

**University of Guelph**  
**College of Biological Science**  
**Department of Integrative Biology**  
**COURSE OUTLINE *version 2***

**BIOL\*2400 Evolution**

**Fall 2014**

THE DETAILS OF THIS COURSE OUTLINE MAY CHANGE UNTIL THE FINAL VERSION IS PRESENTED IN THE FIRST WEEK OF CLASSES.

**Course description**

**BIOL\*2400 Evolution F,W (3-0) [0.50]**

This course provides a broad overview of evolutionary biology. It examines the concepts and mechanisms that explain evolutionary change and the evolution of biological diversity at different levels of biological organization (gene to ecosystem) and across space and time. It also introduces historical forms of scientific inquiry, unique to biology. The course is designed to be of interest to students with general interests in science and in research in all areas of biology.

Prerequisite(s):

BIOL\*1040 or (BIOL\*1070, BIOL\*1090)

Restriction(s):

BIOL\*3400

Department(s):

Department of Integrative Biology

**Teaching team**

Professor: Dr. Elizabeth G. Boulding

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Course Coordinator: Dr. Colin DeMill

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Teaching Assistants

Tyler Elliott:

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## **Course schedule Fall 2014**

Monday/Wednesday/Friday, 9:30-10:20 am (lectures)

Monday, October 13th, Thanksgiving, is a holiday and the make-up lecture day is Friday, November 28th (last day of classes).

## **Learning Outcomes (goals and rationale)**

By the end of the course students will understand the theories and hypotheses that explain the generation of biodiversity at all levels of biological organization and methods that can be used to test them. This will include:

(1) Conceptual skills: Students will be able to:

- (a) Differentiate Darwin's original theory from the Modern Synthesis of the Theory of Evolution.
- (b) Explain simple methods of phylogenetic tree estimation and interpretation.
- (c) Explain basic mechanisms of evolutionary change at the genetic, molecular and phenotypic levels.
- (d) Differentiate natural selection on phenotype resulting in viability/ fecundity differences from sexual selection, multilevel selection, and coevolution.
- (e) Identify species concepts and explain several mechanisms of speciation.

(2) Inquiry skills: Students will be able to explain:

- (a) How the comparative method is applied across biological disciplines.
- (b) How model building and hypothesis testing is done in evolutionary biology.

(3) Basic skills: Students will be able to:

- (a) Comprehend scientific and popular material on Evolution.
- (b) Acquire, filter, and synthesis scientific concepts, facts and methods.
- (c) Communicate scientific ideas about evolution.

## **Course Resources**

**D2L site** that will be used for:

- 1) Instructions and hints on the Term Assignment.
- 2) To ask the Professor about course material.
- 3) To ask the Course Co-ordinator about logistics.
- 4) To communicate with other students in the course.

## **Textbook:**

Strongly recommended Textbook: Evolution: Making Sense of Life (Hardback)

Zimmer, Carl and Emlen, Douglas J. (University of Montana) Copyright Year: 2013

ISBN: 9781936221172 Specifications: 720 pages, hardback, printed in four colors

Publication Status: Published on August 17, 2012.

One paper copy only will be available on 2 hour reserve for this class.

### **i>clickers will be used in every lecture.**

To facilitate interactions and discussions in lecture, we will be using “i>clickers”. Marks will be assigned for participation and correct answers, and they will be uploaded to the course website on a weekly basis so that you can monitor your progress through the semester. **We will practice i>clicker questions in Lecture 2 on Monday, September 8, Lecture 3 on Wednesday, September 10, and Lecture 4 on Friday, September 12. We will begin the graded clicker questions in Lecture 5 on Monday, September 15.** The 6 lowest clicker scores will be dropped at the end of the semester so that you won't be penalized for missing occasional lectures due to illness or for forgetting to bring your clicker to class. If you have not purchased an i>clicker for a previous course, they are available from the University of Guelph Bookstore. The Bookstore stocks the “i>clicker2” but you will be able to use the “i>clicker1” in this course if you already own or can borrow one.

It is your responsibility to ensure that your i>clicker is registered and functional. Please **ignore** the instructions on the package that your i>clicker came in about their company website!!! Instead to register, go to this UG link:

<https://www.uoguelph.ca/courselink/widgets/signon.cfm?destination=%2Fcourselink%2Fwidgets%2Fclickers%2Findex%2Ecfm>

For more information on i>clickers please go to:

<http://www.uoguelph.ca/tss/lrci/clickers/index.cfm>.

On the right hand side of the screen, under the Resources heading, click on the Student i>clicker Registration link. Log in and follow the instructions.

### **Course Content**

week	Topics	Readings (before class*) from Zimmer & Emlen textbook
1	Review of key Evolutionary concepts and Preparation for Class Debate (see Assessment table) that will continue online on D2L: “Predictions of the modern NeoDarwinian Theory of Evolution are well supported by the available evidence!” Students with surnames: A to L will be PRO – “Predictions that have been tested are well supported” and for the	Ch. 1: The Virus and the Whale: How Scientists Study Evolution page 2 Ch. 2: Biology: From Natural Philosophy to Darwin page 32

	debate should sit on the right side of the lecture theater (when facing the front). Students with surnames M to Z are CON – “Support is still lacking for some predictions!” and for the debate should sit on the left side of the lecture theater (when facing the front).	
2	Evolution of biodiversity: The Cambrian explosion, the extinction of the dinosaurs and the rise of the mammals.	Ch. 3: What the Rocks Say: How Geology and Paleontology Reveal the History of Life page 50
3	Estimation of Phylogenies: Who gave you AIDs: Your Lover or your Dentist?	Ch. 4: The Tree of Life: How Biologists Use Phylogeny to Reconstruct the Deep Past page 82
4	Detecting Mutations: Reading your fate and ancestry in your DNA with your automated DNA sequencer. (Mutation and variation).	Ch. 5: Raw Material: Heritable Variation among Individuals page 120
5	Mating with your relatives in small populations (Inbreeding). Ne, Nc, and Minimum Viable Population Sizes for survival (Genetic Drift). Response to selection.	Ch. 6: The Ways of Change: Drift and Selection page 152
6	Field studies of microevolution in action: how do you feel about excessive rain, sun and bad food for 20 years of longer?	Ch. 8: Natural Selection: Empirical Studies in the Wild page 218
7	Hopeful Monsters: Development and evolution: Ontogeny recapitulates phylogeny? Heterochrony, and Hox genes.	Ch. 10: Adaptation From Genes to Traits page 288
8	Geographical Speciation and Sympatric Speciation: Going your Own Way versus Quantum Leaps	Ch. 13: The Origin of Species page 392
9	The Day the Dinosaurs Died: Would humans have evolved without meteorites and Mass Extinctions?	Ch. 14: Macroevolution The Long Run page 432
10	Spawn until you die or return to the ocean until you can spawn again? A tale of two salmon species.	Ch. 11: Sex: causes and consequences page 328
11	Human evolutionary divergence from other primates varies drastically among characters.	Ch. 17: Human Evolution A New Kind of Ape page 552
12	Modern Research in Evolution; Review Session.	Review and Synthesis

\* Exact pages will be posted on D2L.

You can be tested on material in assigned readings from the text even if the material is not covered in lecture. Usually such material will be straightforward descriptive examples. You will not be tested directly on recommended readings but they will help you understand the lecture material. Other supplementary readings as **assigned** during lectures will be available under our course number at the reserve desk in the library or on Courselink (=D2L).

## Methods of Assessment and Important Dates

Assessment				
Form of Assessment	Weight of Assessment	Due Date of Assessment	Course Content /Activity	Learning Outcome Addressed
Debate	No grade	Friday, September 12, 2014	Lecture	Conceptual, inquiry and basic skills
i>clicker Questions	5% of final grade	All semester beginning Monday, September 15, 2014	Lecture	Conceptual skills
Practice Quizzes	No grade	4 quizzes throughout semester	Lecture	Conceptual, inquiry and basic skills
Midterm Exam	25% of final grade	Friday, October 24, 2014.	Lecture	Conceptual, inquiry and basic skills
40 <sup>th</sup> class day	Last day to drop course with a penalty.	Thursday, October 30, 2014	Web Advisor	
First draft of Term Project due	5% of final grade Assigned by peer review	Before midnight on Monday, November 3, 2014	PEAR	Learning the revision process in academic writing
Peer review of another student's Term Project	5% of final grade Quality of your review assessed by a TA	Before midnight on Wednesday, November 12, 2014	PEAR	Gain increased understanding of the writing process from peer review
Term Project	20% of final grade	Before midnight on Friday, November 21, 2014	PEAR	Writing the term project applies the three main outcomes: conceptual, inquiry and basic skills
Final Exam*	40% % of final grade	TBA	Lecture	Conceptual, inquiry and basic skills

i>clicker questions will be used in each lecture to test your comprehension of the assigned and suggested readings to be done before class, stimulate participation in class discussions, and enhance your understanding of course content and practice the type of multiple choice questions that will appear on the midterm and on the final exam. For most i>clicker questions 50% of your mark will be awarded

for getting the question correct and 50% will be awarded for participation. For difficult questions you will be permitted to discuss the question with your neighbour before selecting the answer.

Practice quizzes in D2L/Courselink will be used to prepare for midterm and final exams. The questions based on material from lectures and from the **assigned** textbook readings.

### **Term project:**

The term project will consist of a written assignment based on a topic of relevance to evolutionary biology and will require application of the concepts and the methodology covered in lecture and by the text book readings. Details of the term project will be given during the first lecture and a complete example written by the instructor will be posted on the class D2L site. The term project must be formally peer reviewed and then revised before it will be graded by the teaching assistants.

\*Multiple choice and written short answers – the final exam will cover all lectures, including the ones before the midterm.

### **Important Dates**

Please see the assessment table above for a list of all important dates and the deadline for dropping courses without penalty (before or on 40<sup>th</sup> class day).

### **Course and University Policies**

#### When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course co-ordinator by email, with your name, id#, and e-mail contact, and be prepared to provide supporting documentation. See the undergraduate calendar for information on regulations and procedures for Academic

Consideration: <http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

There will be one midterm examination given on the date shown in the table above in class. NO make-up midterm exam will be given. Any student who claims illness or compassionate grounds for missing the mid-term exam must obtain a certificate of illness or verification of compassionate reasons as outlined in the Undergraduate Calendar and give it to the course co-ordinator (rather than the professor). If there is an adequate reason (a medical or compassionate exemption) for missing the mid-term exam, then the final will account for the sum of both exams. If you have no adequate reason for missing the exam then a mark of zero will be assigned for the mid-term exam. Students missing the final exam will need to write a make-up final examination at the beginning of the summer semester. The date and time for the examination will be set by Office of the registrar. An INCOMPLETE will be submitted as a mark for those students unable to complete the final exam.

The course-coordinator, rather than the professor, will also provide assistance when the term assignment must be handed in late.

### Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Centre for Students with Disabilities as soon as possible.

For more information, contact CSD at 519-824-4120 ext. 56208 or email [csd@uoguelph.ca](mailto:csd@uoguelph.ca) or see the website: <https://www.uoguelph.ca/csd/>

### Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

### E-mail Communication

As per university regulations, all students are required to check their <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

### Drop Date

The last date to drop one-semester courses, without academic penalty, is the 40<sup>th</sup> class day. To confirm the actual date please see the schedule of dates in the Undergraduate Calendar. For regulations and procedures for Dropping Courses, see the Undergraduate Calendar:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

### Copies of out-of-class assignments

Keep paper and/or other reliable backed-up electronic copies of all out-of-class assignments: you may be asked to resubmit work at any time.

### Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer.

Material recorded with permission is restricted to use for that course unless further permission is granted.

## Grading

**Students whom do not hand in the Term Project will receive an incomplete for the course. Also the Term Project will not be graded without first being formally peer-reviewed by the student assigned to you on D2L.**

## **Campus Resources**

The Academic Calendar is the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs:

<http://www.uoguelph.ca/registrar/calendars/index.cfm?index>

If you are concerned about any aspect of your academic program:

- make an appointment with a program counsellor in your degree program.  
<http://www.bsc.uoguelph.ca/index.shtml> or <https://www.uoguelph.ca/uaic/programcounsellors>

If you are struggling to succeed academically:

- There are numerous academic resources offered by the Learning Commons including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills. You can also set up individualized appointments with a learning specialist. <http://www.learningcommons.uoguelph.ca/>

If you are struggling with personal or health issues:

- Counselling services offers individualized appointments to help students work through personal struggles that may be impacting their academic performance.  
<https://www.uoguelph.ca/counselling/>
- Student Health Services is located on campus and is available to provide medical attention.  
<https://www.uoguelph.ca/studenthealthservices/clinic>
- For support related to stress and anxiety, besides Health Services and Counselling Services, Kathy Somers runs training workshops and one-on-one sessions related to stress management and high performance situations. <http://www.uoguelph.ca/~ksomers/>

If you have a documented disability or think you may have a disability:

- The Centre for Students with Disabilities (CSD) can provide services and support for students with a documented learning or physical disability. They can also provide information about how to be tested for a learning disability. For more information, including how to register with the centre please see: <https://www.uoguelph.ca/csd/>