

**WELCOME TO GENETICS!**

In this course we consider many important areas of genetic study including eukaryotic patterns of inheritance, genetic mapping, mutation and use of genetics for understanding gene function, chromosome organization and mutation, and Recombinant DNA technology and genome analysis. To take this course you need to have successfully completed BIOB10H, BIOB11H and *either* MATA21, MATA35, MATA36, MATA37, STAB22 or PSYB07 or an equivalent course. Prerequisites are enforced for your benefit.

The knowledge you learn in this course is valuable for the practice of health or veterinary-related science, genetic counseling, genetic diagnostics, the use of genetics and molecular technologies to better understand complex biological processes, and for serving as a science-literate citizen in a complex world. If you keep up with the workload of this course it is also fun!

**INTERACTION TIMES**

Lectures for this course are Wednesdays 9-11 in SW319 (there are two in class tests at this time) and Fridays days 8-9 also in SW319.

Students and their TA meet once per week in SW248 or SW250 at times indicated in the timetable. Students organize into teams; each team has some lab work outside of the normal practical meetings in weeks 2-8.

Dr. H's regular office hours are held in the lab (SW250), Fridays 4-6.(but no office hours Sept 14<sup>th</sup>) email questions welcome (hasenkampf@utsc.utoronto.ca), but allow two working days for response time.

Dr H is available for all questions about lectures and test content and is also able to provide advice about the fly crosses, and general program and post-graduation planning.

**LEARNING OBJECTIVES**

1. Students will be able to inter-relate chromosome behavior during meiosis with the key rules of inheritance: segregation of alleles, independent assortment, sex linkage, linkage, and maternal inheritance.
2. Students will combine their knowledge of probability theory with the rules of inheritance to do pedigree analysis and accurately predict genetic outcomes. Additionally students will be able to interpret pedigrees and phenotypic ratios to determine if genes are autosomal or sex-linked, linked or sorting independently, and genotypes of parents.
3. Students will develop an appreciation of how genes work within organisms and will be able to use this knowledge to understand and predict phenotypic ratios. Also they will be able to interpret phenotypic ratios to identify the number of genes, allelic relationships, dominance relationships, and types of interaction gene interactions in biological pathways.
4. Students will do genetic crosses using the model organism *Drosophila melanogaster* to deduce the genotype, mode of inheritance, dominance relationship(s) and recombination frequency map distances and interference of several *Drosophila* genes. These classical genetic techniques will provide students with first hand experience with the rigor and precision needed to perform biological experiments, and with the difficulties, frustrations and errors that can occur.
5. Students will gain experience working collaboratively as part of a team to accomplish the work of a set of experiments. This includes learning to distribute a task's workload equitably and giving each other productive feedback in a professional and constructive manner.
6. Students will evaluate their data and create a group oral and an individually written report of their

experiment that effectively communicate complex ideas to colleagues.

7. Students will efficiently search the primary literature for an article related to their experiment, and provide a concise analysis of key findings of the research article.
8. Students will examine the cellular processes that combat DNA damage and replication errors, and will be able to analyze how mutations can be used to explore biological processes, genome structure and evolution.
9. Students will be able to characterize the types of DNA and chromosomal mutations and will understand the origins and consequences of these mutations.
10. Students will be able to describe the key molecular technologies that led to the sequencing of the human genome (and other model organisms) and will understand how entire genome sequencing has led to systems approaches to understanding biochemical and developmental pathways, human diseases and related therapeutic approaches.

**To do well in this course it is vital to keep up with the work on a weekly basis: understanding the key concepts, completing assigned problems to develop skill in using the concepts, and doing weekly lab work on time.** For example, by Monday of week 2 you will need to understand and be able to use, the material of week 1, etc throughout the course.

#### COMMUNICATION INFORMATION

Course announcements, communications and lecture notes will be available on the BIOC15 Blackboard course site. Be sure you have a Utorid and know how to access the Blackboard sites. Check the Blackboard site regularly for important, time-sensitive announcements.

Normally, students will be required to submit their course essays to Turnitin.com for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the Turnitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com web site. You will be given instructions on how to submit your assignment to TurnItIn by your Teaching Assistant in advance of the submission deadline.

Lectures will be videotaped and class notes likely will be posted within 24 hrs AFTER the relevant class meeting. But creating a class with effective learning is a two-way exchange; I need your feedback and interactions to understand how well I am getting the ideas across, so I need many students attending class! If class attendance drops off too much the videotaping will stop.

Learn the name of your TA and interact with your TA and fellow students with respect. They are your important learning partners! Questions about lab work and assignments, lab quizzes etc should be addressed to your TA.

**Course evaluations for this course and all UTSC courses will be done on-line; please participate. Your assessments and insights are important!**

#### ABSENCE POLICY

If you are ill or otherwise prevented from attending either of the two tests or any lab practical due to a grave circumstance, contact Dr. Hasenkampf by email within three days of the test/lab giving the reason. Medical notes or other official documentation of a serious nature are required so get them during the time period of any illness or other grave circumstance. Dr. Hasenkampf will communicate to your TA if you have an acceptable reason for missing a lab practical session. Remember this course is about learning Genetics. When you are well, work hard and engage! If you are sick take care of yourself, do what you can from home and get back into the swing of the course once you are well.

## IMPORTANT ACQUISITIONS

The textbook for this course is Genetics from Genes to Genomes, 4th edition by Hartwell, Hood, Goldberg, Reynolds, Silver and Veres. It is packed as a bundle with the Solutions manual. The textbook/solutions manual bundle may be purchased at the bookstore. The third edition is acceptable too. But if you buy a used copy be sure they include the solutions manual!

The lab manual is posted on the Blackboard course site. You need to download your copy and bring the relevant part to each lab.

## INFORMATION ON TERM TESTS AND COURSE ASSIGNMENTS

There will be two, IN CLASS term tests (October 10<sup>th</sup> and November 7<sup>th</sup>) and a comprehensive final exam. The final exam is held during the examination period.

**There will be no makeup test for the two, term tests.** Anyone missing either of the term tests (and who has a **valid** and **documented** medical or serious personal problem to miss that test) will have access to that test and have access to the answers (for self-assessment), but will recover the lost marks by having to take a final exam which has the relevant portion of the comprehensive final exam more heavily weighted (and may include a few extra questions) and the final exam will be worth more of their final grade.

Anyone without an acceptable (and documentable) reason for missing a test (or assignment or lab) will receive the grade of zero for the relevant work. To be eligible to recover the marks missed on a test, etc. you are required to contact Dr Hasenkampf, within 72 hours of the test or assignment and provide the appropriate medical or other type of documentation within one week of the test.

Test content, and the level of detail of tests and the exam will be as covered in the lecture class notes, assigned problems, assigned independent reading, the figures from the textbook (as assigned in the lecture class notes) definitions in bold in the lab manual and the questions and answers posed within the lab manual. In our class meetings I try to highlight the most important and/or most challenging concepts and applications, but the posted lecture class notes are the definitive source for lecture content that might be included on the two in class tests or the final exam.

### FINAL EXAM

The final exam in this course is comprehensive in nature, covering topics from throughout the course. The Final exam will be held in the examination period. Anyone absent from the Final exam must petition the registrar's office to take a deferred exam.

## LAB MEETINGS

Each of you is assigned to one practical section that you must attend on a weekly basis. **In addition to this time period, you must also work with your lab team, having some members attend the genetics lab at other posted times to create your genetic crosses and collect data.** Attendance in labs is mandatory; absence will reduce your mark. **The success of your genetic crosses requires coordinated teamwork.** Please develop a good working relationship and effective communication system with your team members. The ability to work as part of a team is an important life skill; use this course as an opportunity to improve your abilities. The lab work is designed to reinforce the concepts and problems considered in the class meetings and assessed on the tests and exam. If you fully engage with the lab work it will improve your learning in genetics.

## MARKING SCHEME FOR THE COURSE

Test 1 October 10 <sup>th</sup>	17 %	In Class time
Test 2 November 7 <sup>th</sup>	17 %	In class time
Final exam	42 %	(Comprehensive for all lectures) in final exam period
Lab performance	12%	(attendance, participation, ability to work fairly and effectively as a team-member, lab assignments.
Oral report	2%	
Written lab report	10%	

The University of Toronto is dedicated to fostering an academic community in which the learning and scholarship of every member may flourish, with vigilant protection for individual human rights, and a resolute commitment to the principles of equal opportunity, equity and justice. The instructors and Teaching Assistants of BIOC15 fully endorse this policy.

#### ACADEMIC INTEGRITY

The University treats cases of cheating and plagiarism very seriously. The University of Toronto's *Code of Behaviour on Academic Matters* (<http://www.governingcouncil.utoronto.ca/policies/behaveac.htm>) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences.

Potential offences in papers and assignments include using someone else's ideas or words without appropriate acknowledgement, submitting your own work in more than one course without the permission of the instructor, making up sources or facts, obtaining or providing unauthorized assistance on any assignment.

On tests and exams cheating includes using or possessing unauthorized aids, looking at someone else's answers during an exam or test, misrepresenting your identity, or falsifying or altering any documentation required by the University, including (but not limited to) doctor's notes.

Please avoid academic dishonesty, express faith in your own abilities and commit to learning!

#### ACCESSABILITY

Students with diverse learning styles and needs are welcome in this course! In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or the AccessAbility Services Office as soon as possible. I will work with you and AccessAbility Services to ensure you can achieve your learning goals in this course. Enquiries are confidential. The UTSC AccessAbility Services staff (located in SW302) are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations (416) 287-7560 or [ability@utsc.utoronto.ca](mailto:ability@utsc.utoronto.ca).

SCHEDULE OF LECTURE TOPICS AND IN CLASS TESTS. (Lab schedule is in the lab manual)  
Please note this is topic-order, but we occasionally get a little ahead or a little behind the posted dates.

September 12, 14	Course Overview, The Patterns of How Genes Are Transmitted (Chapter 2)
September 19, 21	How Genes (& the environment) interact to determine phenotypes (Chapter 3) Mutational & Analysis
September 26, 28	Statistical Methods (Chapter 3), Mitosis and karyotyping (part of Chapter 13) Chromosome Behavior Accounts for the Inheritance of Nuclear Genes (Chapter 4)
October 3,5	Chromosome Behavior Accounts for the Inheritance of Nuclear Genes
October 9	Special pre-test office hours 4-6 pm in IC367
<b>October 10</b>	<b>Test 1</b>
October 12,17,19	Mapping genes to chromosomes using organismal phenotypes (Chapter 5)
October 24, 26	DNA Damage, Repair and Gene Mutation (Chapter 7), Karyotyping
Oct 31, Nov 2	Chromosome Mutations –Chromosome rearrangements (Chapter 13) Costumes welcome Oct 31 <sup>st</sup> !
Nov 6	Special pre-test office hours (IC367) 4-6pm

**Nov 7****Test 2**

November 9, 14

Chromosomal mutations – changes in the number of chromosomes

*Week of Nov.19<sup>th</sup>**Oral reports in lab practicals*

Nov 16, 21, 23

Molecular Biology and Recombinant DNA technology

November 28, 30

The Human Genome Sequencing Initiative, and Genomic Approaches  
(Chapter 10 and Parts of 11)

November 26th

The written lab reports are due on Monday November 26<sup>th</sup> 4 pm to Dr H in IC 367  
or to Gloria Luza in SW420B.You must also submit an identical version of the lab  
report through TURNITIN for the same deadline; your TA will provide instructions.

After 5pm November 26<sup>th</sup> there is a 5pt penalty, after 5 pm November 27<sup>th</sup> there  
is an additional 5pt penalty etc, for each additional day the report arrives late.  
PLEASE TURN IN YOUR REPORT ON TIME for the best chance for a high mark and  
to allow you time to move on to your other important commitments!