

Course Description, BOT*3050

Plant Functional Ecology, Fall 2014. Department of Integrative Biology

I. General Information

Course Description: This course will examine fundamental and applied aspects of plant ecology, focusing on how functional traits, physiological mechanisms, life history strategies, abiotic constraints, and biotic interactions influence 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 on ecosystems. Labs will explore variation in functional aspects of plants and the structure of communities in the field. This course is especially valuable for students interested in plant or wildlife biology and environmental management. Credits: 0.5. Prerequisites: 7.50 credits including (BIOL*1040 or BIOL*1070).

Teaching Team:

Instructor: Prof. Hafiz Maherali, SSC 1472, ext. 52767, maherali@uoguelph.ca
Office hours: By appointment

Laboratory

Coordinator: Carole Ann Lacroix, SSC 2507, ext. 56444, botcal@uoguelph.ca

Teaching Assistants: Morgan Randall (mranda04@uoguelph.ca)
Jennifer Bernard (jbernard@uoguelph.ca).

Course meeting times:

Lecture: 10:30 - 11:20 AM, MWF. Monday and Wednesday classes will be in MCKN 031 unless otherwise stated. Friday sessions will be in SSC 2306.

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

NOTE: There will be no laboratories during the week of Thanksgiving.

II. Course Goals

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 daily. 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.

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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.

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:

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

III. Course Content

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 as well as consider the design of future studies that follow up on the results. 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. All lab work will be done in groups, which will be established during the first lab. 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.

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Schedule of topics for Lecture and Lab

<u>Week</u>	<u>Days</u>	<u>Activity</u>	<u>Details</u>
Sept. 5	Friday	Lecture	What is plant functional ecology?
Sept. 8	M,W	Lecture	Plant identification (herbs, grasses); Historical perspectives on vegetation and climate.
	M,Tu	Laboratory	Lab 1: Species area curves.
Sept. 15	M,W	Lecture	Plant identification (trees); Historical perspectives on plant communities.
	M,Tu	Laboratory	Lab 2: Sampling forest vegetation.
Sept. 22	M,W	Lecture	Historical perspectives on plant communities.
	M,Tu	Laboratory	Lab 3: Species abundance across a resource gradient.
Sept. 29	M,W	Lecture	Defining species, their evolution, and their habitat tolerances.
	M,Tu	Laboratory	Lab 4: Spatial patterns within populations: evidence for competition?
Oct. 6	M,W	Lecture	Water relations and climate.
	M,Tu	Laboratory	Lab 5: Predicting the future species composition of a restored woodlot.
Oct. 13	W	Lecture	Water relations and climate.
	M,Tu	Laboratory	NO LABS – THANKSGIVING HOLIDAY
Oct. 20	M,W	Lecture	Photosynthesis and climate.
	M,Tu	Laboratory	Lab 6: Dispersal mechanisms and the distribution of species.
Oct. 27	M,W	Lecture	Nutrient acquisition.
	M,Tu	Laboratory	Lab 7: Tree phenology discussion – each group discusses hypotheses and data analysis plans
Nov. 3	M,W	Lecture	Linking plant function with competition and coexistence.
	M,Tu	Laboratory	Lab 8: Tree phenology analysis and discussion
Nov. 10	M,W	Lecture	Trophic interactions: Herbivores and mutualists.
	M,Tu	Laboratory	Lab 9: Open session/final group project.
Nov. 17	M,W	Lecture	Disturbance, dispersal and succession.
	M,Tu	Laboratory	Lab 10: Open session/final group project.
Nov. 24	M,W,Th	Lecture	Species and Ecosystems; Synthesis and Review.
	M,Tu	Laboratory	Lab 11: Open session/final group project.

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IV. Course Resources

Recommended Textbooks:

1. 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.*
2. Hofmann, A.H. 2013. Writing in the Biological Sciences. Oxford University Press. 290 pp. *Available for purchase at the University Bookstore or Co-op. This is an excellent and relatively inexpensive writing manual for science students. A copy of this book is on reserve in the Library.*

Required resources for laboratories:

3. The **Plant Functional Ecology Laboratory Manual** is available as a PDF from the course website, accessible via courselink (<https://courselink.uoguelph.ca/shared/login/login.html>).

Recommended resources for writing lab reports:

4. 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, graph results, and demonstrate your thinking as you interpret your results. Notebooks with graph paper for drawing graphs of analyzed data will be the most useful to have.
5. Writing services at the University of Guelph Learning Commons: http://www.lib.uoguelph.ca/assistance/writing_services/

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

V. Methods of Assessment

1. Written laboratory reports (35%). Reports communicate and interpret the results of laboratories. You are required to submit the following lab reports:
 - a. Graphical results for lab 1 (2.5%)
 - b. Graphical results for lab 2 (2.5%)
 - c. Graphs and full results for lab 3 (5%)
 - d. Graphs and full results for lab 4 (5%)
 - e. Graphs, full results and discussion for lab 5 (10%)
 - f. Graphs, full results and discussion for lab 6 (10%)Instructions and rubrics for writing these reports are in the laboratory manual.
2. Phenology data collection (5%) and final group report (20%). The final group report describes the analysis and interpretation of the semester long class project on tree phenology.

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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.

Due Dates

1. Laboratory Reports (submitted via Dropbox on the course website).

Laboratory	Due Date
Lab 1: Species area curves.	Monday Section: September 15, 11:59 pm. Tuesday Section: September 16, 11:59 pm.
Lab 2: Sampling forest vegetation.	Monday Section: September 22, 11:59 pm. Tuesday Section: September 23, 11:59 pm.
Lab 3: Species abundance across a resource gradient.	Monday Section: September 29, 11:59 pm. Tuesday Section: September 30, 11:59 pm.
Lab 4: Spatial dispersion patterns.	Monday Section: October 6, 11:59 pm. Tuesday Section: October 7, 11:59 pm.
Lab 5: Predicting the future species composition of a restored forest.	Monday Section: October 20, 11:59 pm. Tuesday Section: October 21, 11:59 pm.
Lab 6: Dispersal mechanisms and the distribution of species.	Monday Section: November 3, 11:59 pm. Tuesday Section: November 4, 11:59 pm.

2. 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 **Monday, Sept. 15 at 11:59 pm**. The final spreadsheet (with the data that has been recorded from your observations) is due **Oct. 30 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 28 at 11:59 pm**.

3. Final Exam – The final exam (40%) is on **Friday, December 5 at 8:30 am**, and will consist of short answer, data analysis and short essay questions about material presented in lectures and laboratories. Examples of these exam questions will be discussed in lecture.

VI. Course and University Policies

The Academic Calendar is the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs: <http://www.uoguelph.ca/registrar/calendars/index.cfm?index>

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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% if submitted within 12 hours of the due date and time. For each subsequent day (24 hour period), beginning 12 hours after the due date/time, submissions will incur a 20% penalty per day late, including weekends.

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.

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.

When you are unable to meet a course requirement

Students who miss exams or assignments will receive a grade of zero for that work (missed final exams automatically result in consideration by academic review). The grade will remain zero until the student is granted Academic Consideration from their program counselor for documented medical or other legitimate, compassionate reasons for missing the assigned work. If you are 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, student ID number, and e-mail contact. See the undergraduate calendar for information on regulations and procedures for Academic Consideration:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

If Academic Consideration is granted, the student will be permitted to submit the assigned work. No changes to the evaluation scheme will be made without written consent of all students in the course and approval of instructors. Unofficial deferments of any scheduled evaluation will not be granted.

Drop Date

The last date to drop one-semester courses, without academic penalty, for Fall 2014 is Thursday, October 30, 2014. For regulations and procedures for Dropping Courses, see the Undergraduate Calendar:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

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.

E-mail Communication

As per university regulations, all students are required to check their <uoguelph.ca> e-mail account regularly. E-mail is the official route of communication between the University and its students. All emails to course instructors must be sent from your <uoguelph.ca> e-mail account.

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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.

Academic misconduct and plagiarism

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.

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:
<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

The University policy on academic integrity (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 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 when submitting assignments. If we detect plagiarism, we will be forced to assign a grade of zero for the item and take other disciplinary action under university guidelines.

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 your responsibility to verify the academic integrity of 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. If in doubt - ASK!

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

Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the

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University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Centre for Students with Disabilities as soon as possible. For more information, contact CSD at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: <http://www.csd.uoguelph.ca/csd/>

VII. 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.learningcommons.uoguelph.ca/>

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 Centre for Students with Disabilities (CSD) 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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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
Forest and Grassland	<p>-Meeting cars while walking on road. Stay to side.</p> <p>-Poison ivy. Learn what it looks like and avoid. If contact is made, wash skin and clothing as soon as possible.</p> <p>-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.</p> <p>-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.</p> <p>-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.</p> <p>-Lightning. Do not conduct field work if there is lightning.</p> <p>-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.</p> <p>-Animal bites. Do not encourage any vertebrate to approach you. This includes both wild and domestic animals.</p> <p>-Sunstroke. Wear a hat and sunblock if long periods of time are to be spent in the open. Bring water to drink.</p>
River	<p>-Any body of water can cause drowning. Always wear hip waders if so instructed. Never enter water alone. Respect powerful currents and slippery surfaces.</p> <p>-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.</p> <p>-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.</p> <p>-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.</p>
Agricultural Fields	<p>-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.</p>