

Department of Biology Course Outline

BIOL 3250, Experimental Design For Environmental And Evolutionary Biology
Fall 2017

Course Description

This course examines advanced concepts associated with the design and implementation of experiments in environmental and evolutionary biology. Both basic and applied designs are described and major contemporary developments summarized.

Prerequisites

Prerequisites: SC/BIOL 2060 3.00 or an equivalent statistics course.

Course Instructors and Contact Information

Instructor: Dr. Richard Vogt
Email: vogtr@yorku.ca

Office Hours: Office hours will be kept according to appointments made by students by prior arrangement. To set appointments, please contact the instructor by email, or make arrangements before or after lecture.

Schedule

Lectures: Thursday (180 min) @ 11:30
Lab 1: Wednesday (180 min) @ 14:30
Lab 2: Thursday (180 min) @ 14:30

Evaluation

Materials associated with lectures, including Lecture Test, are valued at 55% and Labs valued at 45%.

20% - Lab Exercises
10% - Grant Proposal
15% - Paper Critique
30% - Lecture Test
25% - Lab Report

Note: Final course grades may be adjusted to conform to Program of Faculty grades distribution profiles.

Important Dates

Fall Reading Days: Oct 26-29
First Class – September 7
First Lab – September 20/21
Last Class – November 30

Due Dates for Lab Exercises:

Lab Exercise 1 – September 27/28
Lab Exercise 2 – October 4/5
Lab Exercise 3 – November 15/16
Lab Exercise 4 – November 22/23

Lab Report – November 30

Due Dates for other Exercises and Examinations

Paper Critique – Presentation Dates Range from October 19-November 30. First come, first served.
Grant Proposal – October 19

Lecture Exam – November 9th

NOTE: for additional important dates such as holidays, refer to the “Important Dates” section of the Registrar’s Website at <http://www.yorku.ca/yorkweb/cs.htm>

Resources

Lecture Material	Slides provided by the instructor
Textbook	‘Experimental design for the life sciences’, fourth edition, By Ruxton & Colegrave, Oxford University Press
Lab Instruction Sheets	Provided by the instructor
Readings	Provided by the instructor and teaching assistant

Learning Outcomes

Upon successful completion of this course, students should be able to:

1. Understand the core concepts of experimental design for any natural science experiment
2. Understand key terminology, semantics, and experimental design philosophies
3. Critically assess experiments
4. Provide visual heuristics and workflows for experiments
5. Design and execute an effective experiment
6. Effectively execute and communicate a critique of a paper published in the primary research literature
7. Give a concise oral presentation to a group of their peers
8. Write a focused grant proposal suitable for submission to funding agencies.

Course Content

Experiments are an invaluable tool for helping scientists explore and better understand the workings of the natural world. This course will outline the important terminology and concepts that you will need to start using experiments to support your own work. These skills will be valuable no matter where you ultimately look for employment. The lectures will present principles of experimental design and will outline the key terms needed to understand experimental science. In labs, you will practice designing and conducting your own experiments, both in the field and in the laboratory. You will work through both pre-designed exercises and self-directed research projects, being given the chance to design your own experiments from scratch.

You will also be given tools to critically analyze experiments and will have the opportunity to provide critiques and suggestions for improvement for already published experiments. You will additionally learn how to write a grant proposal to get practice in seeking funding to conduct your own research. Both of these exercises will help you to refine your science communication skills, in both oral and written formats.

Lectures will include both traditional professor-led instruction, and class participation. This part of the class will be evaluated using a combination of short and long-answer questions.

General topics covered in this class include:

1. Importance of experimental design
2. Creation of well-defined hypotheses
3. Between-individual variation, replication, and sampling
4. Different types of experimental design
5. Taking measurements
6. Practical applications of experimental design: research and outreach
7. Ethics and Experiments
8. Field studies and Manipulative Experiments

Laboratory Schedule:

1. Ecological sampling and measurement (Sep 20,21)
2. Experimental Design: finding inspiration on campus! (Sep 27,28)
3. Experimental Design for Lab Report (Oct 4/5, 11/12, 18/19, Nov 1/2)
4. Experimental Design for Ecology and Evolution (Nov 9)
5. Ethics and Experiments (Nov 16)

Experiential Education and E-Learning

Experiential education: Students will engage in hands-on work, in both the field and in the lab. Students will participate in class discussions to break down lecture material and generate ideas and concepts for use in the laboratory component.

E-Learning: Students will have the chance to explore the primary literature using bibliographic databases and search engines.

Other Information

Expectations: Attendance of lectures is mandatory because they will provide an opportunity to interact with the lecture material and participate in brainstorming of ideas for use in the laboratories. Information and insights that emerge from class discussion during lectures is considered potentially testable.

Course Policies

If an in-class exam is missed for a valid, documented reason, the student will not receive a 0 grade if the following conditions are met: (1) the course director is notified within one week, and (2) all relevant documents are provided within one week, ideally at the next lecture.

To ensure fairness, all assignments are due on the dates specified, and a 20% penalty will be applied the first day an exercise is late, with a 5% penalty provided for each additional day.

Students are discouraged from recording lectures or lab tutorials using their own devices.

University Policies

Academic Honesty and Integrity

York students are required to maintain the highest standards of academic honesty and they are subject to the Senate Policy on Academic Honesty (<http://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/>). The Policy affirms the responsibility of faculty members to foster acceptable standards of academic conduct and of the student to abide by such standards.

There is also an academic integrity website with comprehensive information about academic honesty and how to find resources at York to help improve students' research and writing skills, and cope with University life. Students are expected to review the materials on the Academic Integrity website at - <http://www.yorku.ca/academicintegrity/>

Access/Disability

York University is committed to principles of respect, inclusion and equality of all persons with disabilities across campus. The University provides services for students with disabilities (including physical, medical, learning and psychiatric disabilities) needing accommodation related to teaching and evaluation methods/materials. These services are made available to students in all Faculties and programs at York University.

Students in need of these services are asked to register with disability services as early as possible to ensure that appropriate academic accommodation can be provided with advance notice. You are encouraged to schedule a time early in the term to meet with each professor to discuss your accommodation needs. Please note that registering with disabilities services and discussing your needs with your professors is necessary to avoid any impediment to receiving the necessary academic accommodations to meet your needs.

Additional information is available at the following websites:

Counselling & Disability Services - <http://cds.info.yorku.ca/>

Counselling & Disability Services at Glendon - <http://www.glendon.yorku.ca/counselling/personal.html>

York Accessibility Hub - <http://accessibilityhub.info.yorku.ca/>

Ethics Review Process

York students are subject to the York University *Policy for the Ethics Review Process for Research Involving Human Participants*. In particular, students proposing to undertake research involving human participants (e.g., interviewing the director of a company or government agency, having students complete a questionnaire, etc.) are required to submit an *Application for Ethical Approval of Research Involving Human Participants* at least one month before you plan to begin the research. If you are in doubt as to whether this requirement applies to you, contact your Course Director immediately.

Religious Observance Accommodation

York University is committed to respecting the religious beliefs and practices of all members of the community, and making accommodations for observances of special significance to adherents. Should any of the dates specified in this syllabus for an in-class test or examination pose such a conflict for you, contact the Course Director within the first three weeks of class. Similarly, should an assignment to be completed in a lab, practicum placement, workshop, etc., scheduled later in the term pose such a conflict, contact the Course director immediately. Please note that to arrange an alternative date or time for an examination scheduled in the formal examination periods (December and April/May), students must complete an Examination Accommodation Form, which can be obtained from Student Client Services, Student Services Centre or online at

http://www.registrar.yorku.ca/pdf/exam_accommodation.pdf (PDF)

Student Conduct in Academic Situations

Students and instructors are expected to maintain a professional relationship characterized by courtesy and mutual respect. Moreover, it is the responsibility of the instructor to maintain an appropriate academic atmosphere in the classroom and other academic settings, and the responsibility of the student to cooperate in that endeavour. Further, the instructor is the best person to decide, in the first instance, whether such an atmosphere is present in the class. The policy and procedures governing disruptive and/or harassing behaviour by students in academic situations is available at - <http://secretariat-policies.info.yorku.ca/policies/disruptive-and-or-harassing-behaviour-in-academic-situations-senate-policy/>