

## **Biology 4117/5151 WDE Advances in Contemporary Ecology - Course Outline 2021**

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Lectures: 5:30-7:00 pm TUES & THU online D2L.

Office hours: 7:00-7:30 pm TUES & THU online/email

**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 Winter 2021:** Because of the pandemic situation all lectures, assignments, and exams will be delivered remotely online through the D2L website for the course. Lectures will be provided 'synchronously' with the time assigned above for the course. The schedule and links to join lectures can be accessed through "Other Tools" menu by selecting "Zoom" then "Upcoming Meetings" or selecting "Calendar" in the "Other Tools" menu on the D2L website for the course. Lectures will be recorded and available for a limited time on the D2L website for the course under "Zoom" and "Cloud Recordings". Detailed PowerPoint lecture slides can be accessed and downloaded from the D2L website for the course. During the scheduled time slot the instructor will provide a live lecture using the Zoom link on the D2L website for the course. The instructor or speaker will use the share screen function on so that others can view the slides as the live audio lecture is given. Questions during the lecture are also welcome by using the raise hand function (clicking "participants" on control bar then "raise hand" on the pop up window), using the Chat box on Zoom, or just opening your microphone and asking verbally. Feel free to open your camera if desired when asking questions. Because this is a small class verbal questions and discussion with "camera on" are recommended. The midterm and final exam will also be given on a specific date and time through the 'Quiz' link on the D2L main page for the course. If you have special needs for the course please contact Student Accessibility Services (SAS) who coordinate arrangements.\*\*\*

"In Advances in Contemporary Ecology, BIOL 4117/5151, WDE instruction in the classroom will be recorded for confidential access by students registered in the course but who are unable to attend class due to the pandemic or other necessity. To the greatest extent possible only the image and voice of the instructor will be recorded for this purpose but, due to class interaction, the images and voices of students present in the classroom may be incidentally recorded and, thus, be available for access by course students in remote locations. These recordings, however, are strictly confidential and may be used only by the instructor and students registered in the course and only for purposes related to the course. They may otherwise not be used or disclosed. Students in the classroom who are concerned about being recorded in this fashion may request the instructor to exclude them from the recording to the greatest degree possible on the understanding that total exclusion cannot be guaranteed. The recordings are made under the authority of sections 3 and 14 of The Lakehead University Act, 1965. Questions about the collection of

the images and sounds in the recordings may be directed to Questions about the collection of the images and sounds in the recordings may be directed to Chair of Biology (343-8627 ) or Dean of SES (343-8289 ), Thunder Bay Campus,".

### **Recommended Textbook:**

Levin, S.A. (Ed.). 2012. *The Princeton Guide to Ecology*. Princeton University Press, Princeton, paperback, ISBN: 978-0-691-15604-0 *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.*

**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 or more presentations 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 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.

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

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Jan.	12	T	Organizational Meeting and Introduction
	14	Th	Hecnar – Metapopulations to Metacommunities
	19	T	Hecnar – Climate Change
	21	Th	Hecnar – Effects of Climate Change on Community Structure
	26	T	Hecnar – Stability in Coastal Communities
	28	Th	Hecnar – Long-term Population Studies
Feb.	02	T	Hecnar – Biodiversity and Humans
	04	Th	Hecnar – Novel Ecosystems
	09	T	Grad Student Presentation – Understanding ecology & population structure of caribou using molecular genetics & landscape analyses
	11	Th	Grad Student Presentation – Mutualisms & their conservation
	16	T	<b>Study Week</b>

	18	Th	<b>Study Week</b>
	23	T	<b>Study Week Extended</b>
	25	Th	<b>Study Week Extended</b>
Mar.	02	T	Grad Student Presentation – Behavioural ecology & management implications
	04	Th	<b>Midterm Exam</b>
	09	T	Grad Student Presentation – Competition & coexistence
	11	Th	Student Presentation – Keystone species
	16	T	Student Presentation – Biotechnological advances & related ecological implications in phytoremediation
	18	Th	Student Presentation – Chronic wasting disease
	23	T	Student Presentation – TBA
	25	Th	Student Presentation – Edge effects
	30	T	Student Presentation – Modern ecological niche analyses and conservation
Apr.	01	Th	Student Presentation – Effects of eutrophication on populations
	06	T	Student Presentation – Anthropogenic effects on speciation
	08	Th	Student Presentation – Predator reintroduction
	13	T	Student Presentation – Restoration techniques in marine ecology
	15	Th	<b>Last Class – TBA</b>

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