

## Biology 4117/5151 FA Advances in Contemporary Ecology - Course Outline 2025

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**Lectures:** 5:30-7:00 pm Monday & Wednesday in RC 1003.

**Office Hours:** Just after each class ends or by appointment face to face or on Zoom (access D2L course website).

**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.

This year we will focus on recent advancements in basic concepts and examine how the field is changing. We will combine lectures, readings, presentations, and discussions focussing on major concepts in ecology.

**\*\*\*Course delivery for Fall 2025:** All course activities (lectures, presentations, discussions, exams) will be delivered live face to face in the assigned space. Should a pandemic situation return be aware that we could be ordered to return to live remote delivery (Zoom on D2L) on short notice. The university does not currently have a mask mandate, but mask use is recommended when there is considerable risk of transmission. **Do not attend class in person if you test positive or have symptoms of Covid, RSV or other transmissible diseases and contact the instructor as soon as possible.** If you need to miss lectures, detailed lecture slides will be available on the D2L website for the course.

### Recommended Textbook:

Levin, S.A. (Ed.). 2012. The Princeton Guide to Ecology. Princeton University Press, Princeton, paperback, ISBN: 978-0-691-15604-0 (\$95.00). *A concise encyclopaedic account of concepts and topics in both basic and applied ecology.* The 2009 hardcover edition can be used as an alternative.

### 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, the book provides a good inexpensive introduction to the field and background reading for the course.*

Dodds, W.K. 2009. *Laws, Theories, and Patterns in Ecology*. University of California Press, Berkeley ISBN: 978-0-520-26041-2. *A recent textbook that examines the complexity of ecology relative to other sciences and discusses what can be considered laws, theories or patterns.*

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. Blackburn. 2000. *Pattern and Process in Macroecology*. Blackwell Science UK, paperback, ISBN 0-632-05653-3 *An advanced and up to date 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.*

Holyoak, M., M.A. Liebold, and R.D. Holt. (Eds.). 2005. *Metacommunities: Spatial Dynamics and Ecological Communities*. University of Chicago Press, paperback, ISBN: 0-226-35064-9. *The first book on the emerging perspective of metacommunities in ecology.*

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.*

Schmitz, O. J. 2017. The new ecology: Rethinking a science for the Anthropocene. Princeton University Press. *A conservation oriented perspective for viewing human impacts on ecological systems.*

**Journals:** The library subscribes to several primary international ecological journals such as Ecology, Ecology Letters, American Naturalist, Oikos, Oecologia, Conservation Biology, Biological Conservation, Diversity and Distributions, Journal of Biogeography, Trends in Ecology and Evolution (there are many others). Occasionally papers are published in general science journals such as Science or Nature or in taxon specific journals. A good way to search for papers is to use one of the subscribed data sources through the library (Web of Science, Biological Abstracts) or via the worldwide web using Google Scholar.

### **Marking Scheme:**

4117: Midterm 20%, Presentation 20%, Written Summary 10%, Discussion 20%, Final Written Exam 30%.

5151: Midterm 20%, Presentation 20%, Written Summary 10%, Discussion 20%, Final Written Exam 20%, Final Oral Exam 10%.

Your mark will thus be comprised of the quality of your presentations, participation in discussions and more formal examinations.

**Goals & Expectations:** This course, like the ecological concepts it studies, is constantly evolving. Its goal is to provide a contemporary large-scale perspective to graduate students or senior undergraduates who 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 as participation in discussions is graded. 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. If you have a contagious illness do not attend class but inform the instructor as soon as possible.

**Presentation(s):** Students will provide one presentation of a key ecological concept or topic. The topic may be either in basic or applied ecology but must be approved by the instructor. The student(s) should provide at least a 15 to 20 minute presentation using PowerPoint. The presentation should aim to define and provide a contemporary review of the topic. The goal is to ensure that the audience will have a firm grasp of what the concept is, why it is important, what its implications are, how it is used, etc. Graduate students will be expected to use the earliest time slots, followed by undergraduates (fourth year followed by third year). The presentation will be followed by a discussion providing an opportunity to ask and answer questions.

**Written Summary:** Student presenters should provide a one to two page typed summary of their concept or topic as a handout for the class. An electronic copy (Word .doc or .pdf) must be

sent to the instructor.

**Reading and Discussion – Paper:** The student(s) doing the presentation will lead the discussion and critique of a paper related to the concept or topic presented. This paper must be from the recent ecological literature and preapproved by the instructor. The student(s) will provide a summary of the paper, additional information, opinions or criticism, and pose some questions to stimulate and continue discussion. The paper should be sent out to the class the week preceding the presentation so that all will have sufficient time to peruse the paper. Presentations, readings papers, and other materials will be posted to the Desire2Learn website to facilitate exchange of materials and communications in the course. It is thus important to have your seminar date set, and topic and paper approved early.

**Examinations:** Format will vary according to the enrollment in the course but may 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, drawings. If class size is small, questions may be exclusively essay format. 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 or posted to the D2L course website for students to access before class. It is the student's responsibility to regularly check their email inbox/D2L site to download and peruse materials before class or copy reserve materials as required and return originals in good condition to the reserve folder(s). If a student needs help to find additional material on some topic of interest they should see the instructor.

**Other Information:** A Desire2Learn (D2L) website is set up for the course. It is accessed from the MyCourse link at the top right of the main Lakehead webpage. From this site you can **view and/or download the lecture material as PowerPoint or pdf files**. Downloading these files is for your own personal use as a student taking the course. Do not distribute copies to third parties or post on the internet. ***The materials in the PowerPoint lecture files are copyright protected by the instructor and publisher.*** The grade you ultimately earn depends on the level of your effort. A formula for success involves attending all lectures and labs, completing all assignments on time, reading your text, making good notes, and spending a sufficient amount of studying. Participating in lectures is important so that you will not miss the review of the basic topics and any additional information and examples that the instructor provides. Exam questions often come from topics covered during poorly attended lectures. If you must miss a test or exam because of illness or other serious circumstance, contact the instructor or lab technician as soon as possible (documentation may be required). If you must miss a test or exam because of illness or other serious circumstance, contact the instructor or lab technician as soon as possible (documentation may be required). **Turn cell phones off during lecture and use your electronic devices for viewing course materials or taking notes, but not for shopping, surfing the web, watching movies or other purposes.**

**\*\*\*All students are required to be familiar with, and abide by, the Student Code of Conduct and university regulations on academic misconduct. The penalty for plagiarism or any form of cheating on any test, quiz, assignment, midterm or final examination,**

ranges from a grade of zero “0” on the material in question through zero “0” for the course, to expulsion from the university. Occurrence of academic dishonesty remains on your transcript. This can affect your future in terms of employment or further education. Plagiarism or unauthorized copying is theft of intellectual property and subject to penalties to the full extent of the law. Use of Generative Artificial Intelligence (AI) such as ChatGPT or other sources is not to be used in this course and will be considered as cheating\*\*\*

### **Tentative Schedule** (Specific items T.B.A.)

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Sept.	03	W	Organizational Meeting and Introduction
	08	M	Hecnar – Metapopulations to Metacommunities
	10	W	Hecnar – Climate Change
	15	M	Hecnar – Effects of Climate Change on Community Structure
	17	W	Hecnar – Stability in Coastal Communities
	22	M	Hecnar – Long-term Population Studies
	24	W	Hecnar – Biodiversity and Humans
	29	M	Hecnar – Laws in Ecology
Oct.	01	W	Hecnar – Novel Ecosystems
	06	M	
	08	W	
	13	M	<b>Study Week</b>
	15	W	<b>Study Week</b>
	20	M	Student Presentation –
	22	W	<b>Midterm</b>
	27	M	Student Presentation –
	29	W	Student Presentation –
Nov.	03	M	Student Presentation –
	05	W	Student Presentation –
	10	M	Student Presentation –
	12	W	Student Presentation –
	17	M	Student Presentation –
	19	W	Student Presentation –
	24	M	Student Presentation –
	26	W	Student Presentation –
Dec.	01	M	<b>Last Class</b> – Student Presentation –

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