

# **BIOC16H3 – EVOLUTIONARY GENETICS AND GENOMICS**

**Winter 2016**

## **Course Syllabus**

**Lecture: Tuesday, 14:00-16:00, AA 208**

**Tutorial: Thursday, 13:00-15:00, IC 320**

**Instructor:** Dr. Marc Champigny

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**Course description:** This course will cover the fundamentals of modern ecological and evolutionary genetics and genomics. The course begins with an overview of genetic variation, its measurement, and the forces responsible for the origin and maintenance of variation. The remainder of the course describes the ecological and evolutionary context of natural selection as well as the forces that shape genetic variation within and between species. Emphasis will be placed on experimental studies of natural populations, and the relationships between theory and experiments. Overall, the aim of this class is to enable students to apply insights gained from classic and modern genetic and genomic techniques to understand how variation is produced, maintained and distributed in populations.

**Required textbook** (available at campus bookstore):

Connor, J.K. and Hartl, D.L. (2004). A Primer of Ecological Genetics. Sinauer Associates.

**Additional recommended book** (this one is less expensive to purchase through Amazon and I recommend that several students share one copy):

Pagel, M. and Pomiankowski (eds). (2008). Evolutionary Genomics and Proteomics. Sinauer Associates.

<http://www.amazon.ca/Evolutionary-Genomics-Proteomics-Mark-Pagel/dp/0878936548>

**Other readings:** Additional readings, including pdfs for the tutorial paper discussions will be available on Blackboard.

**Tutorials:** Weekly tutorials will be run as discussions of key scientific papers and associated methodologies. The beginning weeks will feature example presentations and presentation tips and expectations by the TAs. The following weeks will consist of presentations and discussions led by students in the class. Each student is required to present one paper during the term and lead the corresponding class discussion pertaining to the paper. A grading outline will be discussed during the initial tutorials. A list of papers will be provided by the instructor/TAs.

Students are also required to submit nine assignments during the term that consist of journal paper summaries and discussion questions. Note that this includes one summary per week, however students are not expected to submit a summary on the week of their own presentation. For the summary assignments, students must select one paper from the papers to be discussed each week and submit a single page précis that summarizes the hypotheses, experimental approaches, major findings and broad significance of the paper. In addition, students must also submit four discussion questions stemming from that paper.

**Grading and Evaluation:**

Final Exam (3 hrs)	35%
Midterm Exam (In class, 2 hrs)	25%
Presentation and Discussion	20%
Paper Summaries with Questions	15% (9 x 1.67% each)
Class and Tutorial Participation	5%

*Please note:*

*The final examination will be cumulative although greater emphasis will be placed on the material covered after the midterm exam.*

A review session prior to the midterm and final exams will be scheduled (time and location TBA) given enough student interest.

**Academic Policies:** The University of Toronto has strict policies on academic integrity and plagiarism. Academic dishonesty tarnishes the reputation of the university and discredits the accomplishments of students. The university is committed to providing students every possible opportunity to grow in mind and spirit; however, this pledge can only be redeemed in an environment of trust, honesty and fairness. As a result, all members of the academic community regard academic dishonesty as a serious offense. This policy sanctions students engaging in academic dishonesty with penalties up to and including expulsion from the university for repeat offenders.

For more information, please follow this link for the University of Toronto's Code of Behaviour on Academic Matters: <http://www.governingcouncil.utoronto.ca/policies/behaveac.htm>

**Access for Students with Disabilities:** Individuals who have any disability, either permanent or temporary, which might affect their ability to perform in this class are encouraged to inform the instructor at the start of the term and also contact *AccessAbility*. Materials or testing may be modified to provide for equitable participation. The instructor and TAs will work with you and *AccessAbility* Services (located in SW302) to ensure that you can achieve your learning goals in this course. Enquiries are confidential, staff are available by appointment to assess specific needs, provide referrals and provide appropriate accommodations. 416 287 7560 or [ability@utsc.utoronto.ca](mailto:ability@utsc.utoronto.ca)

**Missed Exams:** There will be no make-up examination for missing the midterm. Students unable to attend the midterm for religious or other acceptable reasons must notify the instructor as soon as possible. Students who are unable to attend the midterm due to illness must notify the instructor within three working days of the test. Acceptable reasons for missing the test include: illness (a doctor's note will be required, see below), death of a close family member, and *severe* storm delays. Unacceptable excuses include: having another midterm on the same day, travel plans, and minor traffic or weather disruptions.

Students who miss the midterm for a medical reason must present a completed UTSC medical certificate (available via the registrar's website) that confirms their illness, and medical attention, at the time of the exam. *Medical certificates will be verified.* Students who miss the midterm and have provided acceptable documentation must make arrangements with the instructor for alternative evaluation or increasing the weight of their final exam. Students that miss the midterm with no acceptable, documented reason will receive a grade of zero. Students who miss the final exam must petition the Registrar according to UTSC policy in order to write a deferred exam.

**Disclaimer:** The instructor reserves the right to modify this syllabus, lecture schedule and tutorial schedule as necessary throughout the term to better achieve course objectives and enhance the quality of instruction. As such, the lecture and tutorial outlines provided are tentative. Notification of changes will be made in class and the most up-to-date version will always be the one posted on Blackboard. You are responsible for being aware of your duties including presentation times and topics.

### Tentative lecture schedule

<b>Date</b>	<b>Topic</b>	<b>Reading</b>
Jan 5	Introductions/ Syllabus	
Jan 12	Foundations / Genetic variation	C&H Ch1 + 2
Jan 19	Changes in allele frequency I	C&H Ch 2/3
Jan 26	Changes in allele frequency II	C&H Ch 3
Feb 2	F-Statistics and population differentiation	C&H Ch 4
Feb 19	Quantitative genetics I: Introduction and heritability	C&H Ch 4
Feb 16	<i>No lecture – reading week</i>	
Feb 23	<b>Midterm exam (in class)</b>	
Mar 03	Quantitative genetics II	C&H Ch 4
Mar 8	Next-generation sequencing	TBA
Mar 15	Detecting selection in genomes	Biswas & Akey, 2006 Vitti et al, 2013
Mar 22	Origin of new genes and lateral transfer	P&P Ch 3/4
Mar 29	Students' choice	TBA