

**ST 4932 Sec. 1: Population Ecology**  
Department of Biology, College of Sciences  
Spring 2024

**Proposal Rationale:** Population ecology—the study of the dynamics and distribution of biological populations—constitutes one of the core pillars of basic ecology and integrative biology. This discipline informs many practical and applied questions, and exposes biology students to a level of mathematics commensurate with other STEM fields. Questions addressed by population ecology include: How does the human population grow over time? How many wild fish and trees can be sustainably harvested? What are the drivers and temporal patterns of pests and disease organisms? Population ecology is touched upon in many existing biology UCF courses (including Principles of Ecology, Conservation Biology, Disease Ecology & Eco-immunology, and Advanced Ecology), but students are not provided with a comprehensive coverage of its topics nor trained in the quantitative tools necessary for research and management applications. Population ecology is currently offered at both the University of Florida and Florida State University.

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**Class Time:** TR: 3:00PM-4:20PM  
**Class Room:** BIO 209  
**Class Modality:** Face-to Face (P)

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**Instructor:** Dr. Christen H. Fleming  
Christen.Fleming@ucf.edu  
BIO 401E

**Office Hours:** Mondays and Wednesdays, 10AM to 12PM.  
Appointments outside of office hours can be scheduled by email.

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**Prerequisites:** Principles of Ecology (PCB 3044) with a grade of B or better, or instructor's consent.

**Prerequisites/Corequisites:** Calculus (MAC 2233, 2253, or 3211C) with a grade of B or better, or instructor's consent.

**Description:** An introduction to the theory and models of population ecology—including population growth and regulation; competition; metapopulation ecology; and interspecific interactions.

**Scope:** Knowing how populations change over time, how populations are distributed, and what mechanisms and factors drive these dynamics is critical to the understanding of basic ecology, viability and extinction, conservation, and management. In this course we survey the theory and models that govern the fundamental properties of populations—their growth, survivorship, and reproduction. Topics include population growth and regulation, intraspecific and interspecific competition, age structures and life-history theory, metapopulation ecology, predator-prey interactions, plant-herbivore interactions, host-parasite interactions, and mutualism. Ultimately, we aim to develop an understanding of the principles of these topics, an understanding of how these principles relate to higher levels of organization (e.g., communities), and an appreciation for quantitative and

mathematical approaches to ecology.

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**Required Materials:**

- *An Introduction to Population Ecology*, 2<sup>nd</sup> edition, by Larry L. Rockwood  
ISBN-10: 1118947576  
ISBN-13: 978-1118947579

**Optional Materials:**

- *Population Ecology in Practice*, 1<sup>st</sup> edition, edited by Dennis L. Murray and Brett K. Sandercock  
ISBN-10: 0470674148  
ISBN-13: 978-0470674147
- Personal computer or laptop
- R: <https://cran.r-project.org/>
- RStudio: <https://posit.co/download/rstudio-desktop/>

**Learning Outcomes:**

- An understanding of the basic principles, theories and models of population ecology that govern growth, regulation and interactions.
  - The ability to relate population ecology to higher levels of organization, including metapopulations, landscapes and communities.
  - An understanding of the role of ecological theory and modeling in guiding research and management.
  - An appreciation for mathematical approaches to ecology, in both theory and applied work.
  - Experience synthesizing current ecological research.
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**Tentative Schedule:**

Date	Topic	Chapter
January 8–12	Density Independent Growth	1
January 15–19	Density Dependent Growth and Intraspecific Competition	2
January 22–26	Population Regulation	3
January 29–February 2	Populations with Age Structure	4
February 5–9	Metapopulation Ecology	5
February 12–16	Life History Strategies	6
February 19–23	Single Species Populations	Exam I
February 26–March 1	Interspecific Competition	7
March 4–8	Mutualism	8
March 11–15	Host-Parasite Interactions	9
March 25–29	Predator-Prey Interactions	10
April 1–5	Plant-Herbivore Interactions	11
April 8–12	Multi-trophic Interactions	12

April 15–19	Interspecific Interactions among populations	Exam II
April 24–30	Population Ecology	Presentations

**Assignments:**

- Homework:** Regular homework problems will be assigned after every Thursday lecture, to be due before the following Tuesday lecture. Each homework problem will test the understanding and application of course material. These homework problems will involve math, reasoning, and model interpretation. Calculus will be necessary for understanding and interpretation, but problem solving will not go beyond pre-calculus. Homework problems will be graded predominantly on the basis of understanding and reasoning.
- Exams:** There will be two open-book exams. The exams are designed to test your understanding of and ability to apply course material, in addition to solving homework-like problems.
- Presentations:** During the final examination period, graduate students will deliver presentations based on current literature. Undergraduate students are expected to attend and provide questions and comments.

**Grading:**

Homework 1	4.1 $\bar{6}$ %
Homework 2	4.1 $\bar{6}$ %
Homework 3	4.1 $\bar{6}$ %
Homework 4	4.1 $\bar{6}$ %
Homework 5	4.1 $\bar{6}$ %
Homework 6	4.1 $\bar{6}$ %
Exam I	16. $\bar{6}$ %
Homework 7	4.1 $\bar{6}$ %
Homework 8	4.1 $\bar{6}$ %
Homework 9	4.1 $\bar{6}$ %
Homework 10	4.1 $\bar{6}$ %
Homework 11	4.1 $\bar{6}$ %
Homework 12	4.1 $\bar{6}$ %
Exam II	16. $\bar{6}$ %
Presentation	16. $\bar{6}$ %
<b>Total</b>	<b>100%</b>

<b>A</b>	90% ≤ grade ≤ 100%
<b>B</b>	80% ≤ grade < 90%
<b>C</b>	70% ≤ grade < 80%
<b>D</b>	60% ≤ grade < 70%
<b>F</b>	0% ≤ grade < 60%

**Attendance:** Due to the volume of material presented during this course, attendance is essential and expected.

**Make Up Policy:** Lecture exams may be made up at the instructor's discretion and require a documented, verifiable excuse.

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**Required UCF Core Policies:**

**Academic Integrity:**

Students should familiarize themselves with UCF's Rules of Conduct at <https://scai.sdes.ucf.edu/student-rules-of-conduct/>. According to Section 1, "Academic Misconduct," students are prohibited from engaging in:

1. Unauthorized assistance: Using or attempting to use unauthorized materials, information or study aids in any academic exercise unless specifically authorized by the instructor of record. The unauthorized possession of examination or course-related material also constitutes cheating.
2. Communication to another through written, visual, electronic, or oral means: The presentation of material which has not been studied or learned, but rather was obtained through someone else's efforts and used as part of an examination, course assignment, or project.
3. Commercial Use of Academic Material: Selling of course material to another person, student, and/or uploading course material to a third-party vendor without authorization or without the express written permission of the university and the instructor. Course materials include but are not limited to class notes, Instructor's PowerPoints, course syllabi, tests, quizzes, labs, instruction sheets, homework, study guides, handouts, etc.
4. Falsifying or misrepresenting the student's own academic work.
5. Plagiarism: Using or appropriating another's work without any indication of the source, thereby attempting to convey the impression that such work is the student's own.
6. Multiple Submissions: Submitting the same academic work for credit more than once without the express written permission of the instructor.
7. Helping another violate academic behavior standards.
8. Soliciting assistance with academic coursework and/or degree requirements.

**Responses to Academic Dishonesty, Plagiarism, or Cheating:**

Students should also familiarize themselves with the procedures for academic misconduct in UCF's student handbook, The Golden Rule <https://goldenrule.sdes.ucf.edu/>. UCF faculty members have a responsibility for students' education and the value of a UCF degree, and so seek to prevent unethical behavior and respond to academic misconduct when necessary. Penalties for violating rules, policies, and instructions within this course can range from a zero on the exercise to an "F" letter grade in the course. In addition, an Academic Misconduct report could be filed with the Office

of Student Conduct, which could lead to disciplinary warning, disciplinary probation, or deferred suspension or separation from the University through suspension, dismissal, or expulsion with the addition of a “Z” designation on one’s transcript.

Being found in violation of academic conduct standards could result in a student having to disclose such behavior on a graduate school application, being removed from a leadership position within a student organization, the recipient of scholarships, participation in University activities such as study abroad, internships, etc.

Let’s avoid all of this by demonstrating values of honesty, trust, and integrity. No grade is worth compromising your integrity and moving your moral compass. Stay true to doing the right thing: take the zero, not a shortcut.

### **Course Accessibility:**

The University of Central Florida is committed to providing access and inclusion for all persons with disabilities. Students with disabilities who need access to course content due to course design limitations should contact the professor as soon as possible. Students should also connect with Student Accessibility Services (SAS) <<http://sas.sdes.ucf.edu/>> (Ferrell Commons 185, sas@ucf.edu, phone 407-823-2371). For students connected with SAS, a Course Accessibility Letter may be created and sent to professors, which informs faculty of potential course access and accommodations that might be necessary and reasonable. Determining reasonable access and accommodations requires consideration of the course design, course learning objectives and the individual academic and course barriers experienced by the student. Further conversation with SAS, faculty and the student may be warranted to ensure an accessible course experience.

### **Campus Safety:**

Emergencies on campus are rare, but if one should arise during class, everyone needs to work together. Students should be aware of their surroundings and familiar with some basic safety and security concepts.

4. In case of an emergency, dial 911 for assistance.
5. Every UCF classroom contains an emergency procedure guide posted on a wall near the door. Students should make a note of the guide’s physical location and review the online version at <<https://centralflorida-prod.modolabs.net/student/safety/index>>.
6. Students should know the evacuation routes from each of their classrooms and have a plan for finding safety in case of an emergency.
7. If there is a medical emergency during class, students may need to access a first-aid kit or AED (Automated External Defibrillator). To learn where those are located, see <<https://ehs.ucf.edu/automated-external-defibrillator-aed-locations>>.
8. To stay informed about emergency situations, students can sign up to receive UCF text alerts by going to <[www.getrave.com/login/ucf](http://www.getrave.com/login/ucf)> and logging in. On the “My Account” tab, fill out the information, including e-mail address and cell phone number.
9. Students with special needs related to emergency situations should speak with their

instructors outside of class.

10. To learn about how to manage an active-shooter situation on campus or elsewhere, consider viewing this video (<<https://youtu.be/NIKYajEx4pk>>).

### **Deployed Active-Duty Military Students:**

Students who are deployed active-duty military and/or National Guard personnel and require accommodation should contact their instructors as soon as possible after the semester begins and/or after they receive notification of deployment to make related arrangements.

### **Make-Up Assignments for Authorized University Events or Co-curricular Activities**

Students who represent the university in an authorized event or activity (for example, student-athletes) and who are unable to meet a course deadline due to a conflict with that event must provide the instructor with documentation in advance to arrange a make-up. No penalty will be applied. For more information, see the UCF policy at <<https://policies.ucf.edu/documents/4-401.pdf>>

### **Religious Observances**

Students must notify their instructor in advance if they intend to miss class for a religious observance. For more information, see the UCF policy at <<http://regulations.ucf.edu/chapter5/documents/5.020ReligiousObservancesFINALJan19.pdf>>.

### **Title IX Policy:**

Title IX prohibits sex discrimination, including sexual misconduct, sexual violence, sexual harassment, and retaliation. If you or someone you know has been harassed or assaulted, you can find resources available to support the victim, including confidential resources and information concerning reporting options at <https://letsbeclear.ucf.edu> and <http://cares.sdes.ucf.edu/>.