Department of Biology Course Outline

SC/BIOL 3300 3.00 Origins and Development of Biological Theories
Fall 2020

Course Description
An analysis of the origins and development of biological theories, which may include those in evolutionary biology, ecology, biodiversity, and molecular phylogenetics.

Prerequisites
Note: Open only to students in the third or final year of a biology program, or with permission of the instructor. Only open to students who have completed a minimum of 12 credits at the 2000 level in Biology courses. Course Credit Exclusion: SC/BIOL 4300 3.00

Course Instructors and Contact Information
Professor Jan Sapp
Email biol3300@yorku.ca
Office: Farquharson 306.

Schedule
Class time: Thursdays 14:30-17:30
Location: delivered remotely on zoom for live stream lectures. Students will require a computer and internet service. Lectures will also be recorded.
• For outside class time questions, I will provide “office hours” after class. You may also contact me at biol3300@yorku.ca.
Evaluation

**Midterm test:** 25% October 22 - based on lectures and required readings. Jan Sapp, *Co-existence: The Ecology and Evolution of Tropical Biodiversity* (OUP 2016). Chapters supplied on course e-class. **The mid term test may be conducted with the aid of an online proctoring service. All students must write the test on October 13.**

**Research Proposal:** 15%, due date October 1. Assessment will be based on formulation of the questions of your essay highlighting the significance of the research you will write about, and how you will investigate the origins and development of that research. ~250 words, plus a bibliography indicating the literature you intend to study. **To be submitted through turnitin on the e-class site for the course.**

**Student presentations (20%).** Students will give 10 minute PowerPoint presentations of their individual work. Each student will be assessed only on their own presentation and lead class discussion. Students will work in groups on an over arching topic and will be responsible for coordinating their individual projects such that they are partitioned so as to form a coherent series, with little overlap.

**Class participation:** *All students will offer written evaluations of all talks.* Note up to 10% of final mark will be deducted for lack of class attendance and participation; 10% off for three classes missed.

**Essays:** 40% due December 6, -8 pages, double-spaced, 12 pt font (2000 words), plus references with scholarly formatting **(NOTE: At least 7 journal articles and/or scholarly books must be used and properly referenced in the essay. Final essays will be submitted through turnitin on the e-class site for the course. Your aim to write an historical narrative required, Tell a story, not a textbook or Wikipedia entry: What? Where? When? Who? Why? How?. Avoid passive tense such as “it was found” etc. Who reported something: When? Where? Why? Based on what data?**

Final course grades may be adjusted to conform to Program or Faculty grades distribution profiles.

Important Dates

**Dates of Tests/Exams, Due Dates of Major Assignments, First class, last class, drop date, etc.**

First day of Class; September 10
Final day of Class December 3
Research proposals due: October 1
Mid term test: October 22
Reading week: October 10-16
Final term paper due: December 6

NOTE: for additional important dates such as holidays, refer to the “Important Dates” section of the Registrar’s Website at http://www.yorku.ca/yorkweb/cs.htm

Resources

Course E-class: Jan Sapp, Co-existence: The Ecology and Evolution of Tropical Biodiversity (OUP 2016) Required readings for the lecture part of the course and lectures will be provided on moodle. PowerPoint slides will also be made available to the class through the course Moodle site. See also “Getting started” on the course Moodle site for references to suggested topics.

Learning Outcomes

Upon successful completion of this course, you should have acquired some understanding of some of the major changes that have occurred in evolutionary biology and ecology resulting from molecular phylogenetics. You should have improved your ability to read scientific literature critically, to write a scholarly report, and to give an oral presentation.

Course Content

The aim of this course is to introduce you to some major contemporary trends in evolutionary biology and ecology. My lectures will be focussed on the evolutionary ecology of tropical biodiversity. Your essays will be focussed on various contemporary issues in ecology and evolution and the impact of molecular phylogenetics. You will learn how to analyze primary scientific literature and situate the development of new research programs, and to examine the complex relations between theory and techniques. You will work in groups, write essays, and give oral presentations. Suggested research topics include: human microbiomes, evolutionary medicine, human origins, epigenetics, hybridization in evolution, convergent evolution origins of life, the origins and evolution of viruses, ecology and evolution of emerging infectious diseases, mass extinctions.

Class Schedule

September 10: Introduction, methods for writing a term paper for this course, topics and forming groups.

September 17: Three Domains, Symbiosis and Lateral gene Transfer.

Required reading- on moodle:
Gilbert, Scott, Jan Sapp, and Alfred Tauber, “A Symbiotic View of Life, We have never been individuals,” Quarterly Review of Biology 87(2012): 325-341.
September 24: Why are there so many kinds of plants and animals?
**Required readings:** on moodle
*Chapters 1, 3, 4, 5*

October 1: How can so many species live together?
**Required readings:**
Jan Sapp, *Co-existence: The Ecology and Evolution of Tropical Biodiversity*
*Chapters 9, 10, 11, 13,*

October 8: Adaptations, cryptic species, insects and microbes *(proposals also due)*
**Required readings:**
Jan Sapp, *Co-existence: The Ecology and Evolution of Tropical Biodiversity*
*Chapters 15, 16, 17, 18*

October 10-16 reading week
October 22: Test on lectures and required readings
October 29: workshop
November 7: Student Presentations
November 14: Student Presentations
November 21: Student Presentations
November 28: Student Presentations
December 3: Student Presentations

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**Course Policies**

**MISSED test or missed due date on assignment:**

If you miss a test with a legitimate documented reason, permission may be granted to take a **makeup test. Makeup tests may be conducted orally over zoom.** Remember a computer internet connection is a requirement of this course. All students must write the make up. If your internet happens to fail the hour of the test, tethering a cell phone should work.

**Assignment and midterm dates** are non-negotiable. They have been structured to distribute your workload over the term. There are no alternative assignments that can be completed for you to increase your mark, and the value of any missed assignment cannot be transferred to another.

20% of the value will be deducted for any assignment not completed on the due date.

**Recording Lectures:**
Images and material presented are subject to Canadian copyright law. Audio-visual recordings are used ONLY as a personal study aid, and are NOT sold,
The lectures are the intellectual property of the professor and cannot be distributed without permission.

**University Policies**

**Academic Honesty and Integrity**
York students are required to maintain the highest standards of academic honesty and they are subject to the Senate Policy on Academic Honesty ([link](http://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/)). The Policy affirms the responsibility of faculty members to foster acceptable standards of academic conduct and of the student to abide by such standards. There is also an academic integrity website with comprehensive information about academic honesty and how to find resources at York to help improve students' research and writing skills, and cope with University life. Students are expected to review the materials on the Academic Integrity website at - [link](http://www.yorku.ca/academicintegrity/)

**Access/Disability**
York University is committed to principles of respect, inclusion and equality of all persons with disabilities across campus. The University provides services for students with disabilities (including physical, medical, learning and psychiatric disabilities) needing accommodation related to teaching and evaluation methods/materials. These services are made available to students in all Faculties and programs at York University. Student's in need of these services are asked to register with disability services as early as possible to ensure that appropriate academic accommodation can be provided with advance notice. You are encouraged to schedule a time early in the term to meet with each professor to discuss your accommodation needs. Please note that registering with disabilities services and discussing your needs with your professors is necessary to avoid any impediment to receiving the necessary academic accommodations to meet your needs. Additional information is available at the following websites:
- Counseling & Disability Services - [link](http://cds.info.yorku.ca/)
- Ethics Review Process - [link](http://cds.info.yorku/ca/)

**Ethics Review Process**
York students are subject to the York University Policy for the Ethics Review Process for Research Involving Human Participants. In particular, students proposing to undertake research involving human participants (e.g., interviewing the director of a company or government agency, having students complete a questionnaire, etc.) are required to submit an Application for Ethical Approval of Research Involving Human Participants at least one month before you plan to begin the research. If you are in doubt as to whether this requirement applies to you, contact your Course Director immediately.

**Religious Observance Accommodation**
York University is committed to respecting the religious beliefs and practices of all members of the community, and making accommodations for observances of special significance to adherents. Should any of the dates specified in this syllabus for an in-class test or examination pose such a conflict for you, contact the Course Director within the first three weeks of class. Similarly, should an assignment to be completed in a lab, practicum placement, workshop, etc., scheduled later in the term pose such a conflict, contact the Course director immediately. Please note that to arrange an
alternative date or time for an examination scheduled in the formal examination periods (December and April/May), students must complete an Examination Accommodation Form, which can be obtained from Student Client Services, Student Services Centre or online at
http://www.registrar.yorku.ca/pdf/exam_accommodation.pdf (PDF)

Student Conduct in Academic Situations

Students and instructors are expected to maintain a professional relationship characterized by courtesy and mutual respect. Moreover, it is the responsibility of the instructor to maintain an appropriate academic atmosphere in the classroom and other academic settings, and the responsibility of the student to cooperate in that endeavour. Further, the instructor is the best person to decide, in the first instance, whether such an atmosphere is present in the class. The policy and procedures governing disruptive and/or harassing behaviour by students in academic situations is available at - http://secretariat-policies.info.yorku.ca/policies/disruptive-andor-harassing-behaviour-in-academic-situations-senate-policy/

Suggested Essay Topics

How has molecular phylogenetics changed evolutionary and ecological theory?

Your aim to write an historical narrative required, Tell a story not a textbook or Wikipedia entry: What? Where? When? Who? Why? How?. Avoid passive tense such as “it was found” etc. Who reported something: When? Where? Why? Based on what data?

1. Punctuated evolution

a Hybridization


b Wolbachia and speciation


c) Viruses as agents of evolutionary change in animals and plants


2. Microbiomics


e **Schizophrenia** T.G. Dinan et al., Genomics of schizophrenia: time to consider the gut microbiome? *Molecular Psychiatry* (2014) 19


G. Microbiome of plants

3. **Evolutionary medicine**

What is evolutionary medicine? How is it defined? What is its scope? What are its aims?

RM Nesse et al.; Bergstrom, CT; Ellison, PT; Flier, JS; Gluckman, P; Govindaraju, DR; Niethammer, D; Omenn, GS et al. (2009). Evolution in Health and medicine,” *PNAS* 107 suppl 1800-1807


4 **Epigenetics and Evolution**

What is epigenetics? When was it coined? What are its mechanisms? What are its meanings for development and evolution?


Eva Jablonka and Marion Lamb, *Evolution in Four Dimensions* 2005


5. Convergent Evolution

G. McGhee, *Convergent Evolution: Limited Forms Most Beautiful*

a) Convergent evolution of eyes

b) Convergent evolution of wings

c) Convergent evolution of fish

5. Human Origins:

Mitochondrial Eve

What is “mitochondria eve”? 

What methods? 

What conclusions? 

Who did the research? 


6. Evolving humans

A) STEM CELL RESEARCH


b Antibiotic Resistance


Mary Barber, Staphylococcal Infection Due to Penicillin-Resistant Strains," British Medical Journal 1947: 863-865; 863, 865.


Angela Creager, “Adaptation or Selection? Old Issues and New Stakes


c The evolutionary ecology of infectious diseases

Zika Virus.

Lyme disease

COVID 19

Ecological factors Migration, climate change, agriculture

Evolutionary change in pathogens and hosts?


7 Origins of Life on Earth

Where and how did it happen?

Origin of Life and Hydrothermal vents


8. *On the origin of Viruses*:


9. What caused the Cambrian explosion?

