

MDSC/BIOL 515 (WINTER 2026)
Cellular Mechanisms of Disease

Instructor of Record:

Dr. Etienne Mahé
ermahe@ucalgary.ca
Office: 587-231-4769

Office Hours/Policy on Answering Student Emails

Please note that all course communications must occur through your @ucalgary email. Dr. Mahé will make every effort to respond to emails sent via a student's @ucalgary emails within 48 hours. However, as Dr. Mahé is a practising physician, occasional reply delays owing to clinical priorities may occur. Students are encouraged to cc Dr. Mahé's administrative assistant on all emails (see below).

Office hours will be held on an as-needed basis, either in person (in Dr. Mahé's office: Check D2L for location) or by ZOOM; these should be prearranged via Dr. Mahe's admin assistant (see below).

Admin Assistant:

Ms. Elizabeth McGovern
elizabeth.mcgovern@albertaprecisionlabs.ca
Office: 587-231-4221

Teaching Assistant:

Ms. Brooklyn Giesbrecht (brooklyn.giesbrecht@ucalgary.ca). Ms. Giesbrecht's role is to assist with grading, but she is not involved in the development of the grading instruments. As such, students are requested NOT to contact Ms. Giesbrecht with questions or concerns in relation to grading. Instead, questions about grades/grading should be directed ENTIRELY to Dr. Mahé.

Time and Location:

The course is scheduled for MW 15:30 - 16:45
Check D2L for location

Prerequisite/Co-Requisite:

Biochemistry 341 or 393; and Biology 331 or Medical Science 351.

Course Description:

The cellular and molecular mechanisms underlying basic human disease processes and how these can be influenced by lifestyle and environmental factors. The ways in which this knowledge can be used in the laboratory diagnosis of disease.

Overarching Theme

The course format consists of 24 didactic lectures provided by specialist physicians and clinical scientists, expert in the subject matter. The course is designed to cover the various mechanisms of disease and provide pathophysiological explanations for how diseases manifest, their environmental and genetic causes, the clinical consequences, and with some discussion about treatments if applicable. The course is designed to draw together numerous concepts in cell biology and physiology to help learners better understand the consequences of pathology in humans.

Global Objectives

To understand the basic general pathology of human diseases at organ, tissue, cell, and molecular levels, with a focus on the cellular basis of disease.

Course Learning Outcomes

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

1. Understand the cellular and molecular structures, mechanisms and functions that contribute to human health
2. Understand how perturbation of normal cellular and molecular functions may manifest in human disease
3. Understand how the cellular and molecular mechanisms of disease contribute to phenotypic changes, functional impacts and quality of life in humans
4. Understand the techniques that exist, specifically those pertaining to laboratory medicine, that permit the accurate diagnosis of human disease, as well as how these might inform clinical intervention
5. Understand the varied and complex nature of diagnostic medicine, and its contributions to individual, community and social health

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/BIOL 515 will help you build the following transferable skills:

- **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

Links to lecture-specific slides and associated readings will be available through D2L.

Recommended Textbook

STRONGLY RECOMMENDED TEXTBOOK (available through the University of Calgary Bookstore OR as an online resource through the University of Calgary Library):

Robbins & Cotran Pathologic Basis of Disease, 11th Edition, 2026. Elsevier. ISBN: 9780443283932

NOTE: Previous editions of this text are also acceptable and available

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 2025-2026 Calendar. In determining the overall grade in the course, the following weights will be used:

Assessment	Weight (% of Grade)	Due Date and Time	Alignment with course Learning Objectives
Critical Thinking Exercise 1	5	<i>Monday January 19, 2026, 1159pm</i>	EBM Topics
Critical Thinking Exercise 2	5	<i>Monday January 26, 2026, 1159pm</i>	Cell Biology Topics
Critical Thinking Exercise 3	5	<i>Monday February 2, 2026, 1159pm</i>	Genetics & Genomics Topics
Critical Thinking Exercise 4	5	<i>Monday February 9, 2026, 1159pm</i>	Inflammation & Autoimmunity
Critical Appraisal Assignment	10	<i>Wednesday February 11, 2026, 1159pm</i>	
Critical Thinking Exercise 5	5	<i>Monday February 23, 2026; 1159pm</i>	Microorganisms & Infection
Critical Thinking Exercise 6	5	<i>Monday March 2, 2026; 1159pm</i>	Cardiac & Respiratory
Critical Thinking Exercise 7	5	<i>Monday March 9, 2026; 1159pm</i>	GI & Skin Topics
Critical Thinking Exercise 8	5	<i>Monday March 16, 2026; 1159pm</i>	Women & Men Health Topics
Research Proposal Assignment	10	<i>Wednesday March 18, 2026, 1159pm</i>	
Critical Thinking Exercise 9	5	<i>Monday March 23, 2026; 1159pm</i>	Hematology
Critical Thinking Exercise 10	5	<i>Monday March 30, 2026; 1159pm</i>	Infancy, Childhood and Young Adulthood
Critical Thinking Exercise 11	5	<i>Wednesday April 8, 2026; 1159pm</i>	MSK & CNS
Registrar Scheduled Final Exam	25	TBA - Final Exam Period	120 minutes, closed-book, multiple choice

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.

Weekly Critical Thinking Exercises:

The weekly critical thinking exercises will be delivered through the D2L quiz feature. D2L will allow students to do the critical thinking exercises at any point during the timeframe allotment, but once started, each student will have a preset timeframe (which may vary week-to-week) to complete the critical thinking exercises. The critical thinking exercises will contain 4-5 questions.

Critical thinking exercises are designed to be challenging and require short and concise written responses, usually in point-form. The general topic areas of the exercises will relate to those speaker topics presented during the previous week, and these are not meant to be cumulative. However, students may need to apply critical thinking skills and careful thought in generating their responses, potentially using external (e.g., online or other) resources. This approach is meant to assess at how well students are able to apply knowledge obtained from the weekly speaker topics to novel scenarios. Since each critical thinking exercise is low-stakes, students should see these as opportunities to further explore the topics of the week.

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 2025-26 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 to complete each assessment must be properly documented, unless otherwise noted by the instructor. 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.

General Guidelines FOR EACH WRITTEN ASSIGNMENT:

1. **Writing assignments must be submitted through the D2L dropbox. Assignments sent directly to the instructor/coordinator, admin assistant or any of the speakers will be ignored.**
2. Evaluation rubrics for each writing assignment will be posted to D2L in advance, along with any other materials required for the specific assignment.
3. Length must NOT EXCEED 2 pages single-spaced (no less than 1.0 spacing) at size no smaller than 11pt Times New Roman font with 0.5-inch margins.
4. Cover pages ARE REQUIRED and do not count toward the page limit.
5. An appropriate title is REQUIRED.
6. Student name/number MUST BE INCLUDED at the top right of each page of text.
7. Graphs/Figures/Charts: These are optional and may be used to enhance the written content of the work. Graphs/Figures/Charts should not be used to replace, or as a substitute to, written content; students are expected to fully explain complex topics without the need for Graphs/Figures/Charts. Graphs/Figures/Charts DO NOT COUNT toward the page limit.
8. Sources/references: Primary sources such as journal articles are preferred, ideally those that are peer-reviewed. Secondary sources such as textbooks, review papers, internet sources,

- newspaper or magazines articles and others are less desirable. The bibliography DOES NOT COUNT toward the page limit.
9. All sources must be properly cited according to the **APA manual of style**, as outlined by the Effective Writing Program at The U of C: <https://www.ucalgary.ca/ssc/resources/writing-support/436>
 10. Documents should be uploaded to D2L in pdf format.

Critical Appraisal Exercise:

This exercise aims to address students' abilities to critically appraise a piece of scientific literature. For this exercise, a series of several journal articles will be provided to students (through D2L). **Students must select one of the articles provided**, read, and evaluate the contents of the article, and provide a structured assessment of the article's thesis, its manner of exposition and its validity. Students will be provided with a marking rubric.

Scientific Study Proposal Exercise:

This exercise aims to address students' abilities to pose a scientifically valid and assessable question, to design an appropriate experimental protocol to address the question, and to demonstrate an understanding of what would be construed as appropriate evidence to answer the question. Given the content of the course, this exercise should be focused on clinically relevant questions; this includes basic science areas that have clinical motivation or applicability. Students will be provided with a marking rubric.

Grading Scheme:

Letter Grade	Description	Percentage
A+	Outstanding performance	96-100
A	Excellent performance	90-95.99
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:

Late submission of assignments is strongly discouraged. Students will lose 5% of the assignment total value for every day of delay in submission (one day of delay will be considered to have passed one minute after the deadline for submission to D2L). Students who miss taking a quiz or who do not take the final exam will receive a mark of zero for that item.

Exceptions relating to course work requirements and standards outlined herein can only be made in rare circumstances, as for example through a prescribed student accommodation plan (see below). This plan must be adhered to and should be provided to the instructor (and home programme) in advance. Other exceptions may be made in accordance with the University Calendar and Policies (e.g., illness, religious conviction, or domestic affliction) that are received in writing. It is considered proper comportment that the instructor be notified in advance of any anticipated exceptions or delays.

Course Evaluations and Student Feedback

Student feedback will be sought at the end of the course through the new 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

Regular attendance is highly encouraged, although an attendance portion of the final grade in the course does not apply.

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://ucalgary.ca/student-services/student-conduct/policy>

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/university-policies-procedures/acceptable-use-electronic-resources-and-information-policy>

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, including generative AI, as they work through the written assignments in MDSC/BIOL 525. **However, students are ultimately accountable for the work they submit** and AI use must be documented in the written assignment's bibliography. 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.** Students are encouraged to review the library guide for how to cite the use of AI tools: <https://libguides.ucalgary.ca/c.php?g=733971&p=5302331>

Students **may NOT** use AI tools and apps to complete the critical thinking exercises. Use of generative AI as part of the CTEs would be considered use of an unauthorized aid, which is a form of cheating and a breach of academic integrity subject to Academic Misconduct procedures.

Students **are NOT** permitted to upload class slides, assignment instructions, or other course materials to AI tools or platforms. These are considered the intellectual property of the course instructor and/or the visiting lecturer(s); uploading these materials to an AI platform (or sharing with other external partners or resources) is considered a breach of intellectual property rules.

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/legal-services/university-policies-procedures/student-non-academic-misconduct-policy>

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>).

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) by students 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://calendar.ucalgary.ca/pages/e31a7115dca740ec83579e946d4a4193>

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/university-policies-procedures/sexual-and-gender-based-violence-policy>

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 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/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](http://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/risk/emergency-management/drills/assembly-points-and-evacuation-maps](http://www.ucalgary.ca/risk/emergency-management/drills/assembly-points-and-evacuation-maps)

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.

