

## BIOL 4428/6428 Population Dynamics

Summer 2013

TR 8:00-9:45 am, CULC 129

**Instructor:** Dr. Chrissy Spencer, CULC 474D, 404.385.0539  
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**Course description:** This course examines the ecological factors that cause fluctuation and regulation of natural populations and emphasizes the utility of mathematical models to assess the dynamics of populations. Topics include demographic and environmental stochasticity, metapopulation dynamics, structured populations, the role of species interactions, and micro-evolutionary processes such as population genetics, quantitative genetics, and evolution of life histories. Classroom discussion of primary scientific literature (journal articles) will be a major component of the course. As scientists, you need to effectively read, share, and critique research. This course can fulfill a Biology elective.

**Pre-requisite:** Introductory Ecology (BIOL 2335 or similar)

**Course goals:** By the end of this course, you should

- 1) Understand ecological and evolutionary processes occurring at the population level, including
  - The factors influencing the dynamics of single species populations
  - The causes and consequences of variation in populations
  - Interspecific interactions
- 2) Further your scientific skills, including
  - Critical evaluation of primary literature
  - Identifying interesting questions and evaluating hypothesis tests
  - Interpreting and using mathematical models in biology
  - Presenting scientific ideas through verbal, visual, and written form

### Materials:

- L.L. Rockwood, 2006. An Introduction to Population Ecology. Blackwell Publishing. *NOTE also available as an e-book from [www.wiley.com](http://www.wiley.com) (ISBN: 978-1-4443-0910-2 E-book)*
- J.K. Connor & D.L. Hartl. 2004. A Primer of Ecological Genetics. Sinauer Assoc.
- Primary literature articles that will be distributed primarily through T-square.

### Expectations:

Grading	BIOL 4428	BIOL 6428
In-class exercises	20%	15%
Discussion leading	15% or 20%*	15%
Final Presentation	15% or 20%*	15%
Midterm exams (2)	30%	30%
Participation: in-class	10%	10%
Participation: pre-class questions	5%	5%
Key Assignment	–	10%

\*Either your Discussion Leading or Final Presentation grade will be increased to 20% - more weight will be given to the higher of the two grades. This gives some flexibility in how the grading scheme reflects your personal presentation strengths.

**Attendance:** Success in this class is dependent on attendance and active participation. 100% attendance is expected. The exercises in-class will be graded and will also be used as a measure of your attendance in class. In general, I do not excuse you from these daily assignments, unless you have a University-sanctioned absence.

*Discussion Leading:* You will be expected to lead a discussion once (twice for BIOL 6428) during the semester on the assigned primary research article for that day. This will involve giving a short summary of the article to the class (10 minutes max), providing several questions for the class to discuss, and fostering discussion in the classroom. I am available to help you prepare for this assignment. Your grade will be based on three components: your summary of the papers, the quality of your discussion questions (in terms of their ability to generate and sustain discussion), and additional insight material, such as information on the study system, pictures of the organisms, in-class activities related to the readings.

Everyone is also expected to fully participate in the discussions that you do not lead. To ensure this, you will prepare a question for each reading, submit these on T-square before coming to class, and bring them to class. These T-square assignments will be 5% of your participation grade.

*Final Project (White Paper and Presentation):* You will select a topic of clear and obvious connection to this course for a presentation during the final exam period. Students will work in groups of 2-3. These presentations should be structured around a central question and provide a summary of the relevant research addressing this question. Speculative ideas for a new research project are welcome as long as they are substantiated with published evidence. These presentations cannot be a summary of or directly related to your current or past research. Your presentation will be approximately 12 minutes with 3 minutes for questions. Before the project workday, your group must submit a White Paper, a 1-2 page summary statement of the topics in the project. Here is a guideline for your White Paper and Presentation:

State the question: What is the topic of your talk and why is it interesting/important?

Conceptual framework: What theory or observations are motivating this work?

System: What is the focal species, system, habitat, or theory? Give background.

Data: What are the data that support and contribute to this idea? Use images of figures, tables, or diagrams to support or evaluate your ideas.

Analysis: Present your interpretation of how the data are connected to your question. Be specific with suggestions for new directions or future research.

References: You should rely on a diversity of resources, not just one author, school of thought, or type of journal. Rely on primary literature in your final presentation, not secondary sources such as textbooks. WEBSITES are not permitted as references. If you don't know how to properly cite a journal article that you found electronically, ASK!

*Take-home exams:* Two written exams will be distributed for completion at home. You will have approximately one week to schedule the exam, but all work must be completed within one 90 minute setting. You may use all course notes, textbooks, and primary literature articles. The internet and all other sources are prohibited. These exams will focus on your comprehension of the journal articles.

*Participation:* Regular and insightful participation in classroom discussions is expected. This comprises 10% of your final grade: A=regular participation, usually well thought out, useful contributions (10%); B=regular participation, sometimes useful, sometimes not (8%); C= occasional participation, but generally useful (6%); D = occasional participation, but generally non-substantive, adding little new information (4%); F = present by rarely contributed (2%). I reserve the right to assign + or - grades (e.g., B+ may equal 9%). You may ask me at any time where you stand (i.e., what grade I'd assign if it was the end of the term).

*Key Assignment (BIOL 6428 only):* Graduate students will complete one additional key assignment, developed in collaboration with the instructor. Examples include give an in-class lecture, develop and lead an in-class exercise, write a paper.

**Academic Integrity:** Students are reminded of the obligations and expectations associated with the Georgia Tech Academic Honor Code and Student Code of Conduct, available online at:

[http://www.deanofstudents.gatech.edu/integrity/policies/honor\\_code.php](http://www.deanofstudents.gatech.edu/integrity/policies/honor_code.php),  
<http://www.deanofstudents.gatech.edu/codeofconduct>.

**Learning Accommodations:** If needed, I will make classroom accommodations for students with disabilities. These accommodations must be arranged in advance and in accordance with the Office of Disability Services (<http://www.adapts.gatech.edu>).

**Course Schedule** (subject to modification)

Summer	Topic	Readings	Discussion Leader
14-May	Designing ecological studies	R p1-3, C&H p1-8 Hurlbert 1984	
16-May	DI growth	R Ch 1 Grafe et al. 2004	
21-May	DD growth	R Ch 2 Flockhart et al. 2012	
23-May	DD growth	Hamilton et al. 2009	
28-May	Population Regulation	R Ch 3 Elliott et al. 2011	
30-May	Age-structured Populations	R Ch 4 Bohn et al. 2010	
4-Jun	Life history strategies	R Ch 6.1-6.4 Fujiwara & Caswell 2001	
6-Jun	Life history strategies	R Ch 6.5-6.10 (skip 6.11) Wilbur & Rudolf 2006 END OF EXAM 1 MATERIAL	
11-Jun	Metapopulations	R Ch 5 Bahl et al 2011	
13-Jun	Population Genetics I	EXAM 1 DUE in class at 8:00 AM C&H Ch 2	
18-Jun	Population Genetics II	C&H Ch 3 p 47-71.5 Oliver & Piernney 2012	
20-Jun	Population Genetics II	C&H Ch 3 p 71.5-90 Wade & Goodnight 1991	
25-Jun	Quantitative Genetics	C&H Ch 4 Kruuk et al 2000	
27-Jun	Quantitative Genetics	C&H Ch 5 Fischer et al 2011	
2-Jul	Competition	R p 155-158 & Ch 7 TBA reading	
4-Jul	<i>HOLIDAY</i>		
9-Jul	Predation	R Ch 10 TBA reading Project Topics and Groups due by email	
11-Jul	Parasitism	R ch. 9 TBA reading END OF EXAM 2 MATERIAL	
16-Jul	Phenotypic Evolution	C&H Ch 6 TBA reading	
18-Jul	Applied Ecological Genetics	C&H Ch 7 EXAM 2 DUE IN CLASS AT 8 AM	
23-Jul	Conservation Population Biology	TBA reading	
24-Jul	-	<i>White Paper due at noon by email</i>	
25-Jul	Final Presentation Workday		
30-Jul	8:00 - 10:50 am (Final exam period) Student Presentations		