Undergraduate Overview and Syllabus

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T.A.: TBD
Tutorial: Monday, 10:15-11:30, CC-425; Lab: Monday 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 tutorial sessions 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 the laboratory sessions.

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, %*
12/09/2016	introduction	analysing data with R	R, Khan, eBfly, Kirk		
19/09/2016	sampling techniques	mealworm population estimation	mealworm report	R	3
26/09/2016	mealworm presentation	Earthworm sampling		mealworm report	10
03/10/2016	earthworm presentation	earthworm analysis in R	paper I	Kirk	3
17/10/2016	library searches	scientific writing	library	eBfly	3
24/10/2016	IFD background	IFD experimental design	paper II	paper I, **library**	20 + 3
31/10/2016	critiquing research	analysis of a paper			
07/11/2016	IFD data presentation	IFD analysis in R			
14/11/2016	expt III: lichen diversity	lichen sampling		paperII	20
21/11/2016	lichen presentation	lichen analysis in R	paper III	Khan	3
28/11/2016	experimental design	independent project with eButterfly	eBfly report	paper III	20
05/12/2016	project presentation	taxonomic keys: lichen	lichen ID	lichen ID	3
06/12/2016	field trip to Angrignon park	field trip to Angrignon park	tree ID	tree ID, eBfly report	3+ 10
				total	**100**

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