BOT*3050 Plant Functional Ecology

Fall 2018
Section(s): C01

Department of Integrative Biology
Credit Weight: 0.50
Version 1.00 - August 24, 2018

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1 Course Details

1.1 Calendar Description

This course integrates fundamental and applied aspects of plant ecology, focusing on the roles of functional traits, physiological mechanisms, life history strategies, abiotic constraints, and biotic interactions in influencing plant distribution and abundance. Specific topics include physiological ecology, growth and allocation patterns, influence of biotic and trophic interactions [pollinators, pathogens, herbivores, competitors, mutualists, decomposers] on the structure and function of plant communities, and effects of global environmental change. Labs will include a field component that explores variation in functional aspects of plants. This course is especially valuable for students interested in plant or wildlife biology and environmental management.

Pre-Requisite(s): 7.50 credits including BIOL*1070

1.2 Timetable

Lecture: 10:30 - 11:20 AM, MWF, Animal Science & Nutrition (ANNU) Room 156.

Labratory: 2:30 - 5:20 PM, Mondays or Tuesdays, various locations to be announced in class, including the UG Aboretum, Dairy Bush, and Brown's woods, as well as SSC 2306.

Note: Thare are no laboratories during the week of Thanksgiving.

1.3 Final Exam

Exam time and location is subject to change. Please see WebAdvisor for the latest information.

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2 Instructional Support

2.1 Instructor(s)

Merritt Turetsky
Email: mrt@uoguelph.ca
Telephone: +1-519-824-4120 x56166
Office: SC1 2469

Office Hours: By appointment

2.2 Instructional Support Team

Lab Co-ordinator: Carole Ann Lacroix
Email: botcal@uoguelph.ca
Telephone: +1-519-824-4120 x56444
Office: SC1 2507

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3 Learning Resources

3.1 Required Resource(s)

Plant Functional Ecology Laboratory Manual (Lab Manual)
https://courselink.uoguelph.ca/shared/login/login.html
Available as a PDF from the course website, accessible via courselink (link provided)

Notes (Notes)
Slides from all lecture presentations, class datasets, and other resources will be posted to the course website.

3.2 Recommended Resource(s)

The Ecology of Plants (Textbook)
Gurevitch, J., Scheiner, S.M., Fox, G.A. 2006. The Ecology of Plants, 2nd Edition. Sinauer Associates, Sunderland, MA.

Available for purchase at the University Bookstore or Co-op.

A copy of this textbook is on reserve in the Library.

Writing in the Biological Sciences (Textbook)
Hofmann, A.H. 2015. Writing in the Biological Sciences, 2nd edition. Oxford University Press. 360 pp.

This is an excellent and relatively inexpensive writing manual for science students.

Available for purchase at the University Bookstore or Co-op.

A copy of this book is on reserve in the Library.

Notebook (Other)
The purchase of a laboratory or similar notebook is recommended so that you can take observations while in the field, write down data, make calculations for data analysis, and graph results.

Writing Services (Other)
http://www.lib.uoguelph.ca/get-assistance/writing
Writing services at the University of Guelph Learning Commons

3.3 Campus Resources

If you are concerned about any aspect of your academic program

Make an appointment with a program counsellor in your degree program. http://www.bsc.uoguelph.ca/index.shtml or https://www.uoguelph.ca/uaic/programcounsellors

If you are struggling to succeed academically

There are numerous academic resources offered by the Learning Commons including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills. You can also set up individualized appointments with a learning specialist. http://www.lib.uoguelph.ca/get-assistance

If you are struggling with personal or health issues:

- Counselling services offers individualized appointments to help students work through personal struggles that may be impacting their academic performance. https://www.uoguelph.ca/counselling/
- Student Health Services is located on campus and is available to provide medical attention. https://www.uoguelph.ca/studenthealthservices/clinic
- For support related to stress and anxiety, besides Health Services and Counselling Services, Kathy Somers runs training workshops and one-on-one sessions related to stress management and high performance situations. http://www.uoguelph.ca/~ksomers/

If you have a documented disability or think you may have a disability:

The Student Accessibility Services (SAS) can provide services and support for students with a documented learning or physical disability. They can also provide information about how to be tested for a learning disability. For more information, including how to register with the centre please see: https://www.uoguelph.ca/csd/

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4 Learning Outcomes

4.1 Primary Learning Outcomes

Science is a way of understanding how the world works. It allows you, through observation and experiment, to answer the WHY and HOW questions we are confronted with in trying to explain what we see in nature. Answering these questions can help us to understand why life is distributed non-randomly and to make predictions about how the natural world will change. Our goal in this course is to examine plants and plant communities scientifically so that you can:

1. Observe the functions of plants and evaluate how they evolved and why they enable plants to occupy specific habitats.
2. Evaluate the ecological mechanisms that were responsible for generating specific patterns of species composition in plant communities.
3. Identify how land use change, biological invasions and climate change, among other factors, will affect plant communities and predict how changes in plant communities affect the functioning of ecosystems.

4.2 Secondary Learning Outcomes

In addition to using knowledge, a professional biologist must also be able to obtain primary information on the structure and diversity of plant communities and communicate findings to other biologists and to the general public. Therefore, we will also practice:

1. Quantifying the composition and diversity of an unfamiliar plant community with various methodological approaches.
2. Gaining expertise with experimental design and sampling protocols for observational studies.
3. Analyzing and interpretation of primary data as well as communicating the results of research through writing.

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5 Teaching and Learning Activities

5.1 Learning Methods

Though traditional lectures can be an efficient way of communicating information from instructor to student, actively engaging and talking about the material is the best way to learn. Lectures and Labs will feature elements of 'learning by doing', which means that we will practice applying knowledge as it is introduced. **Therefore, regular attendance and participation are essential to achieving the learning outcomes of this course**.

Lectures – In lectures, I will spend time making presentations on course topics, but expect to engage in discussions with me and with your peers. Educational research suggests that concepts are easier to understand if you spend time applying them during class. Expect to spend time using the concepts I present to interpret results and make predictions. We will also spend time in data analysis workshops each week (using the data from that week's lab) in order to examine whether our results support or reject the proposed hypotheses. Through discussion, we will consider how to interpret data. These discussions will be essential preparation for writing your laboratory reports.

Laboratories – Each week, we will spend time in the field learning how to do plant ecological research. For each lab, we will present you with a research question and guide you through the design and a completion of a study to answer that question. Instructions detailing the background and methods for each lab are contained in the Laboratory Manual for the course, which is posted on the course website. **Bring the lab manual with you to laboratory periods – it is expected that you will have read the instructions, and you will need the manual to carry out data analyses during and after the lab period.** Towards the end of the semester, we will use laboratory time to provide advice for your final research project, which involves semester long monitoring of the phenology of trees found in Guelph.

5.2 Schedule of topics for Lecture and Lab

Week	Days	Activity	Details
Sept. 08	Friday	Lecture	What is plant functional ecology?
Sept. 11	M,W	Lecture	Plant identification (herbs, grasses); Historical perspectives on

			vegetation and climate.
	M,Tu	Laboratory	Lab 1: Species area curves.
	Friday	Discussion	Help session for Lab 1 (SSC 2306)
Sept. 18	M,W	Lecture	Plant identification (trees); Historical perspectives on plant communities.
	M,Tu	Laboratory	Lab 2: Sampling forest vegetation.
	Friday	Discussion	Help session for Lab 2 (SSC 2306)
Sept. 25	M,W	Lecture	Historical perspectives on plant communities.
	M,Tu	Laboratory	Lab 3: Species abundance across a resource gradient.
	Friday	Discussion	Help session for Lab 3 (SSC 2306)
Oct. 02	M,W	Lecture	Defining species, their evolution, and their habitat tolerances.
	M,Tu	Laboratory	Lab 4: Spatial patterns within populations: evidence for competition?
	Friday	Discussion	Help session for Lab 4 (SSC 2306)
Oct. 09	W	Lecture	Defining species, their evolution, and their habitat tolerances.
	M,Tu	Laboratory	NO LABS – THANKSGIVING HOLIDAY
	Friday	Discussion	Help session for Lab 4 (SSC 2306)
Oct. 16	M,W	Lecture	Water relations and the distribution of species.
	M,Tu	Laboratory	Lab 5: Predicting the future species composition of a restored woodlot.
	Friday	Discussion	Help session for Lab 4 (SSC 2306)
Oct. 23	M,W	Lecture	Water relations and the distribution of species.
	M,Tu	Laboratory	No Lab today
	Friday	Discussion	Help session for Lab 5 (SSC 2306)
Oct. 30	M,W	Lecture	Photosynthesis and the distribution of species.

	M,Tu	Laboratory	Lab: Tree phenology discussion – each group discusses hypotheses and data analysis plans
	Friday	Discussion	Help session for Lab 5 (SSC 2306)
Nov. 06	M,W,F	Lecture	Photosynthesis and the distribution of species.
	M,Tu	Laboratory	Lab: Tree phenology analysis and discussion
Nov. 13	M,W,F	Lecture	Nutrient acquisition and the distribution of species.
	M,Tu	Laboratory	Lab: Open session/final group project.
Nov. 20	M,W,F	Lecture	Linking plant function with competition and coexistence.
	M,Tu	Laboratory	Lab: Open session/final group project.
Nov. 27	M,W	Lecture	Linking plant function with competition and coexistence.
	M,Tu	Laboratory	Lab: Open session/final group project.

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6 Assessments

6.1 Written Laboratory Reports (35%)

Reports communicate and interpret the results of laboratories. You are required to submit the following lab reports:

1. Graphical results for lab 1 (2.5%)
2. Graphs and full results for lab 2 (5%)
3. Graphs and full results for lab 3 (5%)
4. Graphs, full results and discussion for lab 4 (10%)
5. Graphs, full results and discussion for lab 5 (12.5%)

Instructions and rubrics for writing these reports are in the laboratory manual.

Laboratory Reports (submitted via Dropbox on the course website). We aim to provide you with feedback on your labs so that you can use these comments to improve future lab reports. Thus, each lab is not due until comments from the previous lab have been returned to you.

Laboratory	**Due Date**
Lab 1: Species area curves.	Monday Section: September 17, 11:59 pm.

	Tuesday Section: September 18, 11:59 pm.
Lab 2: Sampling forest vegetation.	Monday Section: September 27, 11:59 pm. Tuesday Section: September 28, 11:59 pm.
Lab 3: Species abundance across a resource gradient.	Monday Section: October 11, 11:59 pm. Tuesday Section: October 12, 11:59 pm.
Lab 4: Spatial dispersion patterns.	Monday Section: October 25, 11:59 pm. Tuesday Section: October 26, 11:59 pm.
Lab 5: Predicting the future species composition of a restored forest.	Monday Section: November 8, 11:59 pm. Tuesday Section: November 9, 11:59 pm.

6.2 Phenology Data Collection (5%) & Final Group Report (20%)

The final group report describes the analysis and interpretation of the semester long class project on tree phenology.

Final Group report – Instructions for this assignment will be posted on the course website.

The preliminary spreadsheet (a list of species you will observe) is due Friday, Sept. 13 at 11:59

pm. The final spreadsheet (with the data that has been recorded from your observations) is due Saturday, Nov. 3 at 11:59 pm. **A spreadsheet must be submitted by each student in order to participate in the group project. If no spreadsheet is submitted, the mark for the group project is zero.** The final report describing your group's project is due on **Friday, November 30, 2017 at 11:59 pm**.

6.3 Final Exam on lecture material and lab projects (40%)

Questions will require you to demonstrate comprehension and application of scientific concepts introduced over the course of the semester.

Final Exam – The final exam (40%) is TBA, and will consist of questions about material presented in lectures and laboratories. Examples of these exam questions will be discussed in lecture.

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7 Course Statements

7.1 Policy on Late Submissions

All items are due on the dates shown by the specified time. Late submissions will be accepted, but will be penalized 10% per 24 hour period late after the due date/time, including weekends.

7.2 Policy on Field Safety

We will be in at field sites around the University of Guelph campus (Dairy Bush, Brown's Wood, Arboretum) for a majority of laboratory periods. You are required to review the field safety protocols listed at the end of this course outline, and then sign the accompanying waiver which acknowledges that you have read the safety information, understand the risks, and agree to participate in the field laboratories.

7.3 Policy on the use of technology in the classroom

You are welcome to bring a laptop to lectures, but use it in a manner that will not disturb those around you. Please do not use your laptop for anything other than activities related to the course. Turn your cell phones off, or put them on silent, and do not text-message during class.

7.4 Policy on Plagiarism

The University policy on academic integrity, http://www.academicintegrity.uoguelph.ca/ defines plagiarism as "…stealing and lying about it afterwards. It means using others' work and misrepresenting that work as your own without giving the author credit". Field work and some data analysis will be done in groups and we therefore expect that many of you will use the same resources, share ideas and discuss how to interpret results. Doing shared work will help you learn, but you must not engage in plagiarism or any other form of academic misconduct, as described by the University academic integrity policy, when submitting assignments. All written assignments must be the product of your own independent work. If we detect plagiarism or any other violation of the academic integrity policy, we are obliged to report it to the College of Biological Science Academic Dean, who will take disciplinary action under university guidelines.

Plagiarism detection software

In this course, we will use **Turnitin**, integrated with the CourseLink Dropbox tool, to detect

possible plagiarism, unauthorized collaboration or copying as part of the ongoing efforts to maintain academic integrity at the University of Guelph.

All submitted assignments will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism or other forms of academic misconduct. Use of the Turnitin.com service is subject to the Usage Policy posted on the Turnitin.com site.

A major benefit of using Turnitin is that students will be able to educate and empower themselves in preventing academic misconduct. In this course, you may screen your own assignments through Turnitin as many times as you wish before the due date. You will be able to see reports that show you exactly where you have properly and improperly referenced the outside sources and materials in your assignment.

7.5 Course Evaluation information (from the CCS website)

CCS now provides the U of G Online Course Evaluation System in a secure, online environment. End of semester course and instructor evaluations provide students the opportunity to have their comments and opinions form part of the information used by Promotion and Tenure Committees in evaluating the faculty member's contributions in the area of teaching. Course evaluations are now conducted through this web site: https://courseeval.uoguelph.ca/CEVAL_LOGIN.php. Login with your central email account login ID and password: Occasionally course evaluations are conducted in class. Instructors do NOT receive evaluations until the end of exam period. Furthermore, evaluations are anonymous, unless you specifically indicate you want to acknowledge your comments.

7.6 SAFETY IN ECOLOGY FIELD COURSES AT THE UNIVERSITY OF GUELPH

Many of the courses at this University involve field work in natural or semi-natural settings. Students must understand the distribution of responsibilities when this work is carried out. The University seeks to provide opportunities for an optimum training and educational experience, but it is the student's responsibility to effectively and safely exploit this opportunity. To this end, here we list the kinds of field settings to be encountered, and the attendant risks involved with these settings. We also list a series of mandatory behaviours that will ensure that the field exercises are conducted safely. Lastly, we include a requirement to sign and return the last page to us, as a written agreement on your part to follow the mandatory behaviours and accept the responsibility for any deviations from them.

Location	Risks and measures to avoid them
	-Meeting cars while walking on road. Stay to side.
Forest and Grassland	-Poison ivy. Learn what it looks like and avoid. If contact is made, wash skin and clothing as soon as possible.
	-Bees. If you are stung, contact one of the course staff

	immediately. This is especially important if you have disturbed a colony! If you are allergic to bee stings, contact the staff at the beginning of the course.
	-Tree branches, twigs, logs, dead snags. All of these can either fall on you, cause you to trip and fall, or otherwise injure you. Do not pull on dead trees, or dead snags. Do not disturb coarse woody debris. Do not climb trees.
	-Glass on ground or in soil can cut you badly. Do not dig through soil with your hands. If you get cut, contact the staff immediately and seek appropriate medical attention.
	-Lightning. Do not conduct field work if there is lightning.
	-Other people. Assaults have been reported in the Dairy Bush, Arboretum, and other University Properties. Always travel with another person. Never conduct field work alone.
	-Animal bites. Do not encourage any vertebrate to approach you. This includes both wild and domestic animals.
	-Sunstroke. Wear a hat and sunblock if long periods of time are to be spent in the open. Bring water to drink.
	-Any body of water can cause drowning. Always wear hip waders if so instructed.
River	Never enter water alone. Respect powerful currents and slippery surfaces.

	-Cold. Even in the absence of a drowning risk, falling into cold water in the fall or winter can result in hypothermia. Do not fall into cold water. Do not enter cold water alone. If you do get wet, exit the water immediately and seek assistance from the staff.
	-Infections. The rivers of the Grand River watershed are not as clean as they used to be. Who knows what lurks in the water? Do not allow the water to get in your mouth. Do not allow open wounds to contact the water. Any illness associated with contact with the water should be reported to medical personnel.
	-Slippery rocks. Avoid stepping on uneven rocks. Walk slowly and carefully. If you have a fall that causes an injury, let the staff know immediately.
Agricultural Fields	-Farm equipment. Do not sample close to the ground in active or abandoned agricultural fields without making your presence known to people using farm machinery. Be alert to approaching machinery.

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8 Department of Integrative Biology Statements

8.1 Academic Advisors

If you are concerned about any aspect of your academic program:

- Make an appointment with a program counsellor in your degree program. B.Sc. Academic Advising or Program Counsellors

8.2 Academic Support

If you are struggling to succeed academically:

- Learning Commons: There are numerous academic resources offered by the Learning Commons including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills. You can also set up individualized appointments with a learning specialist.
- Science Commons: Located in the library, the Science Commons provides support for physics, mathematic/statistics, and chemistry. Details on their hours of operations can be found at: Chemistry & Physics Help and Math & Stats Help

8.3 Wellness

If you are struggling with personal or health issues:

- Counselling Services offers individualized appointments to help students work through personal struggles that may be impacting their academic performance.
- Student Health Services is located on campus and is available to provide medical attention.
- For support related to stress and anxiety, besides Health Services and Counselling Services, Kathy Somers runs training workshops and one-on-one sessions related to stress management and high performance situations.

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9 University Statements

9.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

9.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The regulations and procedures for Academic Consideration are detailed in the Undergraduate Calendar.

9.3 Drop Date

Courses that are one semester long must be dropped by the end of the fortieth class day; two-semester courses must be dropped by the last day of the add period in the second semester. The regulations and procedures for Dropping Courses are available in the Undergraduate Calendar.

9.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

9.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required, however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance, and not later than the 40th Class Day.

More information: www.uoguelph.ca/sas

9.6 Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The Academic Misconduct Policy is detailed in the Undergraduate Calendar.

9.7 Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

9.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.
