

# Syllabus for BIOL 3609 – Evolutionary Concepts – Winter 2009

Root Gorelick

Class Location: Tory 238

Wednesday 8:35 – 11:25 am

## Contact Information and Office Hours

Phone: 613-520-2600 ext 1586

E-mail: Use WebCT e-mail (your e-mails may get lost in my other e-mail accounts)

Office Hours: Wednesday 1:00 - 2:30 pm (or by appointment)

Office: 4625 CTTC (just south of the gym and child care)

## Teaching Assistants (WebCT e-mail addresses in parentheses):

Jessica Carpinone (jcarpino)

Marie-Ange Gravel (magravel)

Crystal Vincent (cvincent)

Prerequisite: BIOL 2104 (Genetics)

## Objectives

Think critically; Think broadly and question everything

Effective reading and writing

Understand the definitions and implications of evolution

Appreciation of evolutionary mechanisms (selection, drift, mutation, genetic mixing)

Understand the continuum and interactions between nature and nurture

Be able to simultaneously think on broad temporal and spatial scales

## Structure of Class

We will have a short quiz during all but the first week and the last two weeks.

I reserve the right to substitute written assignments in lieu of quizzes.

The quiz will be followed by a lecture of about 1.5 hours.

The lecture will be followed by an hour-long discussion.

Discussions will be on assigned readings and questions we pose about the readings.

You will be marked on participation each week.

## Marks

The nine quizzes will be worth 5 points each. I will drop the two lowest marks.

Thus quizzes will be worth 35% of your final mark.

Participation marks will be worth 4 points each week.

There will be 12 participation marks. I will drop the lowest two marks.

Participation will be worth 40% of your final mark.

There will be a final exam worth 25% of your final mark.

However, to pass the course, you must receive a mark of at least 11 of 25 on the final.

Percentage grades will be translated into letter grades using the standard Carleton schema given in §2.3 of the Academic Regulations.

From Undergraduate Calendar (2008-2009):

Evolution is the change in population properties across generations. Genetic variation, mutation, selection, drift, gene flow, genome evolution, speciation, development, biodiversity, fossils, macro-evolution.

Text

The **required** text is Doug Futuyma's *Evolution* (Sinauer), stocked by both the Carleton Bookstore and Haven Books. Buy it now. This is a really good book, the direct descendant of Futuyma's earlier text *Evolutionary Biology*. While not as encyclopedic as the more recent superb book *Evolution* by Barton, Briggs, Eisen, Goldstein, and Patel (Cold Spring Harbor Laboratory Press), Futuyma's book is at a more appropriate level for a third-year course and does a better job with some of the nuances.

Preparation for each class:

- Read the assigned chapter(s) of the text book (see immediately below)
- Read the assigned primary literature (see page 4, below)
- Review lecture slides and any posted questions (WebCT)
- Review your notes and previous quizzes

Schedule:

	<u>Date</u>	<u>Chapters</u>
Patterns: Biodiversity		
1. What is evolution? History	07 January	1
2. Tree of Life	14 January	2, 4, 5
3. Origin of Life	21 January	5
4. Extinction & Origination; Measuring Variation	28 January	9, 16
Process: the ups and downs of heritable variation		
5. Mutation	04 February	8
6. Genetic mixing (recombination, gene flow)	11 February	8
7. Selection	25 February	11, 12
8. Adaptation	04 March	11, 12
9. Drift, Inbreeding	11 March	9, 10
From heritable variation to macro-evolution		
10. Mapping genotype to phenotype	18 March	13, 20,
11. Micro- versus macro-evolution	25 March	21
12. Speciation and origination (reprise)	01 April	7, 16

### Quizzes:

Weekly quizzes will largely cover the previous week's materials. However, this course is cumulative and the quizzes will reflect this. I also reserve the right to ask questions about the readings that are to be discussed later during the class period in which the quiz is given.

All quizzes will be taken without notes and without books.

There will be no make-up quizzes. If you miss a quiz, this will count as one of your two lowest quiz scores, which will be dropped. This policy applies to short-term medical absences, as well as to transportation issues or simply over-sleeping.

Generally, quizzes will be at the start of the class period. I will review the quiz immediately after you have taken it. If you arrive  $x$  minutes late for a quiz, you will have  $x$  minutes less in which to take the quiz. Transportation issues will NOT be a valid excuse. I shall collect your paper at the same time as I collect everyone else's quiz. Refusal to hand in a quiz when they are being collected will result in a grade of zero for that quiz.

It is important that your quiz answers be well thought out and logically presented. Good grammar, spelling, and handwriting will go a long way towards us understanding what you are trying to convey. The concepts are often more important than whether your answer is "right" or "wrong", especially since there are no "right answers" in biology. Please note, however, that there are wrong answers! Feel free to include drawings and cartoons in your answers. These are often very helpful.

I reserve the right to give you a written assignment, due in one week, in lieu of a quiz. If this occurs, you will have at least a one-week warning prior to a non-existent in-class quiz. Please, however, note page 5 of this syllabus regarding any written assignments.

The TAs will mark the quizzes (and possible assignments).

### Appeals of quiz marks

Quiz marks can be appealed, using the following procedure. First talk with the TA for clarification and/or reconsideration. If you are not satisfied with the TAs response, then you can appeal to me, documenting your disagreements, actions taken with your TA, and copies of all relevant papers, including the original quiz. Appeals must be initiated within one week of receipt of the marked quiz.

### Final Exam

There will be a cumulative final exam worth 25% of your final mark. Roughly 40% (10 of 25) of the final exam will cover the material from the last three class periods. The final exam will be cumulative and will occur during the regular final exam period of 8-27 April 2009. In order to pass the course, you must get at least 11 of 25 points on the final exam.

Readings from Primary Literature:

- 7 January Provine WB (1971) Darwin's theory of natural selection: the reaction. In *The Origins of Theoretical Population Genetics*. Pages 1-24. University of Chicago Press.
- 14 January Woese CR and Fox GE (1977) Phylogenetic structure of the prokaryotic domain: the primary kingdoms. *Proceedings of the National Academy of Sciences of the USA* 74: 5088-5090.
- 21 January Poole A, Penny D, and Sjöberg B-M (2001) Confounded cytosine! Tinkering and the evolution of DNA. *Nature Reviews—Molecular Cell Biology* 2: 147-151.
- 28 January Algeo TJ and Scheckler SE (1998) Terrestrial-marine teleconnections in the Devonian: links between the evolution of land plants, weathering processes, and marine anoxic events. *Philosophical Transactions of the Royal Society of London Series B-Biological Sciences* 353: 113-128.
- 4 February Ross KA (2006) Alpha radiation is a major germ-line mutagen over evolutionary timescales. *Evolutionary Ecology Research* 8: 1013-1028.
- 11 February Young A, Boyle T, and Brown T (1996) The population genetic consequences of habitat fragmentation for plants *Trends in Ecology & Evolution* 11: 413-418.
- 25 February Bennett AF, Dao KM, and Lenski RE. (1990) Rapid evolution in response to high-temperature selection. *Nature* 346: 79-81.
- 4 March Gould SJ and Lewontin RC (1979) Spandrels of San Marco and the Panglossian paradigm: a critique of the adaptationist program. *Proceedings of the Royal Society of London Series B-Biological Sciences* 205: 581-598.
- 11 March Bittles AH, Grant JC, Sullivan SG, and Hussain R (2002) Does inbreeding lead to decreased human fertility? *Annals of Human Biology* 29: 111-130.
- 18 March Gorelick R (2004) Neo-Lamarckian medicine. *Medical Hypotheses* 62: 299-303.
- 25 March Pigliucci M and Murren CJ (2003) Genetic assimilation and a possible evolutionary paradox: Can macroevolution sometimes be so fast as to pass us by? *Evolution* 57: 1455-1464.
- 1 April Labandeira CC and Sepkoski JJ (1993) Insect diversity in the fossil record. *Science* 261: 310-315.

### Written work

All written work that you submit must be in your own words. If two or more people have effectively the same answers, I reserve the right to give each person a score of half what they ordinarily would have received. If the same people have effectively identical answers in subsequent quizzes or assignments, I will assign grades of zero to each of these people.

Transcription of somebody else's written or spoken words without quotation marks or without citation to the original source constitutes plagiarism. Failure to include quotation marks (or other distinguishing marks) and a full citation constitutes a *prima facie* violation of the university's academic integrity policy, which will be immediately referred to the dean for adjudication.

### Academic Integrity Policy

The university is committed to ensuring fairness and consistency in the completion of examinations, including quizzes. As part of this commitment, students are required to follow proper examinations procedures. A student who commits a violation of this policy on an examination, test, or take-home examination, or obtains or produces an answer or unfair advantage by deceit, fraud, or trickery, or by an act contrary to the rules of the examination are subject to the sanction under this policy. These rules include but are not limited to:

- attempting to read any textbook, notebook, memorandum, other written material or mechanical or electronic device not authorized by the examiner
- writing an examination or part of it, or consulting any person or materials outside the confines of the examination room without permission to do so
- leaving answer papers exposed to view
- attempts to read other students' examination papers and/or speaking to another student (even if the subject matter is irrelevant to the test).

### WebCT

BIOL 3609 will be managed with Carleton's WebCT system (<http://webct6.carleton.ca/>) . Marks will be posted on WebCT. I will send individual messages and course announcements using WebCT, so check your account frequently. Use WebCT for ALL course-related e-mails and not my other e-mail accounts.

### Classroom decorum

No electronic devices are allowed to be turned on in class. Shut-off or do not bring the following: cell phones, headphones, laptops, PDAs, MP3 players, video cameras. Do not bring newspapers. This class is not the place to hone your multi-tasking skills. The only exceptions I will make are for audio recording devices and for electronic gear requested by PMC.

I strongly encourage you to speak up and participate both in class and out of class, albeit in a respectful manner. In class, pretend that you are a courtroom lawyer. Your job is to advocate, albeit in this context advocating on your own behalf. Please don't forget that you are co-equals with each of your colleagues in the class.

## Requests for Academic Accommodations

### **For Students with Disabilities:**

Students with documented disabilities requiring academic accommodations in this course must register with the Paul Menton Centre for Students with Disabilities (PMC) for a formal evaluation of disability-related needs. Documented disabilities include physical, mental, and learning disabilities, mental disorders, hearing or vision disabilities, epilepsy, drug and alcohol dependencies, environmental sensitivities, as well as other conditions. Registered PMC students are required to contact the PMC, 613-520-6608, early each term to ensure that your Instructor receives your Letter of Accommodation no later than two weeks before the first assignment is due or the first in-class test/midterm requiring accommodations. If you require accommodations for your formally scheduled [final] exam in this course, please submit your request for accommodations to PMC by 6 March 2009 for April exams.

You can visit the Equity Services website to view the policies and to obtain more detailed information on academic accommodation at <http://carleton.ca/equity/accommodation>

### **For Religious Obligations:**

Students requesting academic accommodation on the basis of religious obligation should make a formal, written request to me for alternate dates and/or means of satisfying academic requirements. Such requests should be made during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist, but no later than two weeks before the compulsory event. Accommodation is to be worked out directly and on an individual basis. I will make accommodations in a way that avoids academic disadvantage to the student.

Students who have questions or want to confirm accommodation eligibility of a religious event or practice may refer to the Equity Services website for a list of holy days and Carleton's Academic Accommodation policies, or may contact an Equity Services Advisor in the Equity Services Department for assistance.

### **For Pregnancy:**

Pregnant students requiring academic accommodations are encouraged to contact an Equity Advisor in Equity Services to complete a *letter of accommodation*. The student must then make an appointment to discuss her needs with me at least two weeks prior to the first academic event in which it is anticipated the accommodation will be required.

## **Caveats**

### Changes to Syllabus

This syllabus is subject to change at the instructor's discretion.

If the TAs go on strike, there will be substantial changes to the syllabus.

In the event of changes, I promise to provide adequate notice and a revised syllabus via WebCT.

### Participation

Please contact the relevant people, which could mean me, if you have good reason for wanting an alternative to participation marks. Reasons for not participating verbally could include cultural or physical reasons. If this is a matter for Paul Menton Center or Equity Services, then please contact them first. If this does not fall under their auspices, then please contact me. We can come up with alternative ways to evaluate participation other than verbal participation.

However, please be aware that the alternatives will probably be more labour intensive for both you and me.

### Readings

The readings from the primary literature listed on page 4 herein are available from the Carleton Library. It is your job to download, print, and read them before the assigned class.

### Extra Credit

There will be a trio of opportunities in February to garner extra credit. There will be public evolution lectures on Wednesday 4 February and Friday 13 February, each at 8 pm in the Kailash Mital Theatre (Southam Hall). If you attend and make sure that I have recorded your attendance, you will earn extra credit. The 4 February lecture by Andrew Simons and Charles Goodnight will be an introduction to evolution and will be worth one point of extra credit. The 13 February lecture by Patty Gowaty will be on sexual selection and will be worth two points of extra credit. The third opportunity will be for one point of extra credit for attendance at a panel discussion in the afternoon of Thursday 12 February (location and time to be determined) on Darwinian perspectives on global climate change.

### Deferred Final Exam

Deferred exams are generally only granted to students who cannot take the regularly scheduled exam due to illness. Students must present a doctor's note to the registrar using the Carleton University Medical certificate (<http://www.carleton.ca/registrar/forms.htm>) within five working days of the date of the final exam. The deferred exam replaces only the final exam portion of the marks and students must have completed satisfactory term work to be granted this privilege.

Deferred final exams will cover the same material as the regular final exam. However, the format of deferred exams will differ because it is only given to one or a few students, not dozens of students.