

MDSC/BIOL 503
Pharmacology of Organ Systems

Instructors:

Dr. Antoine Dufour (co-Coordinator) antoine.dufour@ucalgary.ca (403 210-7426)
Dr. Quentin Pittman (co-Coordinator) pittman@ucalgary.ca (403 978-7383)
Dr. Justin Deniset jdeniset@ucalgary.ca
Dr. Matthew Stephens matthew.stephens@ucalgary.ca
Luiz de Almeida luizgustavo.almeida@ucalgary.ca

Office Hours/Policy on Answering Student Emails

Office hours are available by appointment.

Email communications with the course coordinator are welcome. Please email with MDSC / BIOL 503 in the subject line of the message. All efforts will be made to respond to emails received during working hours within 48 hours (excluding weekends and statutory holidays).

Please note that all course communications must occur through your @ucalgary email.

Time and Location:

Monday 9th January – Wednesday April 12th (Term break: week of Feb 20th).
Classes take place Mondays and Wednesdays 5:00pm-6:20pm in HSC G500

Prerequisite/Co-Requisite:

Open to students having successfully completed MDSC/BIOL 501; OR with consent of the course coordinators (Dr. Antoine Dufour antoine.dufour@ucalgary.ca and Dr. Quentin Pittman pittman@ucalgary.ca)

Course Description:

Through analysis and discussion of research literature, this course explores topics in pharmacology including the nervous, cancer, cardiovascular, and gastrointestinal systems.

Overarching Theme

To build on the basic principles of pharmacology introduced in MDSC/BIOL 501, specific emphasis will be based on the analysis, interpretation, and critique of select research topics in pharmacology. This advanced modular course will cover several areas of pharmacological research, from historical to modern investigation, concerning novel drug targets, mechanisms of action and / or therapeutic approaches. The course is designed for senior under-graduate or junior graduate students in the biomedical /biological / biochemical sciences. Course content will be delivered through a series of lectures and topics involving Journal Club-style presentations, debate, and critical discussion of research papers in the field. Participants should be motivated, enthusiastic, questioning, critical and conversant senior undergraduates or junior graduate students who are prepared to discuss basic science and clinical research papers with different topic leads selected for their expertise.

Global Objectives

- To facilitate development of critical and analytical skills in selected topics in pharmacology

- To create and develop an interactive, supportive, and inclusive learning environment

Course Learning Outcomes

This course expects that an interactive environment for learning will be established to facilitate the ability to analyse, critically appraise and discuss scientific papers, as well as the popular over the counter 'natural' treatments and where appropriate integrating old and new concepts. This will be accomplished through active, class discussion based on lectures, journal club style presentations, debates, short written papers (e.g. news & views article, critical paper reviews) plus discussion and questions from the audience.

By the end of MDSC/BIOL 503 students will be able to:

1. develop communication skills by leading journal club style presentations, debate, and discussion of scientific / clinical research papers
2. appraise, critically analyze, and discuss basic and clinical research papers
3. assess appropriateness of scientific methods and models in selected research papers
4. engage concepts from lectures and readings to integrate old and new ideas in pharmacology to guide future avenues of study
5. advance skills in the presentation (written and oral) of complex material for a broad audience
6. Critically evaluate new inhibitor development programs

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 503 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, virtual meeting platforms, and the internet.
- **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

Access to D2L and library resources will be required.

Recommended Textbooks/Readings

There is no assigned textbook for this course. All readings / links to readings will be posted on D2L. Access to library resources will be required.

A Note regarding readings

A list of required readings will be outlined on D2L and links and documents will be made available, where possible. Required readings have been chosen carefully to inform you and enhance the lecture material.

Students are REQUIRED to complete assigned readings BEFORE each class. Instructors will proceed in class on the assumption that students have read completely 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 2022-2023 Calendar.

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

Evaluation

| Description | % grade | Due date |
|---|---------|---------------------------------------|
| Assignment #1 News and views (1 page) | 20 % | January 30 th before class |
| Assignment #2 Drug target (1 page) | 20 % | February 8 th before class |
| Case presentations | 25 % | Variable - assigned times |
| Questions during case presentations | 10 % | Variable - assigned times |
| Final written report of case presentations (2 pages) ** | 25 % | April 12 th |

Rubrics for each component will be provided on D2L.

** This course does not have a final exam. There is only a final report due April 12th

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

Details on each assignment:

Lay Summary or News and views: All students will write a 1-page lay summary (500 words maximum) (on a type of inhibitor. For example: small molecule inhibitor, monoclonal antibody, natural product, etc.). Due before class Jan 30th.

Drug target for their case presentation: Each student as part of the team of 2 or 3 will present a written analysis of the inhibitor program they plan to develop.

Debater and Case Presentation: Each student will present in a case presentation of a new inhibitor program (like one would do when work in a pharmaceutical company) focused on a new drug. Students will be put in teams of 2 or 3. Topics, teams and dates will be assigned in discussion with the course coordinator during the first two weeks of class.

Participation: All students will be engaged and participate in classroom discussions, including ad hoc questions as they arise. Each student will be assigned one case presentation that they will be leading discussion and questions. They will be graded on their participation of the discussion and questions.

Term paper: After selecting a inhibitor program and presenting to the class, each student will write a final report of two pages on their programs, experiments, budgets and analysis they would perform if working for a pharmaceutical company.

Any presentation slides and papers to be submitted on D2L dropbox.

There is no final exam for this 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 2022-23 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 |
| 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:

Students are permitted one 24 h penalty-free extension to a deadline for written material over the entire course. The course coordinator should be informed 24 h in advance of your intent to take advantage of this option. **At the Course Coordinator's discretion, subsequent late assignments will incur a 5% per day late past the deadline for all assignments.** In this case, assignments will **NOT** be accepted more than 72 hours after the posted deadline and students failing to submit any assignment within this time frame will receive a mark of zero. **Exceptions to this policy may be granted on a case-by-case basis.**

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).

Attendance

Students will be required to attend lectures and be graded on their ability to ask questions during the case 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/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/.

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), 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 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/student-advocacy-wellness-hub/home>
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/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 suypaca@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 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.

All course class activities are synchronous, on the dates below from 5:00 – 6:20pm.

Please see next page for schedule and overview of course topics.

| Date | Topics | Instructor | Assignments & Due Dates |
|-----------|---|------------|---|
| Jan 9, M | Introduction to the course, presentation tips | Dufour | |
| Jan 11, W | Drug development and clinical trials | Dufour | |
| Jan 16, M | News and views – format and examples | Dufour | News and views- picking drug target for assignment #1 |
| Jan 18, W | Scientific Integrity | Pittman | |
| Jan 23, M | Disease Topic 1: Inflammation and Pain | Dufour | Picking teams and drug targets for case presentations assignment #2 |
| Jan 25, W | Systems biology, <i>omics</i> era and data science | Dufour | |
| Jan 30, M | Data analysis, bioinformatics, and data hacking | De Almeida | News and views due at beginning of class (1 page report) |
| Feb 1, W | Disease Topic 2: Cancer | Dufour | |
| Feb 6, M | Disease Topic 3: Failure of MMP inhibitors | Dufour | |
| Feb 8, W | Disease Topic 4: Cardiovascular diseases | Deniset | Drug target paper (1 page report) |
| Feb 13, M | Case presentation #1 | Students | Student & class |
| Feb 15, W | Case presentation #2 | Students | Student & class |
| Feb 20, M | No class – reading week | | |
| Feb 22, W | No class – reading week | | |
| Feb 27, M | Case presentation #3 | Students | Student & class |
| Mar 1, W | Case presentation #4 | Students | Student & class |
| Mar 6, M | Disease Topic 5: Central Nervous system diseases | Pittman | |
| Mar 8, W | Database and website searches | Dufour | |
| Mar 13, M | Case presentation #5 | Students | Student & class |
| Mar 15, W | Case presentation #6 | Students | Student & class |
| Mar 20, M | Disease Topic 6: Aptamer-based therapeutics | Stephens | |
| Mar 22, W | Database and website searches part II | Dufour | |
| Mar 27, M | Case presentation #7 | Students | Student & class |
| Mar 29, W | Case presentation #8 | Students | Student & class |
| Apr 3, M | Discussion term paper | | |
| Apr 5, W | Class wrap-up | Dufour | Student & class |
| Apr 10, M | Easter Monday – no class | Dufour | Term report due |
| Apr 12, W | Class wrap-up | Dufour | Student & class |

Note: Depending upon enrollment, student participation assignments may have to be slightly re-scheduled

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|---|
| <p>Topic 1 (Dufour) <u>Inflammation and Pain</u> Basic of inflammatory response will be covered. What cells are involved? What is the timing of immune responses? What are some key chemokines, cytokines and proteases involved?</p> |
| <p>Topic 2 (Dufour) <u>Cancer</u> Basic introduction of cancer biology, metastasis and tumor biology will be covered.</p> |
| <p>Topic 3 (Dufour) <u>Failures of MMP inhibitors</u> One example of a failed clinical trial will be covered regarding the development and clinical trials of matrix metalloproteinase inhibitors.</p> |
| <p>Topic 4 (Deniset) <u>Cardiovascular diseases</u> Basic introduction of cardiovascular diseases and current therapies will be covered.</p> |
| <p>Topic 5 (Pittman) <u>Central nervous system diseases</u> Basic introduction of neurological diseases and current therapies will be covered.</p> |
| <p>Topic 6 (Stephens) <u>Aptamer-based therapeutics</u> How are aptamer-based therapeutics are currently evolving and what are their potential for clinical use?</p> |