

MDSC 501
Principles and Mechanisms of Pharmacology

Instructors:

Dr. Donna Slater	Course Coordinator/Instructor	dmslater@ucalgary.ca
Guest lecturer		
Dr. Chad Bousman		chad.bousman@ucalgary.ca
Dr. William Cole		wcole@ucalgary.ca
Dr. Kyle Flannigan		kyle.flannigan1@ucalgary.ca
Dr. Mark Giembycz		giembycz@ucalgary.ca

Office Hours/Policy on Answering Student Emails

Office hours are available by appointment.

Email communications with the instructor and /or TA are welcome.

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

Please email with MDSC / BIOL 501 in the subject line of the message. All efforts will be made to respond to emails received via student's @ucalgary emails within 48 hours (excluding weekends and statutory holidays).

Teaching Assistants:

Ryan Bianchini ryan.bianchini@ucalgary.ca

Time and Location:

Fall 2020 September 9th to December 9th

Class will be on Mondays and Wednesdays at 5:00 - 6:20 pm. All classes will be online and held via Zoom and will be synchronous

This course will take place **online** via Desire2Learn (D2L) and Zoom. To best succeed in the course, students are encouraged to participate in the asynchronous learning tasks using the D2L learning environment and synchronous Zoom sessions. When unable to participate live due to the time difference or unforeseen circumstances, inform the instructor in advance. An alternative participation activity may be considered and implemented (e.g., watch relevant recordings, read notes, submit a brief reflection, and actively contribute to the follow-up online discussion).

Prerequisite/Co-Requisite:

Admission to the BHSc Honours program; and Biochemistry 341 or 393; and Medical Science 404 or Zoology 463.

Course Description:

Basic principles of pharmacology, with emphasis on mechanisms of drug action and receptor signaling. The application of pharmacology to the treatment of disease will also be explored.

Overarching Theme

The course is designed to introduce the basic principles of 'Pharmacodynamics' – what the drug does to the body, 'Pharmacokinetics' – what the body does to the drug, and the 'mechanisms of drug action' (drug targets, e.g. receptors, enzyme activity). In addition, students will explore the pharmacological manipulation of these in the context of clinical treatment.

The class will be lecture and discussion-based, with select drug examples to build on basic concepts taught.

Global Objectives

- To introduce basic physiology and molecular concepts of pharmacology, including how drugs act along with factors that may affect their absorption, distribution, metabolism, and elimination within the body
- To develop a working knowledge of key pharmacology terms and concepts
- To facilitate the ability to integrate information provided and apply to the principles and mechanisms of pharmacology in the context of select disease and or pathologies
- To be able to critically evaluate evidence and appreciate some reasons why drugs do not always have the desired effect

Course Learning Outcomes

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

1. Define and differentiate the main pharmacodynamics terms (e.g. drug, ligand, receptor, antagonist, agonist, partial agonists, receptor reserve, affinity, efficacy). List the main targets for drug action (e.g. receptors, enzymes, ion channels) and outline the translation into biological responses: i.e. signal transduction mechanisms, gene transcription
2. Explain the principles of pharmacokinetics (ADME) and describe why an understanding of each is important for clinical pharmacology
3. Explain why select patients (e.g. elderly, children, pregnancy, disease state) may respond differently to drugs
4. Describe the basic pathophysiology of select diseases or health problems (e.g. asthma, COPD, hypertension, GI motility, preterm labour, pain, drug abuse), the main classes of drug treatments / mechanism of action, and place these into context of the above principles
5. Investigate a drug in clinical use, describe the main treatment of the drug, adverse outcomes, contraindications, and possible drug interactions, critically assess the literature, and using pharmacological principles above hypothesize why these might be occurring
6. Facilitate classroom learning, by presenting scientific / clinical findings and addressing questions to a broad audience

Learning Resources

There is no assigned textbook for this course

Any readings / links to readings will be posted on D2L

Access to library resources will be required.

Recommended Textbooks/Readings

Supplemental Reading: Rang and Dale's Pharmacology

- 6th edition. By HP Rang, MM Dale, JM Ritter & RJ Flower
- 7th edition. By HP Rang, MM Dale, JM Ritter, RJ Flower & G Henderson
- 8th edition. By HP Rang, JM Ritter, RJ Flower & G Henderson

- 9th edition. By JM Ritter, RJ Flower, G Henderson, Loke YK, MacEwan D & HP Rang,
- Any of the above are recommended to supplement lectures. Copies are kept in the library.

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.

In order to successfully engage in learning experiences at the University of Calgary, students taking online, remote and blended courses are required to have reliable access to the following technology:

- A computer with a supported operating system, as well as the latest security and malware updates;
- A current and updated web browser;
- Webcam (built-in or external);
- Microphone and speaker (built-in or external), or headset with microphone;
- Current antivirus and/or firewall software enabled;
- Broadband internet connection

Most current laptops will have a built-in webcam, speaker and microphone.

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 2020-2021 Calendar.

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

Description	% grade	Due Date	LOs
Open book worksheet 1 (Basic Principles)	22%	Post Oct 7 - due Oct 9, 11:59pm via D2L	1-3
Open book worksheet 2 (Organ Systems / Special topics)	18%	Post Nov 4 – due Nov 6, 11:59pm via D2L	4
Drug evaluation report – summary 300-400 word + refs	10%	Nov 16 th before 4:00pm via D2L	1-4
Final Drug Evaluation Report 7-10 page-double space + refs/figs	25%	Dec 11, 11:59pm	1-5
3 min Poster Presentation or TED talk of drug report	15%	Slides to D2L 24 hours before presentation	1-6
Participation - Student attend and asks Q on posters / TED talk	10%	Participate in class discussion	6

Rubrics for each component will be provided on D2L.

There is no final exam for this course.

A passing grade on each component is not essential to pass the course as a whole. However, students who do not complete each component of the course will be considered as not having completed the course; this will be reflected on the students' official transcript as 'Incomplete'. In the absence of medical or other documented reasons, the instructor reserves the right to award an 'Incomplete'.

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 2020-21 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 a number of instructional services through the Students' Success Centre's Writing Support Services (<http://www.ucalgary.ca/writingsupport/>) for students seeking feedback on assignments or seeking to improve their general writing skills. Students are **strongly encouraged** to take advantage of these programs.

Grading Scheme:

Letter Grade	Description	Percentage
A+	Outstanding performance	95-100
A	Excellent performance	90-94.99
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	Did not meet course requirements	0-49

Missed Components of Term Work:

Students will lose 5% per day late past the deadline for all assignments. 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. **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 presentation in MDSC 501. 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 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).

Guidelines for Zoom Sessions

Zoom is a video conferencing program that will allow us to meet at specific times for a 'live' video conference, so that we can have the opportunity to meet each other virtually and discuss relevant course topics as a learning community.

To help ensure Zoom sessions are private, do not share the Zoom link or password with others, or on any social media platforms. Zoom links and passwords are only intended for students registered in the course. Zoom recordings and materials presented in Zoom, including any teaching materials, must not be shared, distributed or published without the instructor's permission.

The use of video conferencing programs relies on participants to act ethically, honestly and with integrity; and in accordance with the principles of fairness, good faith, and respect (as the Code of Conduct). When entering Zoom or other video conferencing sessions, you play a role in helping create an effective, safe and respectful learning environment. Please be mindful of how your behaviour in these sessions may affect others. Participants are required to use names officially associated with their UCID (legal or preferred names listed in the Student Centre) when engaging in these activities. Instructors/moderators can remove those whose names do not appear on class rosters. Non-compliance may be investigated under relevant University of Calgary conduct policies. If participants have difficulties complying with this requirement, they should email the instructor of the class explaining why, so the instructor may consider whether to grant an exception, and on what terms. For more information on how to get the most out of your zoom sessions visit: <https://elearn.ucalgary.ca/guidelines-for-zoom/>.

If you are unable to attend a Zoom session, please contact your instructor to arrange an alternative activity (where available). Please be prepared, as best as you are able, to join class in a quiet space that will allow you to be fully present and engaged in Zoom sessions. Students will be advised by their instructor when they are expected to turn on their webcam (such as for group work, presentations, etc).

The instructor may record online Zoom class sessions for the purposes of supporting student learning in this class – such as making the recording available for review of the session or for students who miss a session. Students will be advised before the instructor initiates a recording of a Zoom session. These recordings will be used to support student learning only.

Attendance

Attendance at lectures is strongly encouraged. Posted lecture notes provide the basic information required; however, in class questions and discussion in the lecture will add depth to the knowledge base and facilitate greater success in the course assignments. Attendance is recommended as 10% of the final grade is based upon participation in class discussions of student 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/policies/forms/title>.

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>). 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 their instructor.

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/.

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.

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 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>

MEDIA RECORDING

Media recording for the assessment of student learning

The instructor may use media recordings as part of the assessment of students. This may include but is not limited to classroom discussions, presentations, clinical practice, or skills testing that occur during the course. These recordings will be used for student assessment purposes only and will not be shared or used for any other purpose.

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

Wellness and Mental Health Resources

The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the excellent mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (<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 suwpaca@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. The worksheet, Drug Summary and Drug report dates are firm and will not be altered.

CLASS Date	Module / Topics – ZOOM	Lecturer	Assignments and Due Dates
Sept 9 (W)	Overview - Introduction Principles of Drug Action. <i>Discuss assignment expectations</i>	DMS	<i>Drug list introduction</i>
GENERAL PRINCIPLES			
Sept. 14 (M)	Pharmacodynamics I How drugs act on the body	DMS	
Sept. 16 (W)	Pharmacodynamics II	DMS	
Sept. 21 (M)	Pharmacokinetics I (ADME) What the body does to the drug	DMS	
Sept. 23 (W)	Pharmacokinetics II (ADME)	DMS	
Sept. 28 (M)	Drug effects: Individual variation, ethnicity, sex, age	DMS	
Sept. 30 (W)	Personalised Medicine II: Pharmacogenomics	CB	
Oct. 5 (M)	Analgesia: Pain / inflammation / fever (NSAIDs/steroids)	DMS	
Oct. 7 (W)	Analgesia: Opioids and Cannabinoids	DMS (TBC)	Open book worksheet given to students
			worksheet due (Oct 9, 11:59pm)
Oct. 12 (M)	THANKSGIVING HOLIDAY	No Class	
DRUGS AFFECTING MAJOR ORGAN SYSTEMS AND SPECIAL TOPICS			
Oct. 14 (W)	Blood Pressure Control & Hypertension I	WC	
Oct. 19 (M)	Blood Pressure Control & Hypertension II	WC	
Oct. 21 (W)	Blood Pressure Control & Hypertension III: Kidney Diuretics	WC	
Oct. 26 (M)	Drugs used for Asthma and COPD (TBD)	MG	
Oct. 28 (W)	GI Pharmacology	KF	
Nov. 2 (M)	The uterus: drugs for treating complications of labour	DMS	
Nov. 4 (W)	Demo Ted / Poster talks and Tutorial questions	DS/RB	Open book worksheet given to students
			Worksheet due (Nov 6, 11:59pm)
Nov. 9-13	No Class Reading Week	No Class	
Nov. 16 (M)	Class Open Topic discussion (anti-depressants/other TBD)	DMS/RB	Drug Report Draft due
Nov. 18 (W)	Student Ted / Poster talks - 3 mins + 7 min Qs	DMS	6 - 7 students present
Nov. 23 (M)	Student Ted / Poster talks - 3 mins + 7 min Qs	DMS	6 - 7 students present
Nov. 25 (W)	Student Ted / Poster talks - 3 mins + 7 min Qs	DMS	6 - 7 students present
Nov. 30 (M)	Student Ted / Poster talks - 3 mins + 7 min Qs	DMS	6 - 7 students present
Dec. 2 (W)	Student Ted / Poster talks - 3 mins + 7 min Qs	DMS	6 - 7 students present
Dec. 7 (M)	Student Ted / Poster talks - 3 mins + 7 min Qs	DMS	6 - 7 students present
Dec 9 (W)	Student Ted / Poster talks - 3 mins + 7 min Qs	DMS	6 - 7 students present
			FINAL drug report - due (Dec 11, 11.59pm)