

**FACULTY OF SCIENCE
Department of Biology
Course Outline**

**SC/BIOL 3250: Experimental Design. 4.0 Credits
Fall 2014**

GENERAL INFORMATION

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 SC/BIOL2060 or an equivalent statistics course

COURSE

DIRECTOR: Dr. Christopher J. Lortie

SCHEDULE: Lectures: Thursday 11:30am 180 minutes in CLH J
Labs: W-TH 2:30pm 180 minutes LUM 124

EVALUATION:

<u>Lecture component</u>	
Lecture test	25%
Lecture test	20%
Design products	5%
<u>Lab component</u>	
Lab report (report, data, meta-data, figures)	25%
Systematic review (review, data, meta-data)	25%

Final course grades may be adjusted to conform to Program or Faculty grades distribution profiles.

**IMPORTANT
DATES:**

<u>Lectures</u>	
Oct 23 rd , 2014.	Lecture test
Nov 27 th , 2014.	Lecture test

<u>Labs</u>	
Nov 5 & 7 th	Field lab report
Dec 3 & 5 th	Systematic reviews

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>

INSTRUCTOR CONTACT INFORMATION

Lectures: Dr. Lortie, lortie@yorku.ca
Please contact instructor and your lab assistant directly to book appointments for office hours.

RESOURCES

Lecture material	Slides provided by instructor
Textbook	'Experimental design for the life sciences', third edition, by Ruxton & Colegrave, Oxford University Press.
Lab manual	http://bit.ly/design-2014
Readings	Provided by instructor and teaching assistants

Software

Open source: figshare.com, plot.ly, and myexperiments.org, GitHub

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) Be able to design & execute an effective experiment.
- (6) Be able to publish a dataset in a public repository with well-articulated meta-data.
- (7) Be able to clearly write a well-structured manuscript suitable for publication in PeerJ pre-prints.
- (8) Understand the difference between systematic reviews and meta-analyses.
- (9) Be able to do a systematic review, analyse the research, and summarize in a manuscript suitable for publication in PeerJ pre-prints.

COURSE CONTENT

Experiments are a powerful tool to understand, manage, and explore the world around us. This course will provide you with the terminology and concepts you need to be competitive and effective in research and employment. The lectures include exploration of the key terminology and ideas you need to process experiments. You will also practice design experiments in the lecture. In the labs, you will do a field experiment you design from scratch. You will also do a systematic in the labs to ensure you are familiar and capable in handling this pivotal knowledge synthesis tool. There is also a significant focus on open science, collaboration, and data/workflow sharing.

TEACHING INNOVATIONS

Experiential education. Student will be provided with hands-on, highly practical field and lab experience in experimental design and data handling. In the lectures, we will also very actively design experiments.

E-learning. Students will be provided with the opportunity to explore data repositories and evaluated on use of data sharing tools. Twitter and a discussion blog will also be use to facilitate open discovery and connection of principles. Students will also be provided with the opportunity to further research skills using online bibliographic databases to do knowledge synthesis.

OTHER INFORMATION

EXPECTATIONS

Attendance is expected because the lectures will provide an opportunity for the students not only to listen to summary lectures of the readings by the professor but to also engage in the active design of experiments. In the lectures, we will work together to design many of the test questions (but not the answers). All information presented in class including information not provided on lecture slides and the additional resources is testable.

COURSE POLICIES

If the in-class tests/essay are missed for a valid, well documented reason, a requirement to petition for an alternative, 'make-up' exercise will be considered if the following conditions are met (1) the course director is notified within one week of the evaluation, and (2) all relevant documentation is provided within one week in person at the next lecture. In the lab component of the course, the same principles apply. If the teaching assistant and professor are notified within one week and relevant documentation is also provided at the time, the lab assistant will note the valid absence from submission of lab work and generate an extension. However, to complete the course, you must complete all the lab exercises.

To promote fairness and student responsibility, all in class exercises are due on the dates specified on the course website. A 20% penalty will be applied for each day the exercise is late.

Students who anticipate being unable to submit the exercises on the due date are encouraged to submit early.

Grades on exercises and exams are not negotiable. Every reasonable action is made to ensure multiple assessments of the assignments before conveying grades to assure consistency across the entire class. Thus, the course director should only be contacted if there is calculation or clerical error present.

Students are not allowed to record lectures or lab tutorials using their own devices.

UNIVERSITY POLICIES

1. 1. Students who miss the final exam and would like an opportunity to write it must request and obtain deferred standing. A Deferred Standing Agreement form must be completed and submitted with appropriate supporting documentation (such as an Attending Physician's Statement for illness) to the professor or Biology Undergraduate Office. Senate Policy requires that "Normal requests for deferred standing must be communicated within one week following a missed examination, or on the last day to submit course work". The policy and forms for obtaining deferred standing may be found at <http://www.registrar.yorku.ca/exams/deferred/index.htm>
1. 2. All students are expected to familiarize themselves with the following information, available on the Senate Committee on Academic Standards, Curriculum & Pedagogy webpage (see Reports, Initiatives, Documents) -
http://www.yorku.ca/secretariat/senate_cte_main_pages/ASCP.htm
<http://www.yorku.ca/secretariat/senate/committees/ascp/documents/CourseInformationForStudentsAugust2012.pdf>
 - • Senate Policy on Academic Honesty and the Academic Integrity Website
 - • Course accommodation for students with disabilities, including physical, medical, systemic, learning and psychiatric disabilities
 - • Student Conduct Standards
 - • Religious Observance Accommodation