Undergraduate Overview and Syllabus

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T.A.: TBD
Tutorial: Tuesday, 10:15-11:30, CC-101; Lab: Tuesday 13:30-17:30, SP-380.05

The purpose of this course is to bridge the gap between ecological theory and the practice of science. Most of your undergraduate career has been spent learning facts about biology; this course will introduce you to the ways of thinking by which this body of knowledge has been constructed. You will learn to think critically about what you observe, and to think creatively about both the meaning of your observations and the ways to verify them. Through this course you will become familiar with some of the techniques used in ecological research. More importantly you will learn to think about science in a practical way and gain the conceptual tools necessary to find, select, learn and apply appropriate techniques to answer ecological questions.

You will learn to formulate concepts into testable hypotheses, to translate them into feasible experiments, to analyse complex data and to interpret results in terms of their biological significance. You will be introduced to experimental design, statistical data analysis and scientific writing. You will also be encouraged to think critically about the tools used in ecological research. By the end of the course, you should be able to design, conduct and write-up research projects in ecological science.

This course comprises interactive tutorials and practical laboratory sessions in which you will conduct experiments and analyse data. You are required to check the moodle website and do the assigned reading and other preparatory work before the tutorial. Attendance to all tutorial and laboratory sessions is mandatory. There will also be field work in Montreal outside of class time.

The course is organised into several modules, each of which addresses a different issue in ecology and uses different techniques. A module may take up more than one week, often not consecutive weeks, with overlapping projects.

The syllabus is outlined below. There will be no exams; grading will be based on 7 assignments, 2 reports and 3 papers. In the papers, you will be expected to demonstrate understanding of the analyses and to interpret the results in the context of ecological theory. All assignments must be handed in by 10:15 AM on the due date (i.e. at the beginning of the tutorial): assignments received after this time will be considered to be a day late and will be penalized by 5% accordingly.

Marking scheme:	Assignments (7: Kirk, Khan, R, eBfly, library, lichen ID, tree ID):	20 %
	Reports (2: abundance estimation & independent project):	20 %
	Papers (3: earthworm populations, IFD & lichen diversity):	60 %

date	*tutorial*	*lab*	*assignment given*	*assignment due*	*marks, %*
04/09/2018	introduction	analysing data with R -- computer	R, Khan, eBfly, Kirk		
11/09/2018	sampling techniques	mealworm population estimation -- wetlab	mealworm report	R	3
18/09/2018	mealworm presentation	scientific writing --- discussion	library	mealworm report	10
25/09/2018	library searches	Earthworm sampling --- wet lab and field		eBfly	3
02/10/2018	earthworm presentation	earthworm analysis in R --- computer	paper I	Kirk	3
09/10/2018	IFD background	IFD experimental design --- wetlab	paper II	paper I, **library**	20 + 3
16/10/2018	critiquing research	analysis of a paper --- discussion			
23/10/2018	IFD data presentation	IFD analysis in R ---- computer			
30/10/2018	expt III: lichen diversity	lichen sampling --- field		paper II	20
06/11/2018	lichen presentation	lichen analysis in R --- computer	paper III	Khan	3
13/11/2018	experimental design	independent project with eButterfly --- computer	eBfly report	paper III	20
20/11/2018	project presentation	taxonomic keys: lichen --- wetlab	lichen ID	lichen ID	3
27/11/2018	field trip to Angrignon park	field trip to Angrignon park --- field	tree ID	tree ID, eBfly report	3+ 10

Learning goals:

R software package:	introduction to using R for data analysis
Khan academy:	statistics refresher (and catch-up as required)
mealworm study:	mark and recapture population estimation
eButterfly record submission:	field work, data collection, observing, photographing and identifying butterflies
scientific writing:	communicating scientific data and sophisticated ideas effectively
library searches:	effective searching to find the most pertinent materials
earthworm experiment:	sampling design and one-way ANOVA
IFD experiment:	behavioural observation, linear regression, t-tests and ANOVA
critiquing research:	reading a paper, understanding its structure, critical thinking
lichen experiment:	designing a sampling protocol, two-way ANOVA
eButterfly project:	hypothesis building, experimental design and choice of analysis
lichen identification:	using taxonomic keys to identify organisms
Angrignon field trip:	identifying trees with keys and field guides