BIOC15 Fall 2017 Genetics Course Official Syllabus  Professor Clare Hasenkampf

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 (or BIOB10Y)] and [PSYB07 or STAB22, or an equivalent statistics course]. Prerequisites are enforced for your benefit and that of the other students in the course.

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 systems. It also will help you be a better science-literate citizen in a complex world. If you keep up with the learning activities of this course it also can be fun!

INTERACTION TIMES AND COMMUNICATION METHODS

Lectures for this course are Wednesdays 9-11 and Friday 9-10 in SW309. **Labs** There are 9 formal lab meetings, starting in the week of Sept 11; the practicals are held in SW248 or SW250.
They occur as follows

P01 Mon 10am-1pm	P03 Tue 11am-2pm	P04 Tue 2-5pm
P06 Tue 6-9pm	P07 Wed 1-4 pm	

You must attend the practical you are registered in. Students organize into teams of 4-5 students.

Because you are doing real genetics experiment, from start to finish, each team has some lab work outside of the normal practical meetings from Sept 11th- Nov 3rd. (including Reading Week). It is therefore vital that teams equitably distribute the team's lab work so no one person has too much lab work to do, and to share accurate team experimental data.

Dr. H's office hours are 4-6 Mondays and Tuesdays in SY246.
email questions are welcome (hasenkampf@utsc.utoronto.ca), but allow two working days for response time. (note complex genetics questions can not be done by email)

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.

For specific questions about your labs, contact your TA or the Head TA, Mr. Peilu email p.gan@mail.utoronto.ca

LEARNING GOALS AND OUTCOMES FOR BIOC15 GENETICISTS

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 likely 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 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.

5. Students will be able to characterize the types of DNA- and chromosomal mutations and will understand the origins and consequences of these mutations. Students will be able to predict the impact on chromosomal mutations on inheritance

and phenotypes conversely determine the type of chromosomal mutation that has occurred based on altered inheritance pattern and phenotypes.

6. 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. Students will be able to use this knowledge to interpret molecular phenotypes and relate them to genotypes and organismal phenotypes.

7. 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.

8. 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 to give each other productive feedback in a professional and constructive manner.

9. Students will evaluate their data and create a group oral and an individually, personally written report of their experiment that effectively communicates complex ideas to colleagues.

10. Students will critically read an assigned research article, provide a concise analysis of key findings of the research article and relate the work to the mechanisms of eukaryotic inheritance.

11. Students will practice communicating as a professional in all communications for this course: emails to team mates, TAs and instructor, and in the careful organization of lab notebook and accurate and time stamped data collections, and in oral and written assignments.

To do well in this course and avoid unnecessary stress it is vital to keep up with the work on a weekly basis: understanding the key concepts, completing assigned activities 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. To help you make a strong start with this learning pattern there will be weekly online quizzes for the lecture content and unannounced but frequent lab quizzes. For the online lecture quizzes you can work cooperatively with friends for the online quizzes but you must each complete the quiz by its closing date to receive credit, and you must be a participating thinker in the final solutions!

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.
Your TA will give you instructions on how to submit your assignment to TurnItIn in advance of the submission deadline.

Lectures notes typically 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!

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 to me in particular and the university in general!

ABSENCE POLICY

If you are prevented from attending or completing a course requirement (test, lab, or assignment), due to any illness or other circumstance of a grave nature, contact Dr. Hasenkampf by email within two days of the missed requirement, clearly stating the reason. In addition to this email notification, you need to complete the 'Verification of illness or injury'- form or other official documentation of the grave circumstance and deliver it to Jennifer Campbell in the Biological Sciences office (SW421D) during regular working hours Monday -Friday. These documents will be used to determine eligibility to recover any lost marks.
The 'verification of illness or injury' form can be found at
http://www.illnessverification.utoronto.ca/document/Verification%20of%20Student%20Illness%20(VOI)%20-%20Oct%2027%202016.pdf

Acquaint yourself with its content such that in case of an emergency you can obtain the essential information required, even in the absence of the official form.

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. Feel free to contact me for help strategizing for getting caught up.

IMPORTANT ACQUISITIONS

The textbook for this course is Genetics from Genes to Genomes, 2nd Canadian edition. It is packed as a bundle with the Solutions manual. The textbook/solutions manual bundle may be purchased at the bookstore.

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

INFORMATION ON TERM TESTS AND COURSE ASSIGNMENTS

There will be one, IN CLASS term tests (Oct 18th) and a comprehensive final exam. The make up test will be the following Monday (Oct 23th) for those who have provided the requirement documentation of a grave circumstance. The format of the make up test may well be different from the original test. The final exam is held during the examination period.

Anyone missing the term test (and who has a valid and documented medical or serious personal problem to miss that test) must notify Dr. Hasenkampf within 48 hrs of the test (October 18thth) and provide the appropriate documentation before or at the make up test on Monday October23th).

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.

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.

Doing well is not just about having a good set of notes! To convert the information in the lecture notes to your own working knowledge of genetics you need to consider the content compared to what you already know, and how you can use the content to solve real world genetic problems. Doing the assigned genetics problems is very important.

One good way to assess how well you are doing this is to come to class and to fully engage with the learning activities of BIOC15.

FINAL EXAM

The final exam in this course, as in the challenges we face in life, is comprehensive in nature. For BIOC15 this means the exam will assess your working knowledge of our 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

Labs start in the second week of classes in the week of Sept 11th. Each of you is assigned to one practical section that you attend on a weekly basis. In addition to this time period, additional lab work will need to be done by your lab team; some members

attend the genetics lab at additional 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 18th	20 %	In class October 18, 2017
Lecture quizzes	18 %	online through the course site 2% each quiz
Final exam	37 %	(Comprehensive for all lectures)
Research article quizzes	1.5%	(online 0.5% each)
Oral lab report	2%	
Research paper Analysis	2.5%	
Lab Report	9%	
Weekly Lab work	10%	(participation, ability to work fairly and effectively as a team-member, lab assignments, lab quizzes)

Very Important Information - This is a lecture and laboratory course. To pass this course you must have an overall passing grade AND pass the laboratory portion of the course (lab engagement and oral and written reports)

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 instructor 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, have confidence in your own ability to learn and grow academically by doing your own thinking and writing! I know you can learn a lot about genetics and yourself in this course.

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 Access*Ability* Services as soon as possible. Access*Ability* Services staff (located in Rm SW302, Science Wing) are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations 416-287-7560 or email ability@utsc.utoronto.ca. The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.

SCHEDULE OF LECTURE TOPICS AND IN CLASS TESTS. (Lab schedule is in the lab manual)

Please note this is the topic-order, but we occasionally get a little ahead or a little behind the posted dates.

Sept 6,8 (C1, C2)	Overview of BIOC15 and Modern Genetics (Chapter sections 1.1- 1.4), and Inheritance – Mendel's First and Second Laws & Probability Chapter sections 2.1-2.2), and Pedigree analysis (2.3)

	No labs in the first week of class
Sept 13,15 (C3, C4)	Extensions of Mendelian Analysis: Dominance Relationships and Multiple alleles, wild type and mutant alleles (Chapter sections 2.4 and figures 7.22- 7.24 and related text) How Genes (& the environment) interact to determine phenotypes (Chapter sections 2.4- 2.5) and Using Mutational Analysis to understand how phenotypes are determined (Chapter section 8.4)
	Labs begin this week
Sept 20,22 (C5,C6)	Extensions of Mendelian Analysis: Genes' Products Interactions and Continuous Traits (Chapter section 2.4- 2.5); Chromosome Theory of Inheritance Mitosis (Chapter sections 3.2-3.3) and Meiosis (3.4)
Sept 27,29 (C7,C8)	X-linkage: an exception to Mendel's First Law, Sex Determination, (Chapter sections 3.6& 3.7) & nonNuclear Inheritance- another exception to Mendel's First Law; Linkage- an Exception to Mendel's Second Law (genes don't always sort independently) (Chapter section 4.1 & 4.2)
Oct. 4,6 (C9, 10)	Mapping genes on chromosomes using recombination frequencies (Chapter section 4.3), Recombination & Special Mapping techniques; Chi-Square Test and Linkage analysis section 4.3)
Reading Week Oct 9-13	Reading Week, no classes but don't forget to assign team members to do fly matings
Oct 18,20 (C11,12)	**Test 1 (Oct 18 in class)** **(make up for those with a validated strong reason to have missed the test (Monday Oct23)**
Oct. 25,27 (C13, 14)	Chromosome Mutations Rearrangements of parts of chromosomes :Deletions, Duplications, Inversions, Translocations, Structure of these changes and their impact (9.1-9.2), transposition (9.3).
Nov 1,3 (C15,16)	Mutations: Changes in the Number of Chromosomes Aneuploid and Euploid (9.4-9.5) Genome Restructuring and Evolution (9.6)
Nov 8,10 (C17, 18)	DNA damage, Gene Mutation and DNA Repair Mechanisms Chapter section 8.1-8.2
Week of Nov 13th	**Oral lab reports done in lab practicals (this is a chance to get feedback from colleagues, before writing your Experiment Summary and Analysis)**
Nov 15,17 (C19,C20)	Molecular Biology and Recombinant DNA Technology Chapter Section 14.1-14.6
Nov 22,23 (C21,22)	Molecular Biology and Recombinant DNA technology, continued Chapter sections 14.2-14.6 The Human Genome Sequencing Initiative Chapter 20.1-20.3.
November 24th	Each person's **'Research article assignment'** and **'Lab Experiment Summary and Analysis' are due Friday Nov 24th, by the end of class (10am)**. The reports must be completely in your own words. This assignment must be submitted via TURNITIN; your TA will provide instructions on how to use TURNITIN. Please check the similarity report before you submit the final version. We expect all reports to have similarity reports with less than 16% similarity. Life happens; there is a grace period until 10am Monday Nov 27th. Once the grace period has ended there is a 5pt per day penalty for each day late, day ends 6 pm. An electronic copy must be submitted via Blackboard TurnITIN, and paper copy must be given to Dr. Hasenkampf or slipped under her office door. The two copies must be identical (except only the paper copies have the attached coversheets) and all have the same deadline and grace period.
Nov 29,Dec 1 (C23,C24)	Post Sequencing Technologies and Genomic Approaches to Genetics Chapter 15.1-15.5

 I look forward to exploring the marvels of Genetics with you this term! Welcome to BIOC15!