

Population & Community Ecology

Lecture M,W, F 11:30-12:20
Laboratory Tu 12:30-3:15
MS 124 / outdoor classroom southside of
Mulvane Hall

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Office hours: by appointment

Course Description:

This course covers the dynamics of the growth of populations and interspecific interactions among communities of organisms. The role of the environment's relationship to changes in the growth and distribution of populations and the structure of communities will be emphasized. Field and laboratory techniques are covered in the laboratory sessions. This course is recommended for all Biology majors and other serious students of ecology. There are three lecture and discussion periods and one field or laboratory session each week. *Prerequisite: BI 251 and 254 or permission of the instructor.*

Required Texts:

- Lecture Text: Rockwood LL. 2015. *Introduction to Population Ecology*. 2nd Ed. Wiley Blackwell. ISBN 9781118947579.
- Lab Manual: *online exercises available in Moodle.*
- field notebook – *Rite in the Rain*® Metric Field Notebook № 363 (4⁵/₈ in x 7 in)

Course Objectives:

Students completing this course should be able to:

- Define population ecology and community ecology in the broader context of the ecological sciences.
- Identify and explain the effects of the major factors contributing to population growth.
- Explain the importance of intraspecific competition and environmental carrying capacities to populations.
- Explain the role of metapopulation theory in population ecology.
- Define and describe the implications of life history attributes and life history tables.
- Outline the major mathematical models used to describe population growth and structure.
- Define and explain the consequences of major interspecific interactions that determine community structure.
- Outline the major mathematical models used to describe community structural changes.
- Conduct an individual research project by selecting a problem, defining testable hypotheses and predictions, gathering data in the field or lab, analyzing that data and writing up a formal research paper.
- Review and present a seminar on a selected topic from the current population and community ecology literature.



Grading:

The final grade is calculated on a percentage basis:

Lecture = 75%

Lab = 25%

Lecture Grading:

Weekly Quizzes = 40%

A short quiz will be given weekly at the beginning of lecture and lecture will follow immediately. All questions will come from the lecture, text book, and class discussion from the preceding week's lectures. Each quiz may consist of multiple-choice questions, fill-in-the-blank, matching, true/false, and/or short answer questions. If you are absent for a quiz you will receive a zero. The lowest 2 quiz grades will be dropped. There are no make-up quizzes.

3 One-hour Exams = 30%

Each non-cumulative exam will cover approximately equal proportions of course material and will be organized around major themes in the course.

Final Exam = 15%

A cumulative exam will cover material from the lecture section of the course.

Article Critique = 10%

Each student will read and provide a written critique of an experiment published in the primary literature as selected by the professor. The critique will include a review of the experiment, an evaluation of the conclusions presented by the article's authors, and proposals for future research questions.

Attendance and Participation = 5%

Class participation is expected and only possible by attending every class. Contributions to class discussions, group activities, and asking/answering questions during lecture will ensure full credit, but more importantly, participation will provide you the best opportunity to succeed in this course.

Laboratory Grading:

4 Practical Exams = 50%

Each non-cumulative practical exam will cover approximately equal proportions of course material. By their nature, practical exams are extremely difficult to administer; therefore, attendance for exams is critical and missed exams can only be made-up under extreme circumstances. The lowest lab practical score will be dropped from the final grade.

Individual Project and Paper = 20%

Each student will design and conduct an investigation of their choice (from a selected list) that will include developing a hypothesis, designing and conducting a test, and analyzing the results. The project will be summarized and submitted as a paper prepared to the specifications of submissions to the peer-reviewed journal *Ecology*.

Literature Review and Seminar = 15%

A review of current literature on a selected ecological topic will be prepared by each student and presented in a seminar format to the class. This review will include at least 10 peer-reviewed articles, at least 5 of which must have been published within the last two years.

Lab Notebook = 15%

Each student will submit their laboratory notebook detailing the activities and results of field and laboratory exercises twice during the semester, once after the fifth week of lab (5%) and once at the end of the semester (10%).

Grade Scale:

A	94-100%	A-	90-93%		
B+	87-89%	B	84-86%	B-	80-83%
C+	77-79%	C	74-76%	C-	70-73%
D+	67-69%	D	60-66%		
F	0-59%				

Attendance/Make-up Policy:

Attendance is mandatory and expected, but certain circumstances may require an isolated absence. It is the student's responsibility to notify the professor as soon as possible of the expected absence (absolutely no later than one day following the absence, in the case of an emergency) and to make necessary arrangements for lecture or laboratory materials. No make-up quizzes will be allowed.

It is a serious offense to miss a lab or lecture exam. If this happens a grade of zero will be assigned for the missed exam. It is the responsibility of the student to contact the professor *prior to* the exam to schedule a make-up. If a student fails to contact the professor prior to the absence/missed exam to make arrangements, a make-up may not be granted. Special considerations may be made, on a case by case basis, if an exam is missed due to completely unavoidable circumstances. In this case, a student may be permitted to take a make-up exam if they contact the professor prior to the day of the next scheduled class. Each student must present a valid excuse at the time of the make-up. Make-up exams, if they are granted, must be completed within 1 week of the original exam date. Make-up exams will be administered at the convenience of the professor. Only one make-up exam may be granted per semester.

Note to Athletes: Athletes who expect to miss an exam or a quiz due to sanctioned activities must notify the instructor as soon as possible and in all cases before the week of the expected absence. In these cases, quizzes and exams may be administered in alternative formats or at earlier dates, depending on specific circumstances and at the discretion of the professor.

Students with Disabilities:

Baker University is committed to providing "reasonable accommodations" in keeping with Section 504 of the Rehabilitation Act and the Americans with Disability Act of 1992. Access Services coordinates accommodations and services for all eligible students with disabilities. If you have a disability and wish to request accommodations and have not contacted Access Services, please do so as soon as possible. Access Services is located on the Baldwin City campus in the Office of Student Academic Success (in Collins Library (lower level); 785-594-8352; sas@bakeru.edu). Information about Access Services can also be found at www.bakeru.edu/sas. If accommodations have been approved by

Access Services, please communicate with your professor(s) regarding your accommodations to coordinate services.

Academic Honesty:

Students are expected to take responsibility for their own work and provide appropriate credit to the authors of works used by the student to complete course work. Please review the student handbook for a full description of the University's policy on academic misconduct.

From the Student Handbook: Baker University expects students and professors to have solely completed or prepared the work or research that bears their name, and to acknowledge the materials and sources of others.

Students

1. Have the responsibility to do their own academic work.
2. Must acknowledge sources of their materials and material that is the work of others.
3. Have the responsibility to inquire of the professor when they are uncertain as to what constitutes proper acknowledgment.
4. Have the responsibility to inquire of the professor as to what materials and aids are permitted in testing and research work.
5. Have an obligation to know their rights and responsibilities as delineated in the Baker University Student Handbook.
6. Have the responsibility to know the University's position with respect to academic misconduct as set forth in [the student handbook].

Honors Contracts:

Any student with a cumulative grade point average of 3.50 that is interested in taking this course for honors designation should talk to me about the details involved and fill in the necessary form, obtain the required signatures and meet with the honors program director to review the contract before turning in the form to the Records Office. The last day to submit a proposal for an Honors Contract is the last day to add a course for the semester.

Credit Hour Definition and Associated Course Expectations: Consistent with best practices in higher education, Baker University subscribes to the federal definition of the "credit hour" endorsed by the Higher Learning Commission. Driven by intended learning outcomes and verified by evidence of student achievement, the "credit hour" is an institutionally-established equivalency that reasonably approximates not less than one hour of classroom (or direct faculty) instruction and a minimum of two hours of out-of-class student work per week for the duration of the course enrollment period. A 3-credit-hour course, for example, requires approximately 45 classroom contact hours, roughly 90 out-of-class work hours and approximately 135 total instructional hours over the course of a 15-week semester. In that this course carries 4 hours of credit (3 lecture, 1 lab), approximately 60 hours of classroom instruction and 45 hours of laboratory and field instruction have been planned over the scheduled 15-week period. In addition, students are expected to spend roughly 150 hours (10 hours per week) on out-of-class assignments which include: a) assigned text readings, b) reading-related exercises and associated Moodle forum postings, c) unit evaluation and final exam preparation, d) outside lab-related assignments, e) statistical and other homework problems, and f) literature review research and manuscript preparation.

Special Note: PoCoEco is an intense course with a very fast pace. It is the responsibility of the student to keep up in class. Missing lecture or lab will almost certainly result in a lower course grade. It will be critical for students to keep pace by reading ahead in the chapters and by spending significant amounts of time outside of class studying and preparing for quizzes and exams. Utilize all available resources when studying, including lecture notes, text chapter review questions, figures and tables from the text and lab manual, and online resources. The formation of study groups/partners is strongly encouraged.

Tips for Success:

- Spend at least 10 hrs. per week outside of class studying for lecture and lab.
 - This does not need to take place all at one time (and is best if it doesn't). Keep a study journal with a list of the topics covered and the time spent on each to make sure you are allowing yourself enough time each day/week.
 - Break up your study time into manageable "units". Dedicate each study session to one subunit of the lecture/lab material and become comfortable with that unit before moving on to the next.
 - Eliminate distractions during study time. This means turn off all electronics, remove yourself from noisy environments, and let your roommates/family know that you will need time alone while you are studying
 - Do not get behind studying!! There is *no* extra time in the semester to catch up.
- Pay special attention to the figures and tables in the text book. They are very good at summarizing information and are often (though not always) cited in lecture.
- Visit the text book website regularly and become familiar with the resources found there:
 - www.wiley.com/go/rockwood/populationecology
- Look for videos and images online. YouTube is a great resource for videos – though some videos are better than others.
- Record the lecture. This can be done with a cheap MP3 recorder or smart phone placed at the front of the room prior to lecture. I do not give out my lecture PowerPoints, but I encourage you to record lectures so that you can go back and listen more carefully to what was said while you may have been writing.
- Make a friend in class. A classmate can help you study, make sure you get missed notes, and add to a support network for you as you work through all of this new information.
- Please ask for help (sooner than later!). I am always willing to help, but I need to know that you would like some assistance. Then we can see how I can best help you succeed.

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Extra Credit Opportunities

Throughout the semester there will be occasions to earn extra credit through weekend activities related to population conservation. While conservation is not an explicit topic covered in this course, population ecology informs nearly all conservation efforts for species at risk of endangerment or extinction. Therefore, I will bring to your attention specific weekend activities that we will undertake

as a class that will help us understand population ecology from a conservation perspective and that give you a hands-on experience in conservation of species. More details to come!

POLICIES ON ATTENDANCE DURING THE COVID-19 PANDEMIC

Class attendance, whether in the classroom or in a remote environment, is vital to your academic success. This is a time, however, when some situations could preclude your in-person attendance.

Policy 1: While meeting in person, you must wear a mask that covers your nose and mouth or a transparent face shield that covers your entire face. If you feel that you cannot wear a face covering, please contact Mrs. Kathy Wilson (our ADA officer) in the SAS office.

Policy 2: If you are exhibiting any two of the following symptoms, DO NOT attend in person:

- chills or fever (body temperature of 100.4°F or higher)
- cough
- new loss of taste or smell
- shortness of breath or difficulty breathing
- fatigue, muscle or body aches, or headache
- another condition that may be symptomatic of infection with COVID-19
(<https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html>)

Policy 3: Notify both your instructor by email (skimball@bakeru.edu) and Dean of Students Dr. Cassy Bailey by using this link (www.bakeru.edu/sil) if you are unwell and will miss class due to any symptoms above. In these circumstances, you will not be penalized for absence from an in-class session. You will, however, be expected to keep up with the class and submit any and all assignments on time unless your symptoms become severe. You should remain in communication with the instructor regarding ongoing concerns.

Policy 4: If you do become ill with what might be COVID-19 you must follow the protocol that is prescribed by the University. Dean Bailey will help you after you notify her.

Policy 5: If you are ordered by the KDHE to isolate or quarantine due to direct contact with someone infected with COVID-19, notify Dean Bailey (www.bakeru.edu/sil) and your instructor (skimball@bakeru.edu) that you will not be able to attend class for 14 days due to mandated isolation or quarantine. **You will be expected to keep up with the class and submit any and all assignments on time.** Hopefully you will not become ill yourself and will be able to rejoin the class, but you must follow any mandate in order to protect all individuals in the community. Again, in these circumstances, you will not be penalized for absence from an in-class session.

Policy 6: If you miss an assignment due to any illness, including COVID-19 then see the “Attendance/Make-up Policy” above.

Abuse of any of these attendance policies, including, but not limited to, false claims of illness, will constitute misconduct and may subject you to sanctions by the Dean of Students.

Lecture Schedule (subject to change):

<u>Dates</u>	<u>Subject</u>	<u>Text Chapter</u>
Week 1 Aug 17/19/21	Introduction to Population and Community Ecology Density Independent Population Growth: Intrinsic Factors	1
Week 2 Aug 24/26/28	Density Independent Population Growth: Stochasticity	1
Week 3 Aug 31/Sep 2/4	Density Dependent Population Growth: Intraspecific Competition	2
Week 4 Sep 7/9/11	Density Dependent Population Growth: Behavioral Effects	2
Week 5 Sep 14/16/18	Population Regulation Exam 1 --- Sep 18	3 1-3
Week 6 Sep 21/23/25	Age Structure and Life Tables	4
Week 7 Sep 28/30 Oct 2	Life Tables cont'd. Life History Strategies	4 6
Week 8 Oct 5/7/9	Metapopulations	5
Week 9 Oct 12/14/16	Exam 2 --- Oct 12 Interspecific Competition	4-6 7
Week 10 Oct 19/21/23	Mutualism Host-Parasite Interactions	8 9
Week 11 Oct 26/28/30	Predator-Prey Interactions	10
Week 12 Nov 2/4/6	Plant-Herbivore Interactions	11
Week 13 Nov 9/11/13	Multi-trophic Interactions & Trophic Cascades Exam 3 --- Nov 13	12 7-12
Week 14 Nov 16	Final Exam Prep	
FINAL WEEK Nov 18	Final Exam --- Wednesday, 3:00-6:00 PM	

Laboratory Schedule (subject to change):

Date	Subject
Week 1 Aug 18	Intro to Lab; Analysis of Ecological Data
Week 2 Aug 25	Sampling Animal Populations – Mark and Recapture
Week 3 Sep 1	Population Size – Mark and Recapture Cont'd.
Week 4 Sep 8	Practical Exam 1 Setup Competition Experiments
Week 5 Sep 15	Population Dispersion in Prairie Plants
Week 6 Sep 22	Seed Predation in Prairie Plants Individual Project – Hypotheses due Lab Notebook Due – First Check
Week 7 Sep 29	Age Structure and Life History Tables in a Biennial Plant
Week 8 Oct 6	Practical Exam 2 Interspecific Relationships in Upland Forests
Week 9 Oct 13	Riparian Forest Secondary Succession
Week 10 Oct 20	Practical Exam 3 Complete Competition Experiments Literature Review Seminar Topic Due
Week 11 Oct 27	Demography of Human Populations Individual Project – Introduction and Methods Section Due
Week 12 Nov 3	Practical Exam 4 Individual Project Time
Week 13 Nov 10	Predator/Prey Interactions
Week 14 Nov 17	Literature Review Seminars
FINALS WEEK Nov 18	Individual Project Paper Due Lab Notebook Due – Final Check