

Community Ecology

BIOL4113

Course Syllabus

Fall 2021

"To do science is to search for repeated patterns, not simply to accumulate facts"

– R.H. MacArthur



Left: A tropical rainforest tree community, Maliau Basin, Malaysian Borneo. Credit: AC Algar

Middle: A representation of RH MacArthur's classic study on niche partitioning by Deborah Kaspari, CC-BY-SA;

<https://www.esa.org/esablog/2016/02/02/population-ecology-of-some-warblers-of-northeastern-coniferous-forests-esa100-notable-papers/>

Right: A boreal forest tree community, Thunder Bay District, Ontario, Credit: AC Algar

Take a walk through a forest in Northwestern Ontario. The first thing you notice is the trees - jack pine, balsam fir, and trembling aspen. You spot a few white birch. Walk a little further, up a well-drained slope, and you may find a red pine. Stop and listen for the birds – a large pileated woodpecker slowly deconstructing a dead pine, a small downy woodpecker rapidly drumming on a poplar, while a flycatcher sojourns from its exposed branch to—surprise—catch flies. Now stop at a small pond and watch. Caddisfly larvae patrol the bottom, mosquito larvae rise, sink, and rise again, while water striders skate along the surface. Look closer at the moss beneath your feet. Now look even closer – small, almost microscopic, mites crawl through a forest in miniature, spiders hunt on foot or wait in their webs, and the ants – the ants are everywhere. So many species, yet we have only scratched the surface – there are small flowering plants, ferns, lichens, fungi, mammals, nematodes, bacteria, and more. Some similar, others different. Some common, others rare. Some large and others small. Sometimes interacting and sometimes not. And this situation is not unique to our forest – it is repeated across all of Earth's environments, from savannah to steppe, from deep ocean to intertidal zone, from driest desert to wettest rainforest. Each environment harbours its own set of species, some unique and some shared. All feeding, reproducing and struggling to survive in their environments.

Community Ecology is the study of these collections of species. It attempts to understand how these species came to occur together in space and time, and if, why, and how they will continue to persist together. It celebrates what makes communities different from each other, but at the

same time it searches for common processes and properties that transcend these differences. It is in this search for the general principles generating, regulating, and changing these sets of species that we will discover the science behind the study of ecological communities.

LAND ACKNOWLEDGEMENT

Lakehead University respectfully acknowledges its campuses are located on the traditional lands of Indigenous peoples.

Lakehead Thunder Bay is located on the traditional lands of the Fort William First Nation, Signatory to the Robinson Superior Treaty of 1850. Lakehead Orillia is located on the traditional territory of the Anishinaabeg. The Anishinaabeg include the Ojibwe, Odawa, and Pottawatomi nations, collectively known as the Three Fires Confederacy.

Lakehead University acknowledges the history that many nations hold in the areas around our campuses, and is committed to a relationship with First Nations, Métis, and Inuit peoples based on the principles of mutual trust, respect, reciprocity, and collaboration in the spirit of reconciliation.

WHAT ABOUT COVID?

My goal for this semester is to have in-person learning. I am tired of teaching to a screen and I think that many of you are tired of learning from one. With vaccination, face coverings and distancing, we can hopefully have a safe and rewarding semester. However, we must remember that **we are still in the midst of a global pandemic**. This means that **we all need to be flexible** as the term progresses. With caution as our guide, **we may have to pivot to online learning**, either completely, or with certain components online. This may be disappointing for you, but I ask for your understanding and patience given the complex and difficult situation. I will not make the decision to change the delivery mode lightly, but it may be unavoidable to maintain a healthy learning environment. I will communicate any changes as soon as possible.

We will, of course, be following public health and University guidelines for in-person teaching. Please see the official university and public health unit webpages for the complete guidelines, but please note:

- 1) **As per University Policy, you must be vaccinated against Covid-19 to attend my class**, with the exception of those who cannot be vaccinated for medical reasons.
- 2) **You must wear a face covering (mask) in my class** unless you have a medical exemption. I, and the GA, will also be wearing a face covering. If you rely on lip-reading, please speak with me, or your Accessibility Advisor, as soon as possible and we will work something out.
- 3) **Follow distancing guidelines**
- 4) **If you have any potentially Covid-related symptoms, even if you think it's just a cold, or need to isolate, please do not come to class.** We will record as much as possible so that you can view sessions asynchronously. Better safe than sorry. Communicate with me and we will sort something out.

- 5) **Check your email and the online D2L Courselink site regularly.** I will use the Announcements feature of the D2L site to communicate delivery changes, which could happen at short notice (for example, if I wake up with Covid-related symptoms on the day of a class).
- 6) **We are required to take attendance at each session.** This is for contact tracing purposes in case the health unit requires this information.

WHO WILL BE TEACHING AND HOW TO I CONTACT THEM?

Instructor:

Dr. Adam Algar (he/him)

Graduate Assistant:

Ben Wood (he/him)

Office hours:

Mondays 4:00pm-5:00pm on Zoom. Access through D2L site. Subject to change. If you can't make office hours, email me to schedule an appointment:
aalgar@lakeheadu.ca.

GA Office hours:

Ben will not have set office hours. Instead, email Ben to make an appointment if you want to meet: jbwood@lakeheadu.ca

WHAT ARE THE EXPECTATIONS FOR COMMUNICATION?

What you can expect from me:

I try to be as accessible as possible for my students, given the need to balance teaching, research and other requirements of my role.

Meeting with me: I try to be available after class to answer questions, provided I don't have something scheduled immediately afterward. This time is probably best used for short discussions or questions about the course material. I will also be hosting office hours on Zoom. These are scheduled, and can be joined, through the Zoom Tool on the D2L site. Be sure you're joining the right week. When you join the office hours, you'll enter the waiting room and I will admit you when it is your turn. If there is a queue, then I will have to limit the time I can spend with each student. If you need more time or can't make it to the office hours then email me and we'll set a time up that works for both of us. Timings of office hours may change during the semester. Similarly, if you want to meet with Ben, drop him an email.

Email: I reliably check and reply to emails between 8:30am and 5:00pm on weekdays (excluding holidays). I do not reliably check or reply to emails in the evenings, on weekends, or on holidays. I do my best to reply to emails within two working days (i.e. excluding weekends and holidays), but it's not always possible. If you've emailed me about something and it has been more than two working days, please send me a polite email reminding me as sometimes an email slips down my inbox by accident. Please don't email me a reminder before two working days has passed. The implication of the above is that **if you email me the day before a due date, then chances are you won't get a reply before the deadline, so plan ahead.** The above also applies to emailing Ben (the GA). Obviously, if something unforeseen happens that affects your ability to complete assignments, then email me as soon as you can.

What I expect from you:

Other than verbal announcements in class, I will communicate with the class via the Announcements feature on the D2L site for the course, or I may email (if it's really important, I may do both). **It is your responsibility to check the D2L site regularly for announcements** especially regarding possible changes to delivery, scheduling, etc. I also expect that you to fully read the syllabus. Similarly, I also expect that you check your university email address regularly.

WHAT WILL I BE LEARNING?

During the course we will focus on general patterns in the structure of ecological communities, and their assembly. We will learn the major theories to explain these patterns and the key processes underlying them. We will also focus on how to analyse ecological data and reach conclusions based on evidence. Considerable focus will be placed on evidence synthesis. The 'lectures' will include group discussion, some instructor-led and some student-led. Lab sections will be a mix of workshops geared toward the final project and computer practicals where you will learn how to use the programming language R to analyse ecological datasets.

Learning Outcomes

By the end of the course you will be able to:

- 1) Identify the key components of ecological community structure
- 2) Understand key theories of community assembly
- 3) Carry out analysis of ecological datasets to address ecological questions
- 4) Understand the fundamentals of R programming for ecological analysis
- 5) Synthesize evidence to reach conclusions about open ecological problems
- 6) Communicate scientific ideas and findings in verbal and written form

WHAT WILL I BE READING?

There is no textbook for this course. If you would like to read a textbook to get up to speed on fundamentals, then any Community Ecology textbook will suffice. *Community Ecology* by Gary Mittelbach and Brian J. McGill is a good one; either the 1st or 2nd edition is fine. There are many other textbooks, just as good. Each book takes its own approach, which may differ from the one we will take (e.g. some are very focused on mathematical modelling).

We will focus on reading the primary scientific literature – predominantly journal articles. Some will outline new cutting-edge discoveries, others will outline classic problems, and others will present fundamental disagreement and debate among scientists. All will be informative, thought and provoking.

There will be a set of readings posted on the D2L site to accompany each week's sessions. Within the extended list, **there will be a core set of readings that you must read these before attending class**. As this is a 4000 level course, these readings are just a starting point for you to explore the literature more deeply on your own, following your curiosity and interest.

HOW WILL I BE EVALUATED?

Open Book Quizzes ($2 \times 5\% = 10\%$)

There will be two, short, open book quizzes throughout the semester, one on statistical fundamentals and the other on identifying and calculating effect sizes. The purpose of these is to make sure you have the fundamentals to succeed in the remainder of the course. Quizzes will be administered through the D2L site.

Conceptual Essay (10%)

This is a short piece of writing that addresses a challenging concept for the field of community ecology. It will encourage you to question, critically evaluate and reach conclusions about ideas foundational to the field. The topic is: **Should we be abandon the community concept?** The essay has a **word limit of 1200 words**. Further details will be given in class. The essay must be submitted through the D2L site

R Labs ($2 \times 10\%$, best 2 of 3)

These sessions will introduce you to the R programming language, which you will use to carry out analysis on existing community ecology datasets. Don't worry if you have never done any programming before – no experience is required. Assignments will involve short reports answering ecological questions, as well as submitting your code for assessment. There will be three lab assignments throughout the semester (topics are indicative and subject to change):

1. Interspecific interactions
2. Null modelling
3. Functional rarity

Further details will be given in class. The labs must be submitted through the D2L site.

Project Proposal Presentation (15%)

For the presentation you will present your research topic and question for your final project. You will provide the theoretical background and an overview of the existing literature. You will receive instructor and peer feedback. Proposals will be 10 minutes in length with 2 minutes for questions. **The Powerpoint file or PDF must be submitted through the D2L site before your presentation.**

Final Project (40%)

For the final project you will carry out a formal meta-analysis to synthesize the existing evidence from the published literature to answer your topic. You will learn the skills needed to carry out a meta-analysis throughout the semester. Your project will take the form of a scientific research paper formatted as if for submission to the journal *Ecology*. More details will be given in class. **The word limit is 3000 words.** The project must be submitted through the D2L site.

Participation (5%)

Show up and contribute to discussions throughout the semester. Easy! Note that if you have to isolate or miss class bc of Covid symptoms (or if you're just ill), this will not affect your mark – just let me know.

Individual work, Extensions and Accommodations

Discussion of ideas, concepts, and methods are a valuable part of science and I encourage you to discuss topics and ideas with your peers and instructors. Indeed, our in-class sessions will involve a substantial amount of group discussion. **Despite this, all assessments must be completed individually. Late submissions will be penalized 10% per day unless you have a valid reason (e.g. family, medical).** I will be reasonable regarding the difficulty in obtaining evidence of these reasons, given the challenges of the pandemic. Normally the request for an extension should be given before the due date.

I aim to ensure that all students can achieve their best possible results, so if you have particular circumstances affecting your assessments, please speak to me as soon as you can. **For students registered with Student Accessibility Services, you can get in touch with me via your Accessibility Advisor, or, if you want you can speak with me directly (but you still need to discuss with your Accessibility Advisor) so that we can ensure that appropriate accommodations are in place. Please don't hesitate to communicate throughout the course as needed regarding accessibility and accommodations.**

Word Limits

- Written assignments have strict word limits.
- Word limits **exclude** the title, abstract, reference list and any figures or tables (and their captions) you choose to include.
- The marker will not read beyond the word limit, so if you exceed it, your mark will reflect an incomplete piece of work.
- You must report the word count on your paper; we will be sensible regarding the fact that different software can give slightly different word counts.
- Falsely reporting a lower word count to make your essay appear within the limit will be considered academic dishonesty and investigated as a potential breach of academic integrity.

Mark Schemes

Marking schemes will be circulated in the first weeks of class.

Due Dates:

Open Book Quizzes

Quiz 1 (Stats): Wednesday September 22 11:59pm

Quiz 2 (Effect sizes): Wednesday November 10 11:59pm

Conceptual Essay

Disintegration essay: Friday October 1 11:59pm

Presentation

Wednesday Slide Submission: Wednesday October 27 8:30am

Friday Slide Submission: Friday October 29 12:30pm

R Labs

R Lab 1 (Interactions): Friday October 8 11:59pm

R Lab 2 (Null Modelling): Wednesday October 20 11:59pm

R Lab 3 (Functional Rarity): Friday Nov 19 11:59pm

Final Project

Meta Analysis manuscript: Monday December 6 11:59pm

WHEN IS CLASS?

All times local time in Thunder Bay, Ontario.

Lectures: Fridays, 12:30pm-2:30pm, AT1006

Labs: Wednesdays 8:30am-10:30am. Labs will normally take place in AT3002. We may use CB3013 for some of the sessions. Keep an eye on the D2L site for updates.

WHAT WILL WE COVER?

The topics and timings below are a guide only and are subject to change

Week	Week Start	Lab (Wednesdays)	Lecture (Fridays)	Assessment
1	Sept 6	No Lab	Introduction / Syllabus	
2	Sept 13	Stats workshop	What is a Community?	
3	Sept 20	Intro to Meta-Analysis	Coexistence & the Niche	Quiz 1 Due
4	Sept 27	R-Lab 1 Composition	A Neutral Theory	Essay Due
5	Oct 4	R-Lab 2 Null modelling	Diversity	R-Lab 1 Due
6	Oct 11	Reading Week	Reading Week	
7	Oct 18	PRISMA & Zotero	Rarity	R-Lab 2 Due
8	Oct 25	Presentations	Presentations	Presentations
9	Nov 1	Effect size workshop	Stability & Resilience	
10	Nov 8	R-Lab 3 Functional rarity	Networks	Quiz 2 Due
11	Nov 15	Writing workshop	Metacommunities	R-Lab 3 Due
12	Nov 22	Sit down and Write	Determinism	
13	Nov 29	Sit down and Write	No Class	
14	Dec 6			Project Due

HOW SHOULD I MANAGE MY TIME?

As you can see from the schedule, there is quite a bit of assessment early in the course. This is purposeful as much of your time in the second half of the course will be devoted to the final project. The project is a substantial undertaking as you need to systematically search the literature, gather data from the literature, carry out several steps of analysis and then write the paper. **You cannot do this at the last minute.** It is imperative that you start early so that your

analysis is done in plenty of time to write the paper. Do not underestimate the time it will take to extract your data from the literature.

There are three R-labs throughout the semester. Each is worth 10% and the top 2 will count toward your final mark. However, I strongly encourage you not to skip one of the early ones. The third is there to give you an opportunity recoup marks if you haven't done as well as you'd hoped on the first two. You will be busy with your project at the end of the semester and the more time you can devote to it, the better.

WHAT ELSE DO I NEED TO KNOW?

Diversity, Equity & Inclusion

In this class I want us to:

- Develop an environment of mutual respect and safety in, and out of, the classroom and lab for all participants, regardless of culture, ethnicity, gender identity, national origin, race, sex, sexual orientation, socio-economic status, religion, mental and physical ability, experience, or other aspects of identity or background.
- Foster an environment where the merit of ideas, hypotheses, and data are rigorously evaluated and challenged, but the merit of individuals is never in question.

You are expected to abide by the following principle in class, lab and online:

- Be respectful in all of your interactions
 - Remember that others have different life experiences, perspectives, backgrounds, strengths, and challenges
 - Challenge ideas, inferences and evidence but not individuals
 - Listen and learn. Do not dominate discussions.
 - Be willing to change your mind if another argument, dataset, or other evidence is stronger
 - Racist, sexist, or other discriminatory behaviour will not be tolerated. Nor will harassment or bullying of any kind.

Throughout the course we will focus on a scientific approach based on the hypothetico-deductive method. This is just one way of knowing.

- There are other ways of knowing and learning about the world. Our focus on scientific method has no bearing on the value of other forms of knowing.

Science and ecology have a history of discrimination and colonialism that still exists.

- The theory and empirical work that forms the basis of the course has been done overwhelmingly by white males of European descent.
- Some of these researchers had racist, sexist and other discriminatory views. And some of this research was used to strengthen and perpetuate colonialism and discriminatory world views.
-

I am still learning about diversity, equity and inclusion. and trying to improve.

- If I make mistakes, please draw these to my attention and feel free to discuss any concerns that you have with me.

Academic Integrity

I have no tolerance for academic dishonesty and breaches of Academic Integrity. To me, it is theft. Theft of the hard work, the ideas, and achievements of others. And if you obtain your degree through dishonesty you are stealing future jobs, academic spots and other opportunities from others who have earned them. Thus, a breach of Academic Integrity is a serious offence.

The principle of Academic Integrity, particularly of doing one's own work, documenting properly (including use of quotation marks, appropriate paraphrasing and referencing/citation), collaborating appropriately, and avoiding misrepresentation, is a core principle of university study. You must read the Student Code of Conduct – Academic Integrity – for a full description of academic offences, procedures when Academic Integrity breaches are suspected and sanctions for breaches of Academic Integrity.

Link to the Student Code of Conduct and Policy on Academic Integrity:

https://www.lakeheadu.ca/sites/default/files/policies_procedures/Student%20Code%20of%20Conduct%20-%20Academic%20Integrity.pdf

I assume that you have completed Lakehead's online resource, AIM (Academic Integrity Matters course). If you have not, then you should complete it:

<https://www.lakeheadu.ca/students/academic-success/student-success-centre/skills-for-success-seminars/thunder-bay/node/45182>

Furthermore, by signing up for the course, you agree that:

Unless otherwise allowed by the course instructor, I must complete the assignments in this course without the assistance of anyone else. I further understand and agree that, if I violate either of this rule, or if I provide any false or misleading information about my completion of course assignments or exams, I may be prosecuted under the Lakehead University Student Code of Conduct – Academic Integrity, which requires students to act ethically and with integrity in academic matters and to demonstrate behaviours that support the University's academic values.

Accommodation and Accessibility

Lakehead University is committed to achieving full accessibility for persons with disabilities/medical conditions. Part of this commitment includes arranging academic accommodations for students with disabilities/medical conditions to ensure they have an equitable opportunity to participate in all of their academic activities. If you are a student with a disability/medical condition and think you may need accommodations, you are strongly encouraged to contact Student Accessibility Services (SAS) and register as early as possible. For more information, please email sas@lakeheadu.ca or visit <https://www.lakeheadu.ca/faculty-and-staff/departments/services/sas>

The Student Accessibility Services will get in touch with me about your accommodations. Thus there is no requirement that you speak to me about them directly, but you are welcome to do so if you wish, especially if you have any concerns about getting accommodations in place early. Also, please feel free feed back to me during the semester regarding accessibility and accommodations, either directly or through your Accessibility Advisor, so that we can make changes or adjustments that will improve accessibility and better implement accommodations.

Copyright Compliance

By taking the course you sign up to the following statement:

I understand and agree that all instructional, reference, and administrative materials to which I am given access in this course (the "course materials"), whether they consist of text, still or kinetic images, or sound, whether they are in digital or hard copy formats, and in whatever media they are offered, are protected in their entirety by copyright, and that to comply with this copyright and the law.

(a) I may access and download the course materials only for my own personal and non-commercial use for this course; and

(b) I am not permitted to download, copy, store (in any medium), forward or share, transmit, broadcast, show, post or play in public, adapt, or change in any way any text, image, or sound component of the course materials for any other purpose whatsoever except as expressly authorized, and only to the extent authorized, in writing, by the course instructor.

I further understand and agree that, if I infringe the copyright of the course materials in any way, I may be prosecuted under the Lakehead University Student Code of Conduct – Academic Integrity, which requires students to act ethically and with integrity in academic matters and to demonstrate behaviours that support the University's academic values.

Recording Lectures and Class Activities

In Community Ecology, BIO4113 and the associated lab instruction in the classroom will be recorded, where possible, 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 the Chair of the Department of Biology, Lakehead University, 955 Oliver Rd, Thunder Bay, ON, P7B 5E1, +1 (807) 343-8460.