

## Ecology and Evolutionary Biology Graduate Courses 2011-2012

### Courses Offered at the Graduate Level Only

**Note:** Section Code: usually F, S or Y. This indicates whether the course is offered in the fall session (F), the winter session, i.e., second term (S) or over both (Y).

#### EEB 1002H F/S Advanced Research and Reading Course [Staff]

(This course may be taken only once for credit, and is only available to students who were admitted, before September 2008, to the old Zoology, Plant and Microbial Biology, or Botany programs)

#### EEB 1100H F Faculty Research Course [J. Stinchcombe coordinator]

*Day & Time: Wednesday, 7pm – 9pm*                      *Location: ESC 3044*

Students will be exposed to a wide variety of current research issues through presentations by a selection of faculty members from the Department. Presentations could be in the form of formal lectures or as a discussion of published papers or books. Students will be expected to participate in discussions of the ideas presented and to submit written analyses/critiques.

#### EEB 1230H S Multivariate Statistics [D. Jackson]

*Day & Time: TBA*    *Location: TBA*

An introduction to multivariate statistical methods commonly used by researchers in ecology and evolutionary biology. Topics range from methods focused on an single datasets (e.g. principal component analysis, principal coordinates analysis, cluster analysis) to methods involving groups of observations (e.g. discriminant analysis) to methods relating sets of variables to one another (e.g. canonical correspondence analysis, redundancy analysis, procrustes analysis). An emphasis on the graphical geometry of the methods is provided. The course is oriented more towards the underlying application and understanding of the methods rather than the underlying mathematical derivations or theory.

#### EEB 1250H S Spatial Statistics [M-J. Fortin]

*Day & Time: Thursday, 10am – 12pm*                      *Location: RW015A*

Ecological processes are inherently spatial and generally autocorrelated so that standard parametric assumptions of independence do not apply. Students will be introduced to concepts of spatial scale and the appropriate software for spatial analyses.

#### EEB 1310H F Philosophy & Methods [N. Collins]

*Day & Time: Thursday, 2pm – 5pm*                      *Location: RW015*

EEB1310 is designed primarily for graduate students who have some research and scientific writing experience (e.g. MSc thesis or writing a publication or giving a talk based on an undergrad thesis) and are in the early stages of a PhD or MSc program. Activities include a combination of student-lead discussions, short student seminars, and lectures designed to cover general and often controversial scientific issues confronted frequently in both ecological and evolutionary studies. The class will review human subjectivity and its role in science; discuss some semi-philosophical controversies about approaches to science and research tactics; study some common and important errors in experimental design and statistical analysis; and share perspectives on a variety other issues that are important to researchers. The major assignment for the course will be an essay that aims to facilitate progress in thesis research by asking students to a) define the scientific objectives of the audience for their research results, b) evaluate various possible scientific approaches to their broad research objectives, and c) describe and justify a strategic set of approaches that they will likely employ to achieve them. The essay is not a thesis proposal. It's designed to help students do the thinking they need to do before they write their proposals.

**EEB 1320H S Ecology** [H. Cyr assisted by others]

*Day & Time: Thursday, 2:30pm – 4:30pm*

*Location: RW 015*

A course that examines fundamental concepts in ecology that are the subject of active research. The focus of the course will change depending on the faculty involved. The course is structured around student-led discussions of classic and recent papers, mostly from the primary literature. This course will help students develop a deeper and broader understanding of important ecological concepts.

[Course Syllabus](#)

**EEB 1420H S Special Topics in Ecology (Landscape Genetics)** [H. Wagner & M-J. Fortin]

*Day & Time: Wednesday, 11:30am – 3:30pm*

*Location: RW 015A*

This seminar on Landscape Genetics provides a unique opportunity for interdisciplinary training and international collaboration and will cater both to students coming from evolution, especially population genetics, and to students coming from ecology, especially landscape ecology and conservation. Also, this seminar is the local implementation of a Distributed Graduate Seminar on Landscape Genetics that will be held concurrently at six universities in North America and Europe.

**EEB 1440H S Special Topics in Evolution** [S. Wright]

*Day & Time: Monday, 2pm – 4pm*

*Location: ESC 3043 (Lounge)*

A seminar course in which the focus is on critical debate of current issues in evolution. Topics will vary from year to year and may include genome evolution, plant-animal interactions, phylogenetics, molecular systematics, and evolution of mating systems. Students will be expected to read current papers or books, make presentations to the group and participate in discussions.

**Graduate Courses with Significant Undergraduate Content**

(These courses will normally constitute only a minor component of the required credits)

**EEB 1328H F Physiological Ecology** [R. Sage]

*Day & Time: Friday, 10am – 12pm*

*Location: ESC 3087*

*Friday, 1pm – 3pm*

*Location: ESC 3087*

An advanced treatment of the physiological mechanisms controlling plant and animal distribution and ecological success. Topics of focus include photosynthesis and resource balance, water and nutrient relations, temperature effects, and adaptations to abiotic stress.

**EEB 1330H S Systematic Botany** [J. Eckenwalder] (up to 3 grads)

*Day & Time: Tuesday, Thursday, 1pm – 2pm*

*Location: ESC 3087*

*Thursday, 2pm – 5pm*

*Location: ESC 3088*

The theoretical foundations of taxonomy and the types of evidence used in constructing plant classifications. Labs emphasize taxonomic characters and their uses. Includes an independent taxonomic project.

**EEB 1337H Y Families of Vascular Plants** [T. Dickinson] (up to 3 grads)

*Day & Time: Tuesday, Thursday, 1pm – 2pm*

*Location: ESC 3087*

*Thursday, 2pm – 5pm*

*Location: ESC 3088*

This course examines variation in morphology, predominant breeding systems, dispersal syndromes, and other features between families of vascular plants in the Ontario flora. Students learn key characteristics for identification of important groups of free-sporing and seed-producing plants in the context of green plant evolution and phylogeny.

**EEB 1340H S Comparative Plant Morphology** [T. Sage] (no limit on grads)

*Day & Time: Monday, Wednesday, 1pm – 2pm*                      *Location: ESC 3087*

*Thursday, 9am – 12pm*    *Location: ESC 2087*

This course focuses on land plant origins and subsequent diversification of land plant vegetative and reproductive form and function. Discussions synthesize morphological and anatomical knowledge from living organisms and fossil records with cellular, physiological, and molecular information on the developmental tool kit of land plants and their ancestors throughout geological time. Topics address the evolution of vegetative and reproductive meristems; stem, leaf, and root architecture; vascular tissue; the ovule habit; fertilization processes; and pollination biology.

**EEB 1443H F Phylogenetic Principles** [S. Stefanovic] (up to 5 grads)

*Day & Time: Monday/Wednesday, 10am – 12pm*                      *Location: UTM; IB-379 (new Instructional Building)*

Phylogenetic inference is at the heart of modern systematics and plays a pivotal role in bioinformatics and genomics research, with all the implications in medicine, agronomy, conservation, etc. The goal of this advanced course in phylogenetics is to teach biologists how to self-direct analysis of their own phylogenetic data. More importantly, they are expected to be able to 'read' a phylogenetic tree correctly, and critically assess its construction, accuracy, and reliability, and not just take it for granted. Lectures provide an in-depth coverage of modern methods of phylogenetic reconstruction including molecular systematics based on DNA sequences. The principles and philosophy of classification are taught with an emphasis on 'tree-thinking'. Seminars focus on recent developments in the study of evolutionary patterns while enabling students to gain proficiency in reading, presenting, and critiquing primary scientific literature.

**EEB 1459H S Introduction to Theoretical Population Genetics** [A. Agrawal]

*Day & Time: Monday, Wednesday, 10am – 11am*                      *Location: ESC 3088*

A focus on theoretical population genetics, using mathematical models to understand how different evolutionary forces drive allele frequency change. Students learn how to mathematically derive classic results in population genetics. Topics include: drift, coalescence, the relationship between population and quantitative genetics, selection in finite populations, and mutation load.

**EEB 1460H F Molecular Evolution** [A. Baker & D. Irwin] (up to 5 grads)

*Day & Time: Wednesday, 10am – 11am*                      *Location: RW 143*

*Friday, 10am – 12pm*    *Location: RW 143*

Processes of evolution at the molecular level, and the analysis of molecular data. Gene structure, neutrality, nucleotide sequence evolution, sequence evolution, sequence alignment, phylogeny construction, gene families, transposition.

[CAMPUS MAPS](#)

***Graduate courses and seminars begin in the week of September 12<sup>th</sup> for September session courses (F) and January 9<sup>th</sup> for January session courses (S).***