

**MDSC 341**  
**Principles of Human Genetics**

**Instructor:**

Dr. William Brook  
[brook@ucalgary.ca](mailto:brook@ucalgary.ca)

Associate Professor, Dept. of Biochemistry and Molecular Biology, Dept. of Medical Genetics

**Office Hours/Policy on Answering Student Emails**

Meetings with the instructor are available after lecture or by appointment (by Zoom, phone or in person). Teaching assistants are not available outside of scheduled tutorial time. All questions regarding course material should be directed to the instructor.

Students may contact the course instructor by email. Please type MDSC 341 as the subject. The instructor will endeavour to respond within 2 working days.

**Teaching Assistants:**

Kate Ding	<a href="mailto:kate.ding@ucalgary.ca">kate.ding@ucalgary.ca</a>
Harmony Fong	<a href="mailto:harmony.fong@ucalgary.ca">harmony.fong@ucalgary.ca</a>
Jasper Greysso-Wong	<a href="mailto:jgreysso@ucalgary.ca">jgreysso@ucalgary.ca</a>
Arsheen Rajan	<a href="mailto:arsheen.rajan1@ucalgary.ca">arsheen.rajan1@ucalgary.ca</a>

**Time and Location:**

**LECTURES:**

Days/Time: Tuesdays, Thursdays 3-4.20 PM\*  
Location: Health Sciences Centre, Theatre 1

**(There will be no lecture on October 28 (Midterm Exam).**

The instructors will provide lecture material in either pdf or PowerPoint form on D2L. However, there is no guarantee that it will be posted prior to the lecture. During lectures, material posted will be expanded upon and discussed. *Therefore, students should not rely on the web material to obtain all the material taught in a class.*

**\* Lectures on September 7, 9, and 28 and October 26 will run from 3 to 5.50 PM. No lecture on September 30<sup>th</sup> (Truth and Reconciliation Day).**

**TUTORIALS:**

Days/Time: **Tuesdays**, 4:30 – 5:50 pm, Sept. 14, 21, Oct. 5, 12, 19, Nov. 2, 16, 23, 30, Dec. 7;  
**Thursdays**, 4:30 – 5:50 pm, Sept. 16, 23, Oct. 7, 14, 21, Nov. 4, 18, 25, Dec. 2, 9.  
Location: Health Sciences Centre O1504, O1506, O1509, O1509A

**Prerequisite/Co-Requisite:**

Biology 241, 243 and admission to the BHSc Honours program.

### **Course Description:**

Introduction to principles in human genetics including Mendelian and chromosomal basis of inheritance, chromosomal abnormalities, pedigree analysis, mutations, and molecular, metabolic, population and clinical genetics. Studies of model organisms and genomics will be included as required. Incorporates problem-based learning to establish analytical skills in genetics.

### **Overarching Theme**

Genetics is the study of biological information, how it is stored, replicated, used and passed on to the next generation. Genetics plays an ever-increasingly important role in medicine and our world today. It is now recognized that genetics is important not only in rare monogenic disorders but in common disorders such as cancer, diabetes and cardiovascular disease (multifactorial diseases), in the way we react to drugs, other therapies and the environment (pharmacogenomics, envirogenetics) and in the aging process.

The purpose of this course is to provide the student with a foundation in genetics, including Mendelian and chromosomal basis of inheritance, chromosomal abnormalities, pedigree analysis, mutations, and molecular, metabolic, population and clinical genetics. Studies of model organisms and genomics will be included as required. Incorporates problem-based learning to establish analytical skills in genetics.

### **Global Objectives**

- ◆ Promote active learning, critical thinking and an inquiry approach to genetics
- ◆ Provide students with opportunities to develop and practice problem-solving skills
- ◆ Integrate Mendelian principles, molecular biology, and human genetics

### **Course Learning Outcomes**

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

- ◆ Utilize genetic terminology correctly
- ◆ Explain the underlying basis of inheritance
- ◆ Illustrate how DNA provides the genetic blueprint for cellular structures and processes
- ◆ Predict the implications of genetic variation
- ◆ Discuss how genes contribute to health and disease
- ◆ Solve a variety of genetic problems

### **Learning Resources**

#### **Required Textbook**

Required: Michael L. Goldberg, Janice Fischer, Leroy Hood, Leland Hartwell  
Genetics: from genes to genomes 7th edition.

Either the online access or hardcopy are acceptable. *The 6th edition is a reasonable alternative and used copies may be available. However, students who choose to use the 6<sup>th</sup> edition will be responsible for identifying the corresponding chapters and page numbers for suggested readings and problems.*

**Online Access** \$69 for six months. You may a code at the bookstore or buy directly from McGraw Hill at this link (see D2L for instructions):

<https://www.mheducation.ca/higher-education>

**Hardcopy** \$129.95: Available at the Medical School Bookstore and the Main Campus Bookstore.

The study guide and solutions manual for the 6<sup>th</sup> and 7<sup>th</sup> editions will be available to download in .pdf format on the course D2L site.

### **A Note regarding readings**

A list of text readings for all lectures will be posted on D2L and additional links and documents will be made available, where possible. Suggested readings have been chosen to inform you and support the lecture material. **Students are encouraged to complete assigned readings BEFORE each lecture.** Instructors will proceed in class on the assumption that students have read the assigned readings. Students should be aware that many of the readings they will be assigned may be of an unfamiliar nature and style. **Students should allot sufficient time to allow for several reads of the assigned material.**

### **Learning Technology Requirements**

Brightspace (by D2L) 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 they receive all posted communications and documents and that they receive 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.

### **Evaluation**

The University policy on grading and related matters is described in section F of the 2021-2022 Calendar.

Students will be assessed by a combination of assignments and exams as well as participation in tutorial and lecture. While writing skills are not directly being evaluated, your ability to write legibly and communicate your answer (including use of the genetic terms introduced in class) impacts your evaluation. Illegible answers will not be marked; this includes very small handwriting or poorly scanned documents.

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

#### **In Class Assignments and Top Hat Participation (10%)**

Throughout the course, a small number of short assignments will be completed in lecture (**5%**). Participation in lectures will be assessed using the Top Hat platform (**5%**). For all in-class Top Hat questions, marks will be awarded for answering. A detailed explanation of Top Hat grading will be posted on D2L. **Course access for TOPHAT is 038323.**

Students who have arranged with the instructor to be excused from lectures (i.e. due to religious observance, COVID quarantine protocols, participation in varsity sports, attendance at scientific meetings) will complete in class assignments outside of class in consultation with the instructor and will make up their participation grade by providing a 1-2 page summary of the lecture to the instructor within one week of the date of the lecture.

#### **Tutorials (15%)**

The tutorials provide an opportunity for students to work through problems and learn essential concepts in genetics with the assistance of a teaching assistant and in small groups. Each week prior to tutorial, students will be given access on D2L to 1) a brief online quiz about the tutorial

topic and 2) the in-class problems for the tutorial. The quiz must be completed by the end of Monday before tutorials. Students will be allowed two attempts of the quiz with the highest score being awarded. During the tutorial, the teaching assistants will lead the students through the in-class problems and additional exercises. The tutorials are highly interactive. Students will be graded for participation. Students must print and read the tutorial problems prior to class and bring their copy with them. Students are encouraged to attempt the problems prior to tutorial although this is not mandatory. Please note that, other than calculators, **no** electronics may be used in tutorial without permission of the Student Accessibility Services. Students who have arranged with the instructor to be excused from tutorial (i.e. due to religious observance, following COVID quarantine protocols, participation in varsity sports, attendance at scientific meetings) can make up their participation grade by submitting the completed problem set to their TA at the next tutorial session.

Online quizzes	5%
Participation during Tutorials	10%

### Problem Sets (15%)

Three assignments will be posted on D2L that will be based on the concepts in class and tutorial.

Problem set	Assigned	Due (start of class)	Weight
Gene Expression and Mendelian Genetics	Sep 16	Sep 28	5%
Chromosomes and Mapping	Oct 7	Oct 19	5%
Human Molecular Genetics	Nov 18	Nov 30	5%

Completed assignments are to be handed in at the beginning of class on the date indicated. Assignments will be assessed by the TAs. Marks will be given for both the answer and work. All work shown **must** support the answer provided. Late assignments will not be accepted, and illegible assignments will not be marked.

### Stress Busters for Assignments and Quizzes

To help ease deadline stress, students may have an extension of up to 24 hours on one assignment and may have an extension of up to 12 hours on one tutorial quiz. You must contact the instructor by e-mail before the original due date to receive the extension.

### Exams (60%)

Exams will have short answer and problem-solving questions and will be similar to the problem sets, recommended questions, and tutorial questions. Part marks will be given for work shown. The midterm and final exams must be written **in pen**. Students may bring a simple, non-programmable calculator. No other electronic devices are permitted.

	Dates	Material Covered	Weight
Midterm	October 28 3 PM – 6 PM Theatre 1, additional rooms t.b.a.	Material, assignments and readings up to and including October 14, Tutorials 1-5	30%

Final Exam	TBA – final exam period	Material, assignments, and readings and tutorials not covered on the midterm	30%
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**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 2021-22 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). Sources used in research papers must be properly documented. The University of Calgary offers 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:**

Letter Grade	Description	Percentage
A+	Outstanding performance	96-100
A	Excellent performance	90-95
A-	Approaching excellent performance	85-89
B+	Exceeding good performance	80-84
B	Good performance	75-79
B-	Approaching good performance	70-74
C+	Exceeding satisfactory performance	65-69
C	Satisfactory performance	60-64
C-	Approaching satisfactory performance	57-59
D+	Marginal pass	54-56
D	Minimal pass	50-53
F	Did not meet course requirements	0-49

**Missed Components of Term Work:**

***Late assignments will not be accepted and will automatically receive a mark of zero. Students who miss a tutorial or in class assignment will receive a mark of zero unless the instructor has been previously notified. There will be NO exceptions to this policy.***

**Extensions will NOT be granted** on any assignment. The only exceptions to this are those in keeping with the University Calendar (debilitating illness, religious conviction, or severe domestic affliction) that are received in writing and with supporting documentation. Please note that while absences are permitted for religious reasons, students are responsible for providing advance notice and adhering to other guidelines on this matter, as outlined in the University Calendar (<https://www.ucalgary.ca/pubs/calendar/current/e-4.html>).

## **Course Evaluations and Student Feedback**

Student feedback will be sought at the end of the course through the Universal Student Rating of Instruction (USRI) and a qualitative student evaluation. Students are welcome to discuss the process and content of the course at any time with the instructor. Students may also address any concerns they may have with Dr. Ebba Kurz, Associate Dean (Undergraduate Health and Science Education) in the Cumming School of Medicine ([kurz@ucalgary.ca](mailto:kurz@ucalgary.ca)).

## **Attendance**

Recordings of the lectures will be made available on D2L but attendance at all lectures and tutorials is required of all students and will form part of your final evaluation (see above).

## **Conduct During Lectures**

The classroom should be respected as a safe place to share ideas without judgement - a community in which we can all learn from one another. Students are expected to frame their comments and questions to lecturers in respectful and appropriate language, always maintaining sensitivity towards the topic. Students, employees, and academic staff are also expected to demonstrate behaviour in class that promotes and maintains a positive and productive learning environment.

As members of the University community, students, employees and academic staff are expected to demonstrate conduct that is consistent with the University of Calgary Calendar, the Code of Conduct and Non-Academic Misconduct policy and procedures, which can be found at <https://www.ucalgary.ca/legal-services/university-policies-procedures>.

**Students are expected to take notes during class and should not rely solely on material supplied by the instructors.**

## **Use of Internet and Electronic Communication Devices in Class**

The Bachelor of Health Sciences program aims to create a supportive and respectful learning environment for all students. The use of laptop and mobile devices is acceptable when used in a manner appropriate to the course and classroom activities. However, research studies have found that inappropriate/off-topic use of electronic devices in the classroom negatively affects the learning of others during class time.

Students are responsible for being aware of the University's Internet and email use policy, which can be found at <https://www.ucalgary.ca/policies/files/policies/electronic-communications-policy.pdf>.

## **UNIVERSITY OF CALGARY POLICIES AND SUPPORTS**

### **Copyright**

All students are required to reach the University of Calgary policy on Acceptable Use of Material Protected by Copyright (<https://www.ucalgary.ca/policies/files/policies/acceptable-use-of-material-protected-by-copyright-policy.pdf>) and requirements of the Copyright Act (<https://laws-lois.justice.gc.ca/eng/acts/C-42/index.html>) to ensure they are aware of the consequences of unauthorized sharing of course materials (including instructor notes, electronic versions of textbooks, etc.). Students who use material protected by copyright in violation of this policy may be disciplined under the Non-Academic Misconduct Policy <https://www.ucalgary.ca/pubs/calendar/current/k.html>.

### **Instructor Intellectual Property**

Course materials created by instructors (including course outlines, presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the instructor. 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**

It is the student's responsibility to request academic accommodations according to the University policies and procedures listed below. The Student Accommodations policy is available at <https://ucalgary.ca/student-services/access/prospective-students/academic-accommodations>. Students needing an accommodation based on disability or medical concerns should contact Student Accessibility Services (SAS) 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.pdf>). SAS will process the request and issue letters of accommodations to instructors. For additional information on support services and accommodations for students with disabilities, visit [www.ucalgary.ca/access/](http://www.ucalgary.ca/access/).

Students who require an accommodation in relation to their coursework based on a protected ground other than disability should communicate this need in writing to Dr. Ebba Kurz ([kurz@ucalgary.ca](mailto:kurz@ucalgary.ca)), Associate Dean (Undergraduate Health and Science Education).

### **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.

Academic Misconduct refers to student behaviour that compromises proper assessment of a student's academic activities and includes (but is not limited to): cheating, fabrication, falsification, plagiarism, unauthorized assistance, failure to comply with an instructor's expectations regarding conduct required of students completing academic assessments in their courses, and failure to comply with exam regulations applied by the Registrar. **It also includes using of third-party websites/services to access past/current course material, essay/assignment writing services, or real-time assistance in completing assessments, seeking answers to assessment questions and similar, whether paid, bartered or unpaid.**

For information of the Student Academic Misconduct Policy and Procedures, please visit;

<https://ucalgary.ca/policies/files/policies/student-academic-misconduct-policy.pdf>

<https://ucalgary.ca/policies/files/policies/student-academic-misconduct-procedure.pdf>

Additional information is available on the Academic Integrity website at: <https://ucalgary.ca/student-services/student-success/learning/academic-integrity>.

### **Recording of Lectures**

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

## **Freedom of Information and Protection of Privacy Act**

Student information will be collected in accordance with typical (or usual) classroom practice. Students' assignments will be accessible only by the authorized course faculty. Private information related to the individual student is treated with the utmost regard by the faculty at the University of Calgary

## **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 10 business days** of first being notified of the grade. <https://www.ucalgary.ca/pubs/calendar/current/i-2.html>

## **Sexual Violence Policy**

The University recognizes that all members of the University Community should be able to learn, work, teach and live in an environment where they are free from harassment, discrimination, and violence. The University of Calgary's sexual violence policy guides us in how we respond to incidents of sexual violence, including supports available to those who have experienced or witnessed sexual violence, or those who are alleged to have committed sexual violence. It provides clear response procedures and timelines, defines complex concepts, and addresses incidents that occur off-campus in certain circumstances. Please see the policy available at <https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf>

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

Student Success Centre	<a href="http://www.ucalgary.ca/ssc/">http://www.ucalgary.ca/ssc/</a>
Student Wellness Centre	<a href="http://www.ucalgary.ca/wellnesscentre/">http://www.ucalgary.ca/wellnesscentre/</a>
Distress Centre	<a href="http://www.distresscentre.com/">http://www.distresscentre.com/</a>
Library Resources	<a href="http://library.ucalgary.ca">http://library.ucalgary.ca</a>

## **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 (<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/](http://www.ucalgary.ca/ombuds/) or email [ombuds@ucalgary.ca](mailto:ombuds@ucalgary.ca)

## **BHSc Student Faculty Liaison Committee (SFLC)**

The BHSc SFLC, with elected representatives from all majors, serves to raise issues of interest to BHSc students to the program administration, including items pertaining to curriculum, scheduling and events. A list of current representatives can be found on the BHSc website.



**Student Union (SU) Information**

The SU Vice-President Academic can be reached at (403) 220-3911 or [suvpaca@ucalgary.ca](mailto:suvpaca@ucalgary.ca); the SU representatives for the Cumming School of Medicine can be reached at [medrep1@su.ucalgary.ca](mailto:medrep1@su.ucalgary.ca) or [medrep2@su.ucalgary.ca](mailto:medrep2@su.ucalgary.ca).

**Student Success Centre**

The Student Success Centre provides services and programs to ensure students can make the most of their time at the University of Calgary. Our advisors, learning support staff, and writing support staff assist students in enhancing their skills and achieving their academic goals. They provide tailored learning support and advising programs, as well as one-on-one services, free of charge to all undergraduate and graduate students. For more information visit: <https://www.ucalgary.ca/student-services/student-success>

**Emergency Evacuation/Assembly Points**

As part of the University of Calgary Emergency Evacuation plan, students, faculty, and staff should locate the closest Assembly Point in case of Fire Alarm. Safety signage is posted throughout the campus showing the locations and the possible route to these locations. All students, faculty, and staff are expected to promptly make their way to the nearest Assembly Point if the Fire Alarm is activated. No one is to return into campus facilities until an all clear is given to the warden in charge of the Assembly Area. For more information, see <https://www.ucalgary.ca/emergencyplan/building-evacuation/assembly-points>

**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.

## MDSC 341, Fall 2021

Course Schedule and Recommended Reading (Hartwell et al Genes to Genomes, 7<sup>th</sup> ed.).

	Tuesday	Thursday
<b>Week 1</b>	<b>September 7</b>	<b>September 9</b>
Lecture	<b>Intro/DNA and Replication Mutation: Mutagenesis and Repair</b>	<b>Transcription and Translation</b>
Reading	Ch.6:2-3; Ch.6:4; Ch.13:4; Ch. 7:1-3; Ch. 6:5 (187-191)	Ch.8:2 (240-245); Ch.9:2-4
<b>Week 2</b>	<b>September 14</b>	<b>September 16</b>
	<b>Mendelian Genetics</b>	<b>Mendelian Genetics II</b>
	Ch. 1	Ch. 2:1-3
Tutorial 1	DNA, mutation and Gene expression	DNA, mutation and Gene expression
<b>Week 3</b>	<b>September 21</b>	<b>September 23</b>
Lecture	<b>Chromosome Structure, Meiosis and Chromosome Theory</b>	<b>Sex Chromosomes and Aneuploidy</b>
Reading	Ch. 3:1-3; Ch. 13:1-2,5; Ch. 4:1,3	Ch. 4:2,4,5; Ch. 15:1-2
Tutorial 2	Mendelian Genetics	Mendelian Genetics
<b>Week 4</b>	<b>September 28</b>	<b>September 30</b>
Lecture	<b>Linkage, chromosome exchange, and mapping</b>	<i>National Day of Truth and Reconciliation, no class or tutorial</i>
Reading	Ch. 5:1-2	
3-6 PM		
<b>Week 5</b>	<b>October 5</b>	<b>October 7</b>
Lecture	<b>Mapping and Chi Square</b>	<b>Chromosome Rearrangements</b>
Reading	Ch. 5:3-4	Ch. 13:2 (400-402); Ch. 14:1-2
Tutorial 3	Meiosis and Aneuploidy	Meiosis and Aneuploidy
<b>Week 6</b>	<b>October 12</b>	<b>October 14</b>
	<b>Mutation: gene structure and function</b>	<b>Mutation: gene structure and function</b>
	Ch. 8:1 (230-232), Ch. 9:1 (259-261); Ch. 8:2-3; Ch. 9:5	Ch. 8:1 (230-232), Ch. 9:1 (259-261); Ch. 8:2-3; Ch. 9:5
Tutorial 4	Linkage and Mapping	Linkage and Mapping
<b>Week 7</b>	<b>October 19</b>	<b>October 21</b>
	<b>Genetic Variation</b>	<b>Detecting Genetic Variation I</b>
	Ch.12:1; 14.3 (440-442)	Ch.12:2; Ch.10:1,3
Tutorial 5	Rearrangements and Mutations	Rearrangements and Mutations
<b>Week 8</b>	<b>October 26</b>	<b>October 28</b>
Lecture	<b>Detecting Genetic Variation II</b>	Midterm exam
Reading	Ch.12:3	<i>Lecture material up to and including October 14, tutorials 1-5</i>
3-6 PM	<b>Review session</b>	Midterm exam 3-6 PM

<b>Week 9</b>	<b>November 2</b>	<b>November 4</b>
Lecture	<b>Sequencing Genomes</b>	<b>Mapping Disease Genes</b>
Reading	Ch.11:3; Ch.12:4-5	Ch.10:2; Ch.11:1; Ch.12:4
Tutorial 6	Detecting Genetic Variation	Detecting Genetic Variation
<b>Week 10</b>	<b>November 16</b>	<b>November 18</b>
Lecture	<b>Gene Regulation 1</b>	<b>Gene Regulation 2</b>
Reading	Ch. 16:4; Ch. 18:2	Ch. 13.3; Ch. 19
Tutorial 7	Genetic variation/Sequencing	Genetic variation/Sequencing
<b>Week 11</b>	<b>November 23</b>	<b>November 25</b>
Lecture	<b>Cell Cycle and Cancer I</b>	<b>Cell Cycle and Cancer II</b>
Reading	Ch. 23:1,3	Ch. 23:2,4-5
Tutorial 8	Gene regulation	Gene regulation
<b>Week 12</b>	<b>November 30</b>	<b>December 2</b>
Lecture	<b>Non-Mendelian Genetics: Imprinting and Epigenetics</b>	<b>Non-Mendelian Genetics: Dynamic and Mitochondrial Mutations</b>
Reading	Ch.20	Ch.7:2 (211-213); Ch.17:1,5
Tutorial 9	Cell Cycle, Cancer	Cell Cycle, Cancer
<b>Week 13</b>	<b>December 7</b>	<b>December 9</b>
	t.b.a.	Review/Q and A Session
Tutorial 10	Non-Mendelian/Mitochondrial genetics	Non-Mendelian/ Mitochondrial genetics