BIOLOGY 4117

BIOL 4117/5151 Advances in Comtemporary Ecology

Course Outline 2009

Instructor: Dr. S. Hecnar
Office CB 4039, Research Lab CB 3021, Tel: 343-8250
Email: Stephen.Hecnar@lakeheadu.ca

Lectures: 9:30-10:30 am M,W,F in AT 1005 Office hours: 10:30-11:30 am M,W,F

Course Description: An investigation of topics in contemporary ecology with an emphasis on large-scale patterns of abundance and distribution of organisms in nature. Topics covered will include the importance of scale in ecology, latitudinal patterns of species richness, range size theory, and the relationship between abundance and distribution. This course will include instruction and practice in compilation, analysis and interpretation of macroecological data.

Optional Textbooks:

Brown, J.H. 1995. Macroecology, University of Chicago Press, paperback, ISBN 0-226-07615-6. *The first macroecology textbook produced. Although several years old, it still provides a good and inexpensive introduction to the field and background reading for the course.*

Gaston, K.J. 2003. The Structure and Dynamics of Geographic Ranges, Oxford University Press, paperback, ISBN 0-19-852641-5. *An up to date synthesis of the field of aerography.*

Recommended Books for Further Reading:

Blackburn, T.M. and K.J. Gaston (eds). 2003. Macroecology: Concepts and Consequences. Blackwell Publishing, paperback, ISBN 0-521-54932-9. *The most recent textbook on the topic of macroecology with chapters written by experts on many of the important questions in the field.*

Gaston, K.J. 1994. Rarity. Chapman & Hall, paperback, ISBN 0-412-47510-3. *A thorough treatment of the topic of rarity in a compact volume.*

Gaston, K.J. and T.M. Blackburn. 2000. Pattern and Process in Macroecology. Blackwell Science UK, paperback, ISBN 0-632-05653-3. *An advanced summary of the field that uses Britain's avifauna as a case study. An excellent but expensive book.*

Hanski, I. 1999. Metapopulation Ecology. Oxford University Press, paperback, ISBN 0-19-854065-5 *A comprehensive synthesis of the field of metapopulation ecology covering both theoretical and empirical research*.

Hubbell, S.P. 2001. The Unified Neutral Theory of Biodiversity and Biogeography. Princeton, paperback, ISBN 0-691-02128-7 *A new mathematical theory that extends MacArthur and Wilson's island model in an attempt to merge the fields of ecology and biogeography*.

Maurer, B.A. 1999. Untangling Ecological Complexity: the Macroscopic Perspective. University of Chicago Press, paperback, ISBN 0-226-51133-2 *An interesting perspective on complexity in ecological communities written by one of the co-founders of the sub-discipline of macroecology. Maurer provides an extensive justification for using the macroecological approach and in-depth discussion of the geographic range, large-scale assembly of communities, and evolution at the macro-scale.*

Ricklefs, R.E., and D. Schluter. 1993. Species Diversity in Ecological Communities: Historical and Geographical Perspectives. University of Chicago Press, paperback, ISBN 0-226-71823-9 *An influential edited volume that coalesced changing viewpoints in ecology. Chapters are uneven, but many provide an interesting read.*

Rosenzweig, M.L. 1995. Species diversity in space and time. Cambridge University Press, paperback, ISBN 0-521-49952-6 *An entertaining and informative book that provides a very thorough treatment of the role of area in producing patterns of species diversity*.

Journals: Important journals in macroecology include: Global Ecology and Biogeography, Ecography, and Evolutionary Ecology Research. Papers on macroecological topics also occur in ecological journals such as: Ecology, American Naturalist, Oikos, Oecologia, Ecography, Conservation Biology, Journal of Biogeography. Occasionally macroecological papers are published in general science journals such as Science or Nature or in taxon specific journals.

Marking Scheme:
4117: Midterm 20%, Assignments 30%, Discussion 10%, Final Written Exam 40%.
5151: Midterm 20%, Assignments 30%, Discussion 10%, Final Written Exam 30%, Final Oral Exam 10%.

Goals & Expectations: This course, like the ecological communities it studies, is constantly evolving. Its goal is to provide a contemporary large-scale perspective to students who are, or intend on, pursuing graduate studies in ecology. The course is taught at an advanced level and assumes that the student has a solid foundation in basic ecology. The course is demanding. Besides covering much lecture material, students must prepare for and take an active part in discussions, and complete assignments on their own time. Maintaining good attendance is for your own benefit. Examination questions often come from poorly attended lectures. Missed examinations will be graded zero unless you have a bonafide excuse and supporting documentation. If you do miss an exam, contact the instructor as soon as possible.

Discussions: One time slot of the week will be used to discuss a previously assigned paper from the literature or a book chapter. The discussion leader(s) will provide a summary of the paper, additional information, opinions or criticism, and pose some questions to stimulate and continue discussion. It is advisable that all students peruse the paper or chapter, review related lecture material, and seek additional information that can be used to discuss and criticize the paper. Your mark will be based upon the quality of your contribution to the discussion or your success as a discussion leader. Graduate students must act as a discussion leader for at least one session. Senior graduate students should chose a time in the earliest slots available and new graduate students towards the end. Undergraduates will work in small groups as discussion leaders for their assigned paper.

Assignments: Several small assignments or demonstrations may be given during the course to give the student some experience in compiling, analyzing, and interpreting macroecological data. A major project will be assigned early in the semester (see class handout for details) and will be due on the last lab time period of the semester. Assignments will be marked based on accuracy, format, neatness, and quality of conclusions derived. All assignments must conform to the format of the journal *Ecology* http://esa.sdsc.edu. They are to be handed in on time. Considering the size of large-scale databases, some work may initially be partitioned among students for preparation and combined for analysis later. In this case, being late can affect the entire class.

Examinations: Format will vary according to the enrollment in the course but can be expected to include a mix of different types of questions such as true or false, multiple choice, fill in the blank, short answer, essays, quantitative problems, pattern interpretation, and drawings. Graduate students will be given an oral examination at the end of the course in addition to all other requirements.

Reserve Materials: Discussion papers and instructions for assignments will be emailed to class members and reference materials will be placed on reserve at the Paterson Library under the course number and instructor's name. It is the student's responsibility to regularly check their email accounts to download course materials for perusal before class and to copy material as required and return originals in good condition to the reserve folder(s). If a student would like to find additional material on some topic of interest they should see the instructor.

Tentative Schedule

Jan. 05 M Lecture: Introduction (Chap. 1, 2, 3; Brown)
07 W Lab: Major Project: detailed instructions and material handout
09 F Discussion:

12 M Lecture: Range Size (Chap. 6, sections in 8 & 9; Brown)
14 W Lab: Assignment 2 - Range size distributions
16 F Discussion:

19 M Lecture: Species-area Effect, Island Biogeography & Landscapes
21 W Lab: Assignment 3 - Species area effects
23 F Discussion:

26 M Lecture: Scale, Local vs. Regional Processes
28 W Lab: Major project tutorial
30 F Discussion:

Feb. 02 M Lecture: Nested Assemblages
04 W Lab: Assignment 4 - Nestedness analysis
06 F Discussion:

09 M Lecture: Abundance-Distribution Relationship (Chap. 4; Brown)
11 W Lab: Major assignment data must be submitted for compilation
13 F Discussion:

	16	M	Study Week
	18	W	" "
	20	F	" "
	23	M	Lecture: Abundance-Distribution Relationship (Chap. 4, 7; Brown)
	25	W	Discussion:
	27	F	MIDTERM EXAMINATION
	02	M	Lecture: Rarity
	04	W	Lab: Assignment 5 - Identifying common and rare species
	06	F	Discussion:
Mar	09	M	Lecture: Metapopulations
	11	W	Lab: Major project tutorial
	13	F	Discussion:
	16	M	Lecture: Body Size and Energetics (Chap. 5, 10; Brown)
	18	W	Lab: Major project tutorial
	20	F	Discussion:
	23	M	Lecture: Latitudinal Species Richness Gradient
	25	W	Lab: Major project tutorial
	27	F	Discussion:
	23	M	Lecture: Macroecology and Conservation (Chap. 12; Brown)
	25	W	Lab: Major project tutorial
	27	F	Discussion:
	30	M	Lecture: T.B.A.
Apr	01	W	Lab: Major assignment report due (no fooling!)
	03	F	Discussion: