peers. We will also solicit feedback from our peers on your term paper proposal

Some examples of the term paper projects:

- Discard mortality affects simulated fishery performances across a range of size restrictions *(published*)
- Stochastic demography and population growth of a hibernating subalpine rodent (*published*)
- Walking the tightrope: the interplay of anthropogenic mortality and habitat degradation in driving the persistence of wide-ranging, conflict-prone species (*published*)
- Metapopulation dynamics of the yellow-bellied marmot (*published*)
- Effects of maternal exposure to P,P'-DDE on population growth rates of zebra fish
- Effects of nutrient and water limitation on secondary forest tree populations
- Evaluating single generation fitness measures using a simulation-based approach
- Use of length limits to manage fishery exploitation rates: a simulation study
- Population viability of small, isolated gopher tortoise populations
- Modeling the effects of upper respiratory tract disease on desert tortoise populations (*published*)
- Exploring the effects of natural disturbances and habitat degradation on the viability of the snail kite populations (*published*)
- Variation in population growth rates of mottled ducks in Texas and Louisiana
- Demographic analysis of olive-sided flycatchers
- Effects of stochastic disturbance on metapopulation growth rate and patch stage distribution for a long-lived tree species in the Huai Kha Khaeng Wildlife Sanctuary, Thailand
- The effect of including individual variation in growth on population projections and yield-per-recruit estimates for size-selective fisheries
- Outlining an adaptive management approach for Elephants in the Kruger National Park using matrix models
- Does proximity to roads promote population growth rates of native species? Tests with a Neotropical savanna herbivore

Course policies

1. **Attendance policy:** You are expected to attend all classes. However, we will not take attendance; we trust that you are in the class to learn and therefore will make every effort to attend the class. You are responsible for any announcements and all material covered during lectures, computer exercises, and discussion sessions. If you must miss a class, please talk to your classmates (or one of us) to see what you missed.
2. **Make-up quiz policy:** For unexcused absences, make-up quizzes will not be given.
3. **Questions regarding grades:** We do not discuss grades over the telephone or e-mail. If you have concerns regarding your grades, you must meet us during office hours (or by appointment).
4. **Announcements and notices:** All course-related announcements and notices (including homework assignments, changes in schedule, etc.) will be posted on the e-Learning course homepage. Please be sure to visit the e-Learning homepage regularly.
5. **Discussion of course-related issues, assignments, or long questions:** Please avoid sending e-mails or phone messages that cannot be answered with a few words. If you

have questions or issues that require discussion or a detailed explanation, please meet with us via Zoom.

6. **Academic honor:** On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment."
7. **AI use policy:** We encourage you to use AI resources (including Large Language Models (LLMs)) as learning tools to assist with ideation and grammar/editing. Note, however, that AI frequently makes mistakes; you must carefully evaluate information generated by AI tools. Also, you must complete all exams, quizzes and homework problems on your own and may my rely on AI to do your homework or complete other assignments. You should include a statement in any submitted assignment describing how you used the AI tool and which tool you used. You should also keep in mind that you are still responsible for the quality and accuracy of anything you submit.

   The University of Florida's Information Technology offers Navigator chat, featuring a large number of LLMs. Many students find Google Notebook LM particularly helpful to create study guides and guided notes. Note, however, that AI tools make mistakes, experience the so called "AI Hallucination", and you must verify that information generated by AI tools is accurate and consistent with the lecture and lab materials. Some guidance regarding the use of AI tools can be found here.

Academic Policies and Resources

Academic policies for this course are consistent with university policies. See https://syllabus.ufl.edu/syllabus-policy/uf-syllabus-policy-links/

Campus Health and Wellness Resources

Visit https://one.uf.edu/whole-gator/topics for resources that are designed to help you thrive physically, mentally, and emotionally at UF.

Please contact UMatterWeCare for additional and immediate support.

Software Use

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

Course evaluations

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their

Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/

Students with disabilities

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodation within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues.
0001 Reid Hall, 392-8565, www.dso.ufl.edu/drc/

Privacy and Accessibility Policies

- Instructure (Canvas)
  - Instructure Privacy Policy
  - Instructure Accessibility
- Zoom
  - Zoom Privacy Policy
  - Zoom Accessibility