The University of Calgary
Bachelor of Health Sciences
Cumming School of Medicine

Academic Year 2023-2024

MDSC 351
Honours Cell and Molecular Biology

Instructors:

Dr. Tim Shutt, PhD, Course Coordinator (timothy.shutt@ucalgary.ca)
Dr. Alexander Lohman, PhD, Course Coordinator (alex.lohman@ucalgary.ca)

Office Hours/Policy on Answering Student Emails

Please note that all course communications must occur through your @ucalgary email, and we will respond to emails sent via student's @ucalgary emails within 48 hours.
When sending an e-mail, please use "MDSC 351" in the subject line of the message.

Teaching Assistants:

Cassidy Da Silva - cassidy.dasilva@ucalgary.ca
Andreas Dauter - andreas.dauter@ucalgary.ca
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Time and Location:

On Tuesdays, lectures and integrated tutorials run from 3:30 to 6:30 pm.
On Thursdays, lectures and integrated group sessions run from 3:30 to 5:30 pm.

All classes take place in (see D2L for location) of Health Sciences Centre, with a few exceptions (see schedule below). Tutorials and group sessions have specific rooms that are outlined in the schedule. Students will be assigned to groups and will be responsible for going to their designated group room for these sessions.

Prerequisite/Co-Requisite:

MDSC 341 and enrollment in the BHSc Honours program, or consent of instructor.

Course Description:

Introduction to principles in cellular and molecular biology. Emphasizes how structure underlies and determines function in the cell and how complex processes are organized and regulated at the molecular level.

Overarching Theme:

Combining interactive lectures, small group discussions, and inquiry-based learning, this course intends to build on the concepts learned in the introductory biology and genetics courses and to provide the solid background in cellular and molecular biology that students in the Bachelor of Health Sciences need to understand many aspects of modern medical sciences. This course will focus on the structural organization of cells and the molecular basis of dynamic cellular processes, with emphasis on eukaryotic cells. Topics will include membrane trafficking, cell signaling, cytoskeleton, cell cycle, and cells and their environment.

Global Objectives:
By the end of this course, the student will have learned key concepts of cell and molecular biology, specifically how structure underlies and determines function in the cell, and how complex processes are organized and regulated at the molecular level.

Course Learning Outcomes

By the end of this course, students will be able to:
1. Explain key concepts of cell and molecular biology;
2. Apply their understanding of these concepts in new situations;
3. Draw connections among ideas, whether presented in this course or elsewhere;
4. Evaluate ideas, evidence, and interpretations;
5. Articulate their learning through original work (written or in other media);
6. Facilitate the learning of others; and
7. Reflect on their performance.

Transferable Skill Development:
Many of the skills and abilities that you are developing in your coursework are transferable to the workforce, graduate and professional studies and other facets of life. Employers seek applicants with transferable skills because they can be an asset in the workplace, regardless of industry or sector. Transferable skills are core skills for your success in building your future career.

The work that you will do in MDSC 351 will help you build the following transferable skills:

- **Collaboration**: Work respectfully with others from different backgrounds, cultures, and countries.
- **Verbal Communication**: Learn and share information by presenting, listening, and interacting with others.
- **Creativity and Innovation**: Find different and better ways to do things, being curious, thinking imaginatively.
- **Critical Thinking**: Actively and skillfully conceptualize, apply, analyze, synthesize, and/or evaluate information (data, facts, observable phenomena, and research findings) to make a reasoned judgement or draw a reasonable conclusion.
- **Digital Skills**: Use digital technologies like computers, social media, virtual meeting platforms, and the internet.
- **Information Literacy**: Find, understand, and use information presented through words, symbols, and images
- **Problem solving**: Identify an issue, find and implement a solution, and assess whether the situation has improved.
- **Project Management:** Conceptualize, initiate, plan and execute a plan to achieve a predetermined goal (project) by effectively prioritizing activities and meeting deadlines.
- **Written Communication**: Share ideas and information by using words, images, and symbols.

Learning Resources
Required Textbook
Iwasa J and Marshall W. 2020. Karp's Cell and Molecular Biology. Hoboken, N.J.: John Wiley & Sons, Inc. Ninth edition.

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.

A laptop, desktop, tablet or mobile device is required for D2L access. If you need help accessing or using D2L, please visit the Desire2Learn resource page for students: http://elearn.ucalgary.ca/d2l-student/.

Evaluation
The University policy on grading and related matters is described in section F of the 2023-2024 Calendar.

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

Problem summary essay 1	15% Associated learning objectives: 1-5,7
Problem summary essay 2	15% Associated learning objectives: 1-5,7
Exam #1	20% Associated learning objectives: 1-4
Exam #2	20% Associated learning objectives: 1-4
Novel problem project	20% Associated learning objectives: 1-7
Exercises, tutorials, concept maps, reflections	10% Associated learning objectives: 1-7
	100%

There is no final exam for this course

****A student's final grade for the course is the sum of the separate assignments. It is not necessary to pass each assignment separately in order to pass the course.***

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 2023-24 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	90-95.99

Letter Grade	Description	Percentage
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	Does not meet course requirements	0-49

Missed Components of Term Work:
As per University Calendar Section G.1.2, **students who are absent from an in-class assessment will receive a mark of zero on the missed component.** Students who are absent are responsible for contacting their instructor to discuss the impact of their missed assessment. The instructor may ask for supporting documentation to confirm an absence. Alternative opportunities for completing missed assessments or shifting of the assessment weight **may** be possible but are not guaranteed. Students who are identified as falsifying information related to missed assessments will be subject to investigation for academic misconduct.

Any unexcused late submissions will suffer a penalty of 10% per day. No submissions will be accepted beyond the 3rd day of any assignment. Students who miss a quiz 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 or quizzes in MDSC 351. 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. Traffic jams and late or full buses are common events in Calgary and are NOT acceptable reasons for late arrivals to class, meetings and examinations. 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 UCalgary Course Experience Survey 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. Fabiola Aparicio-Ting, Associate Dean (Undergraduate Health and Science Education) in the Cumming School of Medicine (feaparic@ucalgary.ca).

Attendance
While attendance per se is not compulsory, one should be aware that 10% of the final mark is derived from a student's participation in activities done during class time.

Also, attendance will be checked on both days of the Novel Problem presentations.

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/student-services/student-conduct/policy .

Students are expected to take notes during class and should not rely solely on material supplied by the instructors. Instructors will NOT post lectures notes to D2L.

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/legal-services/sites/default/files/teams/1/Policies-Acceptable-Use-of-Electronic-Resources-and-Information-Policy.pdf.

Use of Artificial Intelligence Tools
Generative Artificial Intelligence (AI), and specifically foundational models that can create writing, computer code, and /or images using minimal human prompting includes not only GPT-4 (and its siblings ChatGPT and Bing), but many writing assistants that are built on this or similar AI technologies.

Students may use artificial intelligence tools for specific assignments that will be discussed in class, but ONLY these learning assignments. This use must be documented in an appendix for each assignment. The documentation should include what tool(s) were used, how they were used, and how the results from the AI were incorporated into the submitted work. Failure to cite the use of AI generated content in an assignment/assessment will be considered a breach of academic integrity and subject to Academic Misconduct procedures.

UNIVERSITY OF CALGARY POLICIES AND SUPPORTS

Copyright
All students are required to read the University of Calgary policy on Acceptable Use of Material Protected by Copyright (https://www.ucalgary.ca/legal-services/university-policies-procedures/acceptable-use-material-protected-copyright-policy) 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/legal-services/sites/default/files/teams/1/Policies-Accommodation-for-Students-with-Disabilities-Procedure.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/ .

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. Fabiola Aparicio-Ting (feaparic@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://www.ucalgary.ca/legal-services/university-policies-procedures/student-academic-misconduct-policy.

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/student-services/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

Media Recording
Please refer to the following statement on media recording of students: https://elearn.ucalgary.ca/wp-content/uploads/2020/05/Media-Recording-in-Learning-Environments-OSP_FINAL.pdf

Media recording for lesson capture

The instructor may use media recordings to capture the delivery of a lecture. These recordings are intended to be used for lecture capture only and will not be used for any other purpose. Although the recording device will be fixed on the Instructor, in the event that incidental student participation is recorded, the instructor will ensure that any identifiable content (video or audio) is masked, or will seek consent to include the identifiable student content to making the content available on University approved platforms.

Sexual and Gender-Based 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/legal-services/sites/default/files/teams/1/Policies-Sexual-and-Gender-Based-Violence-Policy.pdf.

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/
Student Advocacy and Wellness Hub (CSM)	https://cumming.ucalgary.ca/mdprogram/current-students/student-advising-wellness
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 UCalgary Wellness Centre (https://www.ucalgary.ca/wellness-services/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/student-services/ombuds/ or email 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; the SU representatives for the Cumming School of Medicine can be reached at medrep1@su.ucalgary.ca or 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.

Class Schedule

The following is a list of topics for class, associated readings, and assignment / exam due dates. Please note that unforeseen circumstances may cause changes to the schedule with respect to the timing of topics and readings. Students will be notified of all changes in a timely manner by way of email and D2L announcements. The exam dates are firm and will not be altered.

Date	Reading	Lectures	Tutorials	Room #	Lecturer
January 2nd, 2024	Start of Term				
Jaunary 2nd - 6th, 2024	Block Week				
January 9th, 2024	Chapter 1	Intro/overview of cells and cell research	Tutorial 1: Sample problem/Small group tutorial format	See D2L	Shutt and Lohman
January 11th, 2024	Chapters 10 & 13	DNA structure and replication	Intro to Concept Maps / Concept Map #1	See D2L	Shutt
January 16th, 2024	Chapter 13	DNA damage and repair	Tutorial 2: Personal reflection in inquiry learning	See D2L	Shutt
January 18th, 2024	Chapters 11 & 12	Gene expression & regulation	Concept Map #2 / Reflection #1	See D2L	Shutt
January 23rd, 2024	Chapter 12	Cell structure and function: the nucleus	Tutorial 3: Problem summary #1	See D2L	Shutt
January 25th, 2024	Chapter 14	Cell cycle	Concept Map #3	See D2L	Shutt
January 30th, 2024	Chapter 4	Plasma membrane I	Tutorial 4: Paraphrasing and summarizing	See D2L	Lohman
February 1st, 2024	Chapter 4	Plasma membrane II	Concept Map #4/ Reflection #2	See D2L	Lohman
February 5th, 2024	None	**Problem Solving Assignment #1 due at 11:59PM.**	None		
February 6th, 2024	Chapter 8	Cytoplasmic membrane systems I	None	See D2L	Lohman
February 8th, 2024	Chapter 8	Cytoplasmic membrane systems II	Concept Map #5 / Reflection #3	See D2L	Lohman
February 13th, 2024	None	Exam #1 Review	None	See D2L	Lohman
February 15th, 2024	None	**Exam #1;** material from weeks 1-5.	None	See D2L	Lohman

Date	Reading	Lectures	Tutorials	Room #	Lecturer
February 19th – 25th, 2024	NO CLASS – Term Break				
February 27th, 2024	Chapter 5	Mitochondria and energy metabolism	Tutorial 5: Introduce Problem Solving Assignment #2	See D2L	Shutt
February 29th, 2024	Chapter 9	Cytoskeleton and cell movement	Concept Map #6 / Reflection #5	See D2L	Shutt
March 5th, 2024	Chapter 7	Cell junctions, adhesions, and the extracellular matrix	Tutorial 6: Brainstorming for novel problem assignment	See D2L	Lohman
March 7th, 2024	Chapter 15	Cell signaling I	Concept Map #7	See D2L	Lohman
March 8th, 2024	None	**Novel Problem Assignment Plan due at 11:59PM**	None		
March 11th, 2024	None	**Problem Solving Assignment #2 due at 11:59PM**	None		
March 12th, 2024	Chapter 15	Cell signaling II	Tutorial 7: Groups meet for novel problem assignment	See D2L	Lohman
March 14th, 2024	Chapter 15	Apoptosis	Concept Map #8 / Reflection #6	See D2L	Shutt
March 19th, 2024	Chapter 16	Cancer	Tutorial 8: Groups meet for novel problem assignment	See D2L	Lohman
March 21st, 2024	Chapter 17	Immune Response	Concept Map #9 / Reflection #7	See D2L	Lohman
March 26th, 2024	None	Exam #2 Review	None	See D2L	Shutt
March 28th, 2024	None	**Exam #2;** material from weeks 8-11	None	See D2L	Shutt
March 29th, 2024	None	None	Reflection #8 prompt posted		
April 2nd, 2024	None	Novel Problem Presentations	**Peer evaluations for Tue Presentations due at 11:59PM**	See D2L	Lohman
April 4th, 2024	None	Novel Problem Presentations	**Peer evaluations for Thu**	See D2L	Lohman

Date	Reading	Lectures	Tutorials	Room #	Lecturer
			Presentations due at 11:59PM		
April 9th, 2024	None	Course evaluations/Wrap-up lecture	**Novel Problem Presentation and Supporting Docs due at 11:59PM**	See D2L	Shutt and Lohman
April 11th, 2024	None	Last day of Class	**Submission of Individual NP components due at 11:59PM**	See D2L	Shutt and Lohman

Due dates for short assignments:

Tutorial worksheets (except #6) are due on Thursdays by 3:30PM

Concept Maps and Reflections are to be uploaded to D2L by the following Monday at noon