

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

**BIOL\*3010 Lab and Fieldwork in Ecology  
Fall 2018**

**I. General Information**

**Course Description:**

This course is designed to help students formulate and critically evaluate research questions about ecological processes, plan studies to answer these questions and communicate the results of these studies. Students will gain experience in experimental design, sampling, data analysis, and interpretation of data. Local field sites will be used for research. There is considerable emphasis on group decision-making and individual writing in this course because we want you to practice critical thinking and communication skills as well as use the process of writing to evaluate the logic of ideas. Student evaluation is based on project reports, a laboratory notebook and peer reviews.

**Teaching Team:**

Instructor: Rob McLaughlin, 2456 SSC, x53620, [rlmclaug@uoguelph.ca](mailto:rlmclaug@uoguelph.ca)

Office hours: There will be ample opportunity to consult with instructors during class time. Meetings outside of class time will be scheduled by appointment.

Teaching Assistants: TBD

**Course Meeting Times:**

Laboratories: T,Th 08:30 – 09:50, SSC 2306  
W 14:30 – 17:20, SSC 2306

**II. Course Goals**

**Learning Outcomes:**

By the end of this course, you should be able to demonstrate the following learning outcomes:

1. Distinguish mechanistic research (why/how is it there?) from descriptive research (who/what is there?).
2. Apply the scientific method, develop hypotheses and predictions, and observe

and sample biological organisms, their features (e.g., morphology), and their surroundings.

3. Use your understanding of ecological processes from prior courses (BIOL\*2060) to create a research study that advances understanding about one or more ecological processes in a local natural system.
4. Critically evaluate the scientific and societal value of potential research questions.
5. Analyze scientific literature to motivate your research question, hypotheses and conclusions, and help assess their broader scientific and societal significance.
6. Incorporate uncertainty during the design and implementation of a research study. This means measuring, testing, accounting for, and acknowledging uncertainty throughout the scientific process.
7. Use prior knowledge from statistics courses (STAT\*2040 or STAT\*2230) to summarize, compare, and communicate patterns in collected data and evaluate the quality of evidence.
8. Practice logic- and evidence-based approaches to reach defensible conclusions.
9. Collaborate to identify and answer research questions.
10. Constructively critique your work and that of your peers and revise your work using the constructive criticism of your peers and instructors.
11. Communicate science effectively by writing about your original research contribution. Practice writing 'with the reader in mind', including mastery of structural and grammatical tools to effectively communicate the rationale and importance of your study, and the implications of your findings.

### **III. Course Content**

#### **Learning Methods:**

The course is designed on the principles of active collaborative learning. It is not a typical lecture-based offering. Collaborative learning involves students working in small groups toward a common scholarly goal. Students will be immersed in performing and communicating original ecological research of their choice (within limits of time and available equipment). They will develop and carry out collaborative ecological studies involving collection and analysis of original data, and manuscript writing. There are no traditional lectures or labs (i.e., there is no real distinction between what we do during Tuesday/Thursday and Wednesday periods). Students can expect up to **6 contact hours** per week with faculty and/or teaching assistants, and to invest a total of **15 hours**

**per week** designing, conducting, and writing reports on research projects. Class time will be devoted to discussions and exercises supporting critical thinking, problem solving and writing skills.

**Schedule of Topics:**

A schedule of topics is provided below. Due to the nature of the course, this schedule may be changed to adapt to the needs of student-driven research projects. Any changes of this document will be posted on the course website.

Unless otherwise noted, the chapters and pages in the assigned reading refer to the course textbook or are posted to Courselink under the “Readings” folder.

Date	Day	Topic	Assigned Reading
6 Sept	Th	Introduction to course; What are we doing here? What is Science? How do Ecologists do Science?	
11 Sept	T	What is a hypothesis? What is a prediction?  Introduction to Constructive Criticism	Hutto. 2012. Rosen. 2016.
12 Sept	W	Field trip to the Arboretum, make observations and propose hypotheses. Arboretum website: <a href="http://www.uoguelph.ca/arboretum">http://www.uoguelph.ca/arboretum</a>	“ <a href="#">Picking a Question</a> ”
13 Sept	Th	Workshop: What makes a good research question? Workshop & Brainstorm: What are your research questions? Develop and critique a ‘long’ list of research questions.	List of questions posted to Courselink
18 Sept	T	Form small groups around specific questions. A group should have more than one question in mind (primary and back-ups). Develop a plan to collect preliminary data, which could include i) quantitative observations to verify a pattern you observed and/or ii) a pilot project to see if your question is feasible.  Submit your plan to instructors by the end of class. You will get feedback before Wednesday’s lab.	Lepczek + Donnelly. 2011.
19 Sept	W	Field trip to Arboretum. Do the field work you planned on Tuesday!	

20 Sept	Th	<b>Assignment 1 due, 24 September.</b> Annotated bibliography of 3 references related to their research question via the class discussion board.	
25 Sept	T	Refine your hypotheses within your group, using the literature you discovered over the weekend.  <b>Assignment 2 due Sept 29: Group proposal with short background (3-5 sentences) that describes rationale for hypotheses, hypotheses, predictions, graphs of expected relationships between variables, summary of study design methods, datasheet, and references used in background and methods, due at the beginning of class.</b> Include names and ID# of group members.	
26 Sept	W	Try out your proposed methods; record your data and develop a plan for sharing your data with your group.	Setting up <a href="#">google drive</a> and <a href="#">sharing documents and spreadsheets</a>
27 Sept	Th	Groups should be setting up field work, collecting data, or working on revising hypotheses, predictions, methods based on yesterday's field experience and our comments on your research plans.	
2 Oct	T	Workshop: How to write the Introduction of a scientific paper.  Be wary of plagiarism, Chapter 4 provides good examples of the difference between plagiarism and paraphrasing.	"The Science of Scientific Writing" Reading posted to Courselink. Chapters 1, 2 & 3; Comments on your writing will reference these chapters.
3 Oct	W	Data collection in the field.	
4 Oct	Th	If consultation not needed, groups should be in the field collecting data.	
9 Oct	T	Fall Study Break Day	

10 Oct	W	Data collection. Instructors will be available in the field for consultation and to distribute equipment as needed.	
11 Oct	Th	Instructors available for consultation. One 10 minute appointment available for each group.  If consultation not needed, groups should be in the field collecting data.	
16 Oct	T	<b>Assignment 3: Introduction section of the paper is due at the beginning of class (this is completed individually).</b> Workshop: How to write the Methods of a scientific paper.	Review Chapters 1-4; Chapters 6-9.  Comments on your writing will reference these chapters.
17 Oct	W	Fieldwork; data collection. Instructors will be available in the field for consultation and to distribute equipment as needed.	
18 Oct	Th	Fieldwork; data collection.	
23 Oct	T	Fieldwork; data collection. Instructors will be available in the field for consultation and to distribute equipment as needed.	
24 Oct	W	Fieldwork; data collection. Instructors will be available in the field for consultation and to distribute equipment as needed.	
25 Oct	Th	<b>Assignment 4: Methods section of the paper is due at the beginning of class (this is completed as a group).</b> Feedback on the Introduction section. Instructors available for consultation. If consultation not needed, groups should be in the field collecting data.	
30 Oct	T	Fieldwork; data collection. Instructors will be available in the field for consultation and to distribute equipment as needed.	
31 Oct	W	Fieldwork; last day of data collection. All materials removed from the field and equipment returned.	

1 Nov	Th	Feedback on the Methods section. Instructions on how to submit your assignments to the Peer Evaluation, Assessment and Review (PEAR) system.	
6 Nov	T	<b>Revised Introduction due for peer review. An Introduction section must be submitted in order to participate in Assignment 5.</b> Class discussion: What are the characteristics of a good critic? Class discussion: What is peer review? How do Ecologists use peer review to improve science?	Consult assignment instructions posted to the course website.
7 Nov	W	Data analysis workshop! All group members are expected to attend their scheduled workshop.	Chapters 5 and 6
8 Nov	Th	Data analysis and peer review consultation as needed.	
13 Nov	T	Workshop: How to write the Results section of a scientific paper. Data analysis consultation as needed.	
14 Nov	W	<b>Assignment 5: Peer reviews due, submitted through PEAR.</b> Data analysis consultation as needed.	
15 Nov	Th	Instructors available for consultation.	
20 Nov	T	<b>Assignment 6: Results sections due at the beginning of class (this is completed as a group).</b>	
21 Nov	W	Instructors available for consultation.	
22 Nov	Th	Instructors available for consultation. Workshop: How to write the Discussion section.	
27 Nov	T	Results sections returned with general feedback Instructors available for consultation.	

28 Nov	W	<p>Constructive criticism and making proposals to solve problems.</p> <p>Challenge: How would you improve this course? Oral proposals submitted through small group workshops.</p> <p>Class will vote on the best solution and the group with the winning idea gets a prize!</p> <p>Instructors available for consultation after class activity</p> <p><b>Assignment 7: Lab notebooks due.</b></p>
29 Nov	Th	<p>Last class day for BIOL 3010; Instructors available for consultation.</p>

---

#### IV. Course Resources

##### Course Textbook:

Hofmann, A.H. 2018. Writing in the Biological Sciences. Oxford University Press, 3<sup>rd</sup> Edition. 368 pp.

This inexpensive guide is easy-to-use and cleverly designed. It outlines good practices for writing, data analysis, and results presentation that will be useful for BIOL\*3010 as well as for all of your other science courses. Feedback on written work will be specifically linked to elements in this book and so will aid you in revisions of your work.

Other resources for writing lab reports:

Writing services at the University of Guelph Learning Commons:

[http://www.lib.uoguelph.ca/assistance/writing\\_services/](http://www.lib.uoguelph.ca/assistance/writing_services/)

##### Field/Lab Notebook:

**The purchase of a bound laboratory or similar notebook is required** to record your progress while designing, pursuing, and completing your research project. Notebooks with graph paper for drawing graphs of analyzed data will be the most useful. In your field/lab notebook, record:

- contact information for you and your collaborators
- summaries of all project activities carried out while in the lab, field, or elsewhere, and all data collected. Each entry should have a date, beginning and end times, a **description** of where you were and what you did, **interpretation** of how that activity relates to your project, and **reflection** on appropriate next steps and why. These activities should include:

- all of your thinking as you design your research question, hypotheses and predictions, methods, identify and solve problems throughout, interpret your statistical results, and come to conclusions about your study
- summaries and analyses of relevant scientific literature that you may reference in your written reports
- field and lab activities and group discussions
- calculations for data analysis, preliminary and final graphical results, with references to where your data and saved analyses are stored, e.g. hard drive name/folder names/file names

Laboratory notebooks will be graded at the end of the course. We will be looking for evidence of a ‘narrative’ that shows a beginning (e.g., goals/questions, hypotheses, predictions, etc.) – middle (method and pursuit of data and relevant literature, etc.) – and end (analyses, conclusions, uncertainties, etc.). The absence of these elements in your notebook will result in lower grades. Think of your notebook as a ‘road map’ roughly showing your engagement with and thinking about all aspects of your research. The more complete and expressive of YOUR creativity, the better. Class notes will be posted to the course website when necessary.

## V. Methods of Assessment

Assignment	Allocation	Learning Outcomes Assessed
1. Annotated Bibliography (individual)	NA	1,2,3
2. Proposal (group)	10	1,2,3,5,9,10
3. Introduction (individual)	10	1,2,3,4,5,6
4. Methods (group)	10	1,2,5,6,7,8,9
5. Peer Evaluation of Intro (individual)	10	1,2,3,5,7,8,10,11
6. Results (group)	10	1,3,4,5,8,9,10,11
7. Field/Lab Book	5	1,2,3,5,7,8,10,11
8. Final Research Report (individuals)	30	1,2,3,5,7,8,10,11
9. Peer & self-assessment of participation	15	10
Total	100	



## Important Dates:

First Day of Class	6 Sep
A1. Annotated Bibliography due	24 Sep
A2. Group proposal due	27 Sep
A3. Introduction due	16 Oct
A4. Methods due	25 Oct
Fortieth class day	2 Nov
Introduction and Methods for peer review submitted to PEAR	6 Nov
A5. Peer <b>reviews</b> of Introduction submitted to PEAR	14 Nov
A6. Results due	20 Nov
A7. Lab Notebook	28 Nov
A8. Final Research Report due	10 Dec
A9. Peer evaluation of <b>group</b> due in PEAR	11 Dec

## VI. Course and University Policies

### Grading

Grading of your coursework will be conducted in a manner consistent with the definitions of grades provided in the university calendar. You should familiarize yourself with these definitions: <http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-grds-proc.shtml>

### Due dates

Assignments and project components are to be submitted on the due date specified above via the appropriate method for the assignment (Courselink, PEAR, in class). A penalty of 10% per day will be applied to late submissions. Group assignments will entail an evaluation of group members. This evaluation will be used to adjust your grade up or down based on your contribution to the group component of the project. Students who fail to complete these evaluations will be assigned a grade of 0 for the participation component of the assignment. Further details will be provided in class.

### Feedback

Feedback is always welcome. You can provide it in class, via email, or, for those of you would prefer to remain anonymous, we will provide opportunities in class and on-line.

### Policy on Field Safety

We will be in at field sites around the University of Guelph campus 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.** Students should always perform work in the field in groups of at least 2 students.

### **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 courses, without academic penalty, is the 40<sup>th</sup> class day (**10 March** 2016 for the Winter 2017 semester). To confirm the actual date, please see the schedule of dates in the Undergraduate Calendar. For regulations and procedures for Dropping Courses, see:

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c03/c03-wintersem.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 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.

## **Campus Resources**

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>

*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/>

**Course Description, BIOL\*3010, Fall 2016**  
**Laboratory & Field Work in Ecology, Department of Integrative Biology**

<b>SAFETY IN ECOLOGY FIELD COURSES AT THE UNIVERSITY OF GUELPH</b>	
<p>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.</p>	
Location	Risks and measures to avoid them
Forest and Grassland	<ul style="list-style-type: none"> <li>-Meeting cars while walking on road. Stay to side.</li> <li>-Poison ivy. Learn what it looks like and avoid. If contact is made, wash skin and clothing as soon as possible.</li> <li>-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.</li> <li>-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.</li> <li>-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.</li> <li>-Lightning. Do not conduct field work if there is lightning.</li> <li>-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.</li> <li>-Animal bites. Do not encourage any vertebrate to approach you. This includes both wild and domestic animals.</li> <li>-Sunstroke. Wear a hat and sunblock if long periods of time are to be spent in the open. Bring water to drink.</li> </ul>
River	<ul style="list-style-type: none"> <li>-Any body of water can cause drowning. Always wear hip waders if so instructed. Never enter water alone. Respect powerful currents and slippery surfaces.</li> <li>-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.</li> <li>-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.</li> <li>-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.</li> </ul>

**Course Description, BIOL\*3010, Fall 2016**  
**Laboratory & Field Work in Ecology, Department of Integrative Biology**

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.
------------------------	---