

MDSC 541 Advanced Genetics

Instructors:

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Office Hours/Policy on Answering Student Emails

By appointment, emails are usually answered within 24 hours

Time and Location:

Tuesday/Thursday 9:30 – 11:20
G750 (unless otherwise specified)

Prerequisite/Co-Requisite:

CMMB 311 or MDSC 341 (or equivalent)

Course Description:

Historical papers will illustrate the foundations of the fundamental principles of modern transmission genetics. Topics including the chromosomal theory of inheritance, the role of pairing and recombination for chromosomal disjunction during meiosis, cytogenetics, the nature of dominant mutations, genetic screens and genetics analysis of developmental pathways. Material covered is drawn from model organisms and humans.

Overarching Theme

Lecture format with <20 students. Lectures provide the background so that students can present oral presentations on papers assigned from the primary literature.

Global Objectives

To give the student a solid background in traditional transmission genetics and to acquaint students with contemporary genetic methods commonly used in model organisms.

Learning Objectives

By the end of this course, students will be able to:

- Understand the relationship between recombination and chromosome disjunction during meiosis
- Infer gene activity based on gain and loss of function mutations
- Use genetic interactions to order genes in pathways
- Understand the genetic methodologies available in yeast, worms, flies, zebrafish, mice and humans to the primary literature for these organisms
- Prepare and deliver oral presentations based on the primary literature

Required Textbooks

No textbook, all readings will be posted on D2L.

Recommended Textbooks/Readings

none

Evaluation

The University policy on grading and related matters is described in section F.2 of the 2017-2018 Calendar.

In determining the overall grade in the course the following weights will be used:

Attendance	4%	
Oral Critiques	4%	Discussion during student talks
Homework	25%	10 Assignments, each valued at 2.5%. Students will be assigned questions and will be required to submit a written response during the next lecture
Take Home Quiz 1	6%	Highest mark on the two quizzes count for 14%
Take Home Quiz 2	14%	
Talk 1	14%	Individual will be assigned papers
Talk 2	18%	Individual will be assigned papers
Paper	15%	<i>Nature News & Views</i> style, based on Talk 1 or 2. Due after Talk 2

There is no final exam.

A passing grade on a particular component is not essential to pass the course as a whole.

A Note regarding Writing Assignments:

Writing skills are important to academic study in all disciplines. In keeping with the University of Calgary's emphasis on the importance of academic writing in student assignments (section

E.2 of 2017-18 Calendar), writing is emphasized, and the grading thereof in determining a student's mark in this course. The Bachelor of Health Sciences values excellence in writing. Competence in writing entails skills in crafting logical, clear, coherent, non-redundant sentences, paragraphs and broader arguments, as well as skills with the mechanics of writing (grammar, spelling, punctuation). The University of Calgary offers a number of instructional services through the Students' Success Centre's Writing Support Services (<http://www.ucalgary.ca/writingsupport/>) for students seeking feedback on assignments or seeking to improve their general writing skills. Students are **strongly encouraged** to take advantage of these programs.

Grading Scheme:

A+ 97-100%	B+ 80-84%	C+ 65-69%	D+ 54-56%
A 90-96%	B 75-79%	C 60-64%	D 50-53%
A- 85-89%	B- 70-74%	C- 57-59%	F 0-49%

Missed Components of Term Work:

Late assignments will lose 25% for each day late.

Desire2Learn (D2L)

Desire 2 Learn is located on the University of Calgary server and will be used extensively for communication with students. **It is the student's responsibility to ensure that s/he gets all posted communications and documents and that s/he receives emails sent by instructors or fellow students through D2L.** Only your @ucalgary.ca email address may be linked to D2L. Please ensure that you are regularly checking your @ucalgary.ca account.

If you need help accessing or using D2L, please visit the Desire2Learn resource page for students: <http://elearn.ucalgary.ca/d2l-student/>.

Policies Governing the Course:

Attendance

4% of the course grade is based on attendance.

Conduct During Lectures

Students are expected to conduct themselves in a mature and courteous manner during ALL lectures. Students are expected to frame their comments and questions to lecturers in respectful and appropriate language, always maintaining sensitivity towards the topic.

Students are expected to take notes during each session and should not rely solely on handout material supplied by the instructors.

Electronic Devices

The Bachelor of Health Sciences program aims to create a supportive and respectful learning environment for all students. Research studies have found that student use of electronic devices (laptops, tablets, etc) in the classroom negatively affects the learning of both the user and those sitting nearby. Inappropriate use of laptops is also disruptive to your fellow classmates and disrespectful to the lecturer. The use of laptops and other electronic note-taking devices is permitted; however, their use in the classroom should be for course-related work/note-taking only. Please do **NOT surf the web, check email or do other unrelated work**. Students who use their laptops inappropriately or are otherwise disruptive during lectures will be asked to leave.

Cell phones (or similar devices) should **be turned off** (not merely silent) upon entering the classroom. Sending/receiving text messages or leaving the class to take calls is disruptive to the entire class and will not be tolerated unless absolutely necessary. Students who disregard this rule during lectures or tutorials will be asked to leave. These items are not permitted under any circumstance during exams/quizzes, etc.

Copyright

It is the responsibility of students and professors to ensure that materials they post or distribute to others comply with the Copyright Act and the University's Fair Dealing Guidance for Students (library.ucalgary.ca/files/library/guidance_for_students.pdf). Further information for students is available on the Copyright Office web page (<http://library.ucalgary.ca/copyright>)

A Note Regarding Instructor Intellectual Property

Generally speaking, course materials created by professor(s) (including course outlines, presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the professor(s). These materials may **NOT** be reproduced, redistributed or copied without the explicit consent of the professor. **The posting of course materials to third party websites such as note-sharing sites without permission is prohibited.** Sharing of extracts of these course materials with other students enrolled in the course **at the same time** may be allowed under fair dealing.

Academic Accommodations Based on Disability or Medical Condition

It is the student's responsibility to register with Student Accessibility Services to be eligible for formal academic accommodation in accordance with the Procedure for Accommodations for Students with Disabilities (https://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities_0.pdf). If you are a student who may require academic accommodation and have not registered with Student Accessibility Services, please contact their office at (403) 220-8237; <http://www.ucalgary.ca/access/>. Students will be provided with all necessary accommodations to ensure equal opportunity to succeed in this course. Please provide the instructor your accommodation letter from Student Accessibility Services within 14 days after the start of this course so that all needed arrangements for exams and assignments can be made.

Accommodations on Protected Grounds other than Disability

Students who require an accommodation in relation to their coursework based on a protected

ground other than disability, should communicate this need, preferably in writing, to the designated BHSc program contact, Mrs. Jennifer Logan (jljlogan@ucalgary), or to Dr. Ebba Kurz, Associate Dean, Undergraduate Health and Science Education, Cumming School of Medicine. Students who require an accommodation unrelated to their coursework or the requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to the Vice-Provost (Student Experience). For additional information on support services and accommodations for students with disabilities, visit www.ucalgary.ca/access/.

Academic Misconduct

The University of Calgary is committed to the highest standards of academic integrity and honesty. The University of Calgary has created rules to govern all its members regarding the creation of knowledge and the demonstration of knowledge having been learned. These rules are contained principally in Sections J to L of the *University of Calgary Calendar*. Students are expected to be familiar with these standards and to uphold the policies of the University in this respect. The Calendar also stipulates the penalties for violating these rules. Please know that the University and the Cumming School of Medicine take these rules seriously. **All incidences of academic dishonesty in this course, such as cheating and plagiarism, will be reported to the Associate Dean for investigation;** infractions will be noted on the record of a student found to be guilty.

Recording of Lectures

Audio or video recording of lectures is prohibited except where explicit permission has been received from the instructor.

Other Important Information

Freedom of Information and Protection of Privacy Act

This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIP); students should identify themselves on written assignments (exams and term work) by their name and ID number on the front page and ID on each subsequent page. Work assigned to you by your course instructor will remain confidential unless otherwise stated before submission. The assignment cannot be returned to anyone else without your expressed permission to the instructor. Grades will be made available on an individual basis and students will not have access to other students' grades without expressed consent. Similarly, any information about yourself that you share with your course instructor will not be given to anyone else without your permission. See <http://www.ucalgary.ca/policies/files/policies/privacy-policy-2011.pdf> for more information.

Appeals

If there is a concern with the course, academic matter or a grade, first communicate with the instructor. If these concerns cannot be resolved, students can proceed with an academic appeal, as per Section I of the University Calendar. Students must follow the official reappraisal/appeal process and may contact the Student Ombuds' Office (<http://www.ucalgary.ca/ombuds>) for assistance with this and with any other academic

concerns, including academic and non-academic misconduct. Students should be aware that concerns about graded term work may only be initiated **within 15 days** of first being notified of the grade.

Resources for Support of Student Learning, Success, Safety and Wellness

Student Success Centre	http://www.ucalgary.ca/ssc/
Student Wellness Centre	http://www.ucalgary.ca/wellnesscentre/
Distress Centre	http://www.distresscentre.com/
Library Resources	http://library.ucalgary.ca

Wellness and Mental Health Resources

The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the excellent mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370 MacEwan Student Centre, <https://www.ucalgary.ca/wellnesscentre/services/mental-health-services>) and the Campus Mental Health Strategy (<http://www.ucalgary.ca/mentalhealth/>).

Student Ombuds' Office

The Student Ombuds' Office supports and provides a safe, neutral space for students. For more information, please visit www.ucalgary.ca/ombuds/ or email ombuds@ucalgary.ca

Student Union (SU) Information

The SU Vice-President Academic can be reached at (403) 220-3911 or suvpaca@ucalgary.ca; the SU representatives for the Cumming School of Medicine can be reached at medrep@su.ucalgary.ca.

Emergency Evacuation/Assembly Points

Assembly points for emergencies have been identified across campus. Assembly points are designed to establish a location for information updates from the emergency responders to the evacuees; and from the evacuated population to the emergency responders. The primary assembly point for the HSC G750 is the HRIC - Atrium. The alternate assembly point is the HMRB Atrium. For more information, see the University of Calgary's Emergency Management website: <http://www.ucalgary.ca/emergencyplan/assemblypoints>.

Safewalk

Campus security will escort individuals, day or night, anywhere on campus (including McMahon Stadium, Health Sciences Centre, Student Family Housing, the Alberta Children's Hospital and the University LRT station). Call 403-220-5333 or visit <http://www.ucalgary.ca/security/safewalk>. Use any campus phone, emergency phone or the yellow phone located at most parking lot pay booths. Please ensure your personal safety by taking advantage of this service.

Class Schedule

Sept 12	Introduction, meiosis and three factor crosses (Mains)
Sept 14	Worm hermaphrodite genetics (Mains)
Sept 19	Genes are on chromosomes and nondisjunction, Bridges 1916, part I (Mains)
Sept 21	Genes are on chromosomes, Bridges 1916, part II. Inversions and nondisjunction, Sturtevant and Beadle 1936, part I (Mains) G384
Sept 26	Inversions and nondisjunction, Sturtevant and Beadle, part II (Mains)
Sept 28	Trivalent formation and secondary nondisjunction. Worm nondisjunction in brief. Cooper 1948, Xiang 2006, Hodgkin 1979 (Mains) G750 then G384 at 10:50
Oct 3	Human cytogenetics and rearrangements (Argiropoulos)
Oct 5	Yeast genetics (Cobb)
Oct 10	Mutation, eugenics and politics, Muller 1932 (Mains)
Oct 12	Dominant mutations and genetic redundancy, Park and Horvitz 1986, Herskowitz 1988 (Mains) G384
Oct 17	Mouse knockout technology (Yang)
Oct 19, 24, 26	Student talks
Oct 31	Human dominant mutations (Parboosingh)
Nov 2	Genetic screens – fish (Huang) G750 then G382 at 10:50
Nov 7	Genetic pathways, epistasis and worm sex determination (Mains) Review lecture notes from Muller and Park and Horvitz
Nov 9	Homeobox genetics (Brook)
Nov 14	Genetic pathways – Mammalian sex determination (Argiropoulos) Take home quiz part 1 handed out. Due November 21.
Nov 16	No Class - ACHRI Retreat
Nov 21	Take home quiz part 1 class discussion. Take home quiz part 2 handed out, due November 24.
Nov 23	Reverse genetics: RNAi, morpholinos, genome editing (McGhee/Huang) G750 then G384 at 10:50
Nov 28	Genetic screens – flies (Grewal)
Nov 30 Dec 5, 7	Student talks (December 7/G384)