

**University of Guelph  
College of Biological Science  
Department of Integrative Biology**

**COURSE OUTLINE**

**Plant Diversity and Evolution (BOT\*3710)  
Winter 2014**

**Course Goal**

This course will provide an introduction to the identification and interpretation of plant biodiversity. Students will explore the taxonomic diversity of flowering plants and investigate evolutionary hypotheses to explain variation in their reproductive, life history and growth characteristics. The principles and methods of evolutionary biology will form the underlying framework for the course. The course will be of value to students interested in biodiversity, the practical aspects of identifying plants, and understanding the variety of forms and life-styles observed among plants. (prerequisites: 7.5 credits including BIOL\*1040 or 1070)

**Teaching Team**

Professor	Dr. Brian Husband, Office - SCIE 1477, <a href="mailto:bhusband@uoguelph.ca">bhusband@uoguelph.ca</a> , ext. 54790. Office hours: by appointment
Lab Instructor	Carole Ann Lacroix, Office - SCIE 2507, <a href="mailto:botcal@uoguelph.ca">botcal@uoguelph.ca</a> , ext. 56444. Office hours: by appointment
Teaching Assistant	TBA

**Course Schedule**

Lectures	1:00–2:20 Tuesday & Thursday, MACK 224 (note: some Thursday lecture periods will be used as labs. Please check the lecture schedule below)
Labs	2:30-5:20 Thursday, SCIE 3315

**Learning Outcomes** By the end of this course, students should be able to:

- 1) Recognize the major families of flowering plants in Ontario and their distinguishing morphological/ecological attributes.
- 2) Identify the major flowering plant families using taxonomic keys.
- 3) Identify select genera and species using taxonomic keys.
- 4) Interpret the evolutionary history of plants through an examination of phylogenetic trees.
- 5) Identify key features (morphology, life history, reproductive biology) of plants and their impact on evolutionary processes including natural selection, gene flow, genetic drift, speciation and adaptation.
- 6) Critically evaluate empirical evidence that tests hypotheses for the evolution of key vegetative, reproductive and genetic attributes of plants.
- 7) Interpret the patterns and causes of trait evolution in plants using phylogenetic information and comparative analytical software.

## Course Resources

**Textbook:** For lectures there is no required text as we will be using articles from the scientific literature (see D2L site for assigned readings). For labs: Field Manual of the Michigan Flora, Voss E.G. & A.A. Reznicek, Cranbrook Institute of Science, is strongly recommended, and is available in the UofG Bookstore and Coop Bookstore.

**Courselink:** This course will make use of the University of Guelph's course website on D2L (via Courselink). Consequently, you are responsible for all information posted on the Courselink page for BOT\*3710. Please check it regularly.

**Undergraduate Calendar:** is the source of information about the University of Guelph's procedures, policies and regulations, which apply to undergraduate programs. It can be found at: <http://www.uoguelph.ca/registrar/calendars/undergraduate/current/>

## Course Structure

The course is organized according to the philosophy that we learn best about biodiversity by: 1<sup>st</sup>, learning to recognize and identify different groups of plants; 2<sup>nd</sup>, observing character variation within and between these groups; and 3<sup>rd</sup>, interpreting this diversity by investigating the evolutionary causes of variation through experimental and comparative approaches. As a result, the course emphasizes classification and identification in the early stage and evolutionary interpretation in the latter stage.

The lab and lecture components of this course are complementary. Lectures will be given on Tuesday and most Thursdays. Occasionally, the Thursday lecture period will be used for additional lab-related activities. Lecture outlines will be posted the night before a lecture. They should not be treated as a substitute for the lectures; instead, they should be used to help you prepare for lectures and should be augmented with careful lecture notes.

### *Lectures*

Lectures will comprise some presentations by the instructor but students will also spend time in class period learning by discussing papers from the primary literature, interpreting data, generating hypotheses. I teach this way because research indicates that practicing some of the things that professional scientists do is a VERY effective way to learn biology, relative to listening to lectures. One consequence of this approach is that if you do not attend lecture, or attend but do not participate in class activities, then it will be difficult for you to learn the concepts and critical thinking skills that you will need to succeed.

### *Labs*

Approximately half of the labs will be spent learning the characteristics and associated terminology of some of the most common, important, and interesting families of flowering plants. You will apply this knowledge to use professional taxonomic keys to identify vascular plants. Learning family characteristics, by allowing you to group related species together, makes it much easier to identify plants. We will spend the remaining lab periods applying contemporary comparative methods for testing adaptive hypotheses about the evolution of plant traits that we see in the wild.

**Tentative Lecture and Lab Schedule** (please note that some Thursday lecture periods will be used for labs)

Week	Date	Lecture Topic (Tues,Thurs)	Lab Topic (Thurs)
1	Jan 7	Introduction to plant biodiversity	
	Jan 9	<i>No lecture; lab starts at 1pm in the scheduled lab room</i>	Classification & Identification; Morphology and use of keys: Magnoliaceae, Ranunculaceae
2	Jan 14	Plant classification	
	Jan 16	<i>No lecture; lab starts at 1pm in the scheduled lab room</i>	Classification & Identification: Caryophyllaceae, Papaveraceae, Brassicaceae
3	Jan 21	Origins of plant diversity: phylogeny and evolutionary history	
	Jan 23	<i>No lecture; lab starts at 1pm in the scheduled lab room</i>	Classification & Identification: Fabaceae, Rosaceae, Apiaceae (LAB QUIZ)
4	Jan 28	Origins of plant diversity: insights from angiosperm phylogeny	
	Jan 30	<i>50 min lecture; lab starts at 2pm in the scheduled lab room</i>	Classification & Identification: Euphorbiaceae, Boraginaceae, Lamiaceae, Onagraceae
5	Feb 4	Why so many species? Patterns of species diversification & its causes	
	Feb 6	<i>50 min lecture; lab starts at 2pm in the scheduled lab room</i>	Classification & Identification: Caprifoliaceae, Apocynaceae, Asteraceae (LAB QUIZ)
6	Feb 11	Geography of evolutionary diversification	
	Feb 13	<b>Plant Family Profile Assignment due</b> ; <i>lab starts at 2pm in the scheduled lab room</i>	Classification & Identification Alismataceae, Liliaceae, Juncaceae
Winter Break	Feb 17-21	NO LECTURES	NO LAB
7	Feb 25	Trait evolution: comparative & experimental approaches	
	Feb 27		Classification & Identification Poaceae, Cyperaceae
8	Mar 4	Evolutionary transitions in gender	
	Mar 6	Evolutionary transitions in gender	<b>PLANT IDENTIFICATION – LAB EXAM</b>
9	Mar 11	Evolutionary transitions in pollination	
	Mar 13	Evolutionary transitions in pollination	Comparative analysis: Define project
10	Mar 18	Evolutionary transitions in mating	
	Mar 20	Evolutionary transitions in mating	Comparative analysis: Collect trait & phylogenetic data, complete analysis tutorial
11	Mar 25	Evolutionary transitions: polyploidy	
	Mar 27	Evolutionary transitions: polyploidy	Comparative analysis: complete analysis of class data
12	Apr 1	Evolutionary transitions: role of chance	
	Apr 3	Evolutionary transitions: role of chance	Comparative analysis: <b>ASSIGNMENT DUE</b>

## Methods of Assessment

Assessment	Value (% of final grade)	Date	Learning Outcome (see above)	Course activity
Morphology & Identification quizzes	2 x 5% = 10%	Jan 23 Feb 6	1, 2, 3 1, 2, 3	Labs 1-3 Labs 4-5
Identification Final	30%	Mar 6	1, 2, 3	Labs 1-6
Family Profile Assignment	15%	Feb 13	4	Lec 2-6
Comparative Analysis Assignment	20%	Apr 3	7	Labs 9 – 12 Lec 7
Final exam	25%	TBA	4,5,6,7	Lec 1 – 11

Grades will be assigned according to the standards outlined in the U of G Undergraduate Calendar (p40-41).

## Description of Assessment

*Plant morphology and identification:* two small quizzes and a final exam will assess your understanding of basic plant morphological terms and their use in plant identification.

*Plant family profile:* you will profile one plant family, research its distinguishing features and its place in the botanical tree of life. This will be written as a 5 page report. A template will be provided.

*Comparative analysis of trait evolution:* for the last 4 weeks of labs, you will participate in a comparative analysis of an adaptive hypothesis. You will be expected to plan your study, collect data from the literature, analyze the data using contemporary character evolution methods and interpret the results. This will be written as a 6-10 page scientific paper.

*Final exam:* held during the final exam period, this exam will present a series of short cases. You will be assessed on your ability to evaluate the information and interpret it in light of the studies you have examined in lecture.

## Important Dates

JAN 7 (Tues.): first lecture in BOT\*3710, 1:00 pm

JAN 9 (Thurs.): first lab in BOT\*3710, 1:00 pm (instead of lecture)

JAN 23 (Thurs): first lab quiz

FEB 6 (Thurs): second lab quiz

FEB 17-21 (Mon – Fri): Winter break: NO CLASSES

MAR 6 (Thurs): Plant Identification – Lab Exam

MAR 7 (Friday): Course drop deadline (40<sup>th</sup> class day)

TBA: Final exam (take home, due April 15, 2014, 8:30-10:30, Room TBA)

## Course & University Policies

### 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, and be prepared to provide supporting documentation. 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>

### 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 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](mailto:csd@uoguelph.ca) or see the website: <http://www.csd.uoguelph.ca/csd/>

### 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:

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

### 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.

### Drop Date

The last date to drop one-semester Winter 2013 courses, without academic penalty, is **Friday March 8**. 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.

### Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded in any electronic media without the permission of the presenter, whether the instructor, a classmate or guest lecturer.

### Grading

If you are absent from classes during the semester, you will be expected to make up missed lecture and laboratory material on your own. Assignments handed in late will be penalized 5% for every day that it is late.

### **General 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/>