

ORIGINAL COURSE IMPLEMENTATION DATE: REVISED COURSE IMPLEMENTATION DATE: January 2013 September 2022 January 2028

COURSE TO BE REVIEWED (six years after UEC approval): Course outline form version: 05/18/2018

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: BIO 340	Number of Credits: 4 Course credit policy (105)							
Course Full Title: Population and Communit	y Ecology							
Course Short Title:								
(Transcripts only display 30 characters. Departments may recommend a short title if one is needed. If left blank, one will be assigned.)								
Faculty: Faculty of Science		Department (or program if no department): Biology						
Calendar Description:								
An introduction to the study of ecological populations and communities, including processes that create, modify, and maintain patterns in biodiversity, population dynamics, species interactions, niche theory, ecological networks, community structure and assembly, and metapopulation and metacommunity dynamics. Laboratories will introduce students to research methods used to study populations and communities in both the lab and the field and will further students' understanding of the process of science in an ecological context, including use of the R language for data analysis. Note: Field trips outside of class time may be required.								
Prerequisites (or NONE):	BIO 210 and MATH 111.							
Corequisites (if applicable, or NONE):								
Pre/corequisites (if applicable, or NONE):								
Antirequisite Courses (Cannot be taken for additional credit.)			Special Topics (Double-click on boxes to select.)					
Former course code/number:		This co	rse is offered with different topics:					
Cross-listed with:		No Yes (If yes, topic will be recorded when offered						
Dual-listed with:				Independent Study				
Equivalent course(s):				If offered as an Independent Study course, this course may				
(If offered in the previous five years, antirequisite course(s) will be				be repeated for further credit: (If yes, topic will be recorded.)				
Included in the calendar description as a note for the antirequisite course(s) cannot take this	ts with credit	🗌 No	☐ Yes, repeat(s) 🗌 Yes, no limit				
			Transfe	er Credit				
Typical Structure of Instructional Hours			Transfe	er credit already exists: (See bctransferguide.ca .)			
Lecture/seminar hours		45	🖾 No	⊠ No □ Yes				
Tutorials/workshops	10	Submit	Submit outline for (re)articulation:					
Supervised laboratory hours		45	🖾 No	No [] Yes (If yes, fill in transfer credit form.)				
Experiential (field experience, practicum, int	ernship, etc.)	Gradin					
Supervised online activities			🖂 Lette	Letter Grades Credit/No Credit				
Other contact hours:			Maxim					
	Total hours	s 90	Expect	ed Frequency of Cours	se Offerings:			
Labs to be scheduled independent of lecture	lo 🛛 Yes		(Every semes	ster, Fall only, annually, etc.)				
Department / Program Head or Director: Gregory Schmaltz			1	Date of meeting:	October 1, 2021			
Faculty Council approval				Date of meeting:	November 5, 2021			
Undergraduate Education Committee (UEC	C) approval			Date of meeting:	January 28, 2022			

BIO 340

Learning Outcomes:

Upon successful completion of this course, students will be able to:

- 1. Explain the core concepts associated with the study of population and community ecology, including:
- 2. Interpret graphical representations and mathematical models of ecological patterns and processes, including basic models of intraspecific and interspecific interactions.
- 3. Evaluate current scientific literature in population and community ecology and discuss its broader scientific impact.
- 4. Analyze data from online databases and identify both the value and limitations of using large-scale online databases in ecological research.
- 5. Demonstrate laboratory techniques used to examine and quantify population growth and/or species interactions.
- Collaborate with peers to design and conduct a field study in community ecology, including development of a research question, hypothesis, and sampling design, data collection, data analysis, and graphical, verbal, and written presentation of scientific findings.
- 7. Demonstrate a working knowledge of the R language and the utility of this tool for both graphics and data analysis in ecology.

Prior Learning Assessment and Recognition (PLAR)

Yes No, PLAR cannot be awarded for this course because

Typical Instructional Methods (Guest lecturers, presentations, online instruction, field trips, etc.; may vary at department's discretion.)

This course will consist of a combination of lectures that introduce students to the main concepts and theories in population and community ecology, with an emphasis on the connection between patterns and underlying processes, and student-led discussions that expand on the topics presented in lecture, with emphasis on current issues and methodologies and practical applications. Labs will introduce students to practical and analytical techniques used to study populations and communities in both the lab and field.

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Typical Text(s) and Resource Materials (If more space is required, download Supplemental Texts and Resource Materials form.)							
	Author (surname, initials)	Title (article, book, journal, etc.)	Current ed.	Publisher	Year		
1.	Mittelbach and McGill	Community Ecology	\boxtimes	Oxford University Press	2019		
2.							
Required Additional Supplies and Materials (Software, hardware, tools, specialized clothing, etc.)							
Tvp	Typical Evaluation Methods and Weighting						

Final exam:	20%	Assignments:	25%	Field experience:	%	Portfolio:	%
Midterm exam:	10%	Project:	%	Practicum:	%	Other:	10%
Quizzes/tests:	%	Lab work:	35%	Shop work:	%	Total:	100%

Details (if necessary): Other = contribution to literature discussions.

Typical Course Content and Topics

Patterns in biodiversity

Biodiversity and ecosystem functioning - nutrient cycling, stability, and invasibility

Population growth models

Predator-prey interactions

- Functional responses
- Lotka-Volterra and Rosenzwig-MacArthur models
- Optimal foraging and prey choice
- Non-consumptive effects of predators

Competitive interactions

- Lotka-Volterra and consumer-resource models
- Niche theory and species coexistence

Mutualisms

Food webs and ecological networks Food chains and trophic cascades Community assembly Metapopulations Metacommunities

Laboratory:

Laboratory is organized around three projects that introduce students to different research approaches used to study patterns and processes in ecological populations and communities, and that allow students to improve their observational, data collection, and data analysis skills, and to develop a better understanding of the process of science in an ecological context.

Introductory lab: Used to introduce students to the R programming language.

Project 1: Involves developing and testing hypotheses related to factors that influence species richness and/or diversity at multiple spatial scales, using data from publicly available online databases. This project will also provide students with hands-on experience using R for graphics and statistical analysis.

Project 2: Involves a multi-week lab experiment to examine population growth and/or species interactions, and how climate change (or other abiotic factors) may impact both population growth and the nature of these interactions. This project will also allow students to apply the population growth and species interaction models presented in the lecture component.

Project 3: Involves a largely self-directed, multi-week field study, which can include additional work in the lab (e.g., to identify specimens, extract invertebrates from soil samples...etc.). Working in small groups, students are required to develop a research question (to be approved by the instructor) that can be investigated at the pre-determined study site (e.g., local forest). Groups will then submit a research proposal, after which each group will meet independently with the instructor to receive feedback on their proposed study design. Data collection will then take place over multiple lab periods. Data analysis will then be carried out using R and each group will present their research project to the class.