Spring 2-1-2018

BIOB 506.01: OBE Core Course - Ecology

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Advanced Population and Community Ecology

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Office: Natural Sciences Annex 102 — Health Science 410
Office Hours: Monday, 3-4 pm — Tuesday, 1-2 pm

Rooms and Times: Lectures - ISB 103B, 8:30-9:50 am, Tues. and Thurs.
Discussion - TBD

Course Description:
This course is geared towards newer graduate students and is meant to provide students with a broad overview of population and community ecology. Specific topics related to population ecology include simple and more complex age/stage structured models of population growth, density-dependence and population regulation, spatial aspects of population dynamics including metapopulation and source-sink dynamics, and niche models. Topics related to community ecology include predator-prey interactions, plant-herbivore interactions, mutualisms, community organization, null models of community assembly, metacommunities and species diversity. Lectures will alternate between introducing the theoretical foundations for population and community ecology and discussing the classic and more recent empirical tests of theory.

Grading:

20% *Mini-lecture and paper discussion*
> In a discussion period, each student will present a 15 min lecture on a topic not covered by the instructors, and lead a discussion of a related paper
> Lectures and papers should be discussed with the instructors by the Friday before the assigned discussion period

25% *Mid-term exam (March 8)*

25% *Final Proposal*
> Proposals are due on April 17
> We will distribute guidelines for the proposal

10% *Proposal Review*
> Review panels will be during the last weeks of classes
> We will distribute guidelines for the written and oral review

20% *Participation*

Book: Gotelli, N.J. 2008. A Primer of Ecology. 4th ed. Sinauer Associates, Inc., Sunderland, MA.

Readings: Readings for lectures and a broader reading list will be posted to Moodle.

Policy: We will consider extensions on assignments **ONLY** if you discuss the reason for such a request IN PERSON before the due date.

The University's Academic Policies and Procedures are described at http://archive.umt.edu/catalog/16_17/academics/academic-policy-procedure2.php, including important dates regarding course registration.

**** We encourage students with disabilities of any kind to discuss appropriate accomodations with us.****

Date	Topics	
Jan. 23	Course objectives and structure / Simple population models	JM, WL
Jan. 25	Density dependent population models	JM
Jan. 30	Population regulation	JM
Feb. 1	Stage-structured models 1	JM
Feb. 6	Stage-structured models 2	JM
Feb. 8	Niches	WL
Feb. 13	Competition models 1	WL
Feb. 15	Empirical competition research	JM
Feb. 20	Competition models 2	WL
Feb. 22	Simple predator-prey models	WL
Feb. 27	Complex predator-prey models	WL
March 1	Empirical predator-prey direct effects	JM
March 6	Empirical predator-prey indirect effects	JM
March 8	Mid-term exam	
March 13	Plant defense	JM
March 15	Mutualisms	JM
March 20	Spatial population and community models 1	WL
March 22	Spatial population and community models 2	WL

Date	Topics	
March 27	SPRING BREAK	
March 29	SPRING BREAK	
April 3	Neutral theory	WL
April 5	Disease ecology	AL
April 10	Community assembly / coexistence	JM
April 12	Non-equilibrium community structure	WL
April 17	Food webs 1	WL
	PROPOSAL DUE	
April 19	Food webs 2	WL
April 24	Attributes of communities	JM
April 26	Biodiversity and ecosystem function	JM
May 1	Mock NSF panel 1	-
May 3	Mock NSF panel 2	-

Topic	Learning outcome
Simple population models	Understand the structure of continous and discrete time models of exponential population growth
Density-dependent population models	Understand the structure and behavior of models of density-dependent population growth
Population regulation	Understand the historic debate in ecology about population regulation, and current thinking on this topic
Stage structured models 1, 2	Understand the structure of stage-structured models, how they are developed and analyzed, and their uses
Niches	Understand the evolution of the niche concept and recent applications of this concept
Competition models	Understand the structure and dynamics of foundational models of interspecific competition
Empirical competition	Understand the historical development and current empirical evidence for the importance of interspecific competition
Predator-prey models	Understand the structure and dynamics of foundational models of predator-prey interactions
Empirical predator-prey direct effects	Understand the historical development and current empirical evidence for the importance of the direct effects of predators on animal/plant abundance and behavior
Empirical predator-prey indirect effects	Understand the historical development and current empirical evidence for the importance of trophic cascades
Plant defense	Understand classic and contemporary theory and empirical work related to the evolution of plant defense
Mutualisms	Understand classic and contemporary ideas pertaining to both diffuse and highly specific mutualisms, the maintenance of those interactions, and their ecological importance
Spatial models	Understand the structure and dynamics of metapopulation and metacommunity models
Neutral theory	Understand the conceptual and analytical basis of neutral theories of community assembly
Disease ecology	Understand the structure of basic disease models and applications to ecological questions
Community assembly/coexistence	Understand coexistence theory, and empirical tests of theory. Understand current research on "trait-based" community assembly
Non-eqilibrium community structure	Understand non-equilibrium approaches to community ecology and key differences from equilibrium models
Food webs	Understand different approaches to modeling food webs, key predictions from these models, and empirical tests
Attributes of communities	Appreciate spatial trends in diversity, and the drivers of those patterns. Understand widespread patterns relating to species-area curves, productivity and diversity, diversity and productivity, etc
Biodiversity and ecosystem function	Understand impacts of individual species on ecosystem processes. Understand research examining effects of biodiversity on ecosystem function and the drivers of those patterns