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

Academic Year 2019-2020

MDSC 501
Principles and Mechanisms of Pharmacology

Instructors:

Dr. Donna Slater	Course Coordinator	dmslater@ucalgary.ca
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Office Hours/Policy on Answering Student Emails
Office hours are available by appointment.

Email communications with the instructor and /or TA are welcome. Please email with MDSC 501 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).

Teaching Assistant:

Ryan Bianchini ryan.bianchini@ucalgary.ca

Time and Location:
Fall 2019 September 9th to December 4th
Class will be on Mondays and Wednesdays at 5:00 - 6:20 pm, Clara Christie Lecture Theatre

Please consult course schedule to confirm location of individual sessions.

Prerequisite/Co-Requisite:
Enrolment in the BHSc Honours program, Biochemistry 393 *and one of* Medical Science 404, or Zoology 463, or consent of the BHSc program.

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
Introduce basic principles and concepts of mechanisms of drug action (as drug targets, e.g. receptors, enzyme activity) and the pharmacological manipulation of these in the context of clinical treatment.

The class will be lecture and discussion-based, with tutorials and example case studies to develop concepts taught.

Global Objectives

- Introduce basic physiological and molecular concepts of pharmacology, including how drugs act and the factors affecting their absorption, distribution, metabolism and elimination
- 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

Learning Objectives

By the end of this course, using the lectures, assignments and tutorials provided plus recommended reading resources, students will gain an understanding of the basic principles of pharmacology and 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)
2. Describe the difference between what drugs do (**pharmacodynamics**) and what the body does to the drug (**pharmacokinetics**)
3. Explain the principles of pharmacokinetics (**ADME**) and describe why an understanding of each is important for clinical pharmacology
4. List the main targets for **drug action** at the cellular level, (e.g. receptors, enzymes, ion channels) and outline the **translation into biological responses**; i.e. signal transduction mechanisms, gene transcription
5. Explain why select patients (e.g. elderly, children, pregnancy) may respond differently to drugs
6. Describe the basic pathophysiology of select diseases or health problems (e.g. asthma, COPD, hypertension, GI motility, preterm labour, drug abuse), the main classes of drug treatments / mechanism of action, and place these into context of the above principles
7. Describe the main adverse outcomes, contraindications, and possible drug interactions, and hypothesize why these might be occurring using pharmacological principles

Required Texts

No required textbooks.

Recommended Textbooks / Readings

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

Any of the above are recommended to supplement lectures. Copies are kept in the library.

A Note regarding readings

A list of any required readings for all course sections 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 the lecture or tutorial.** Instructors will proceed in class on the assumption that students have read completely the assigned readings.

Evaluation
The University policy on grading and related matters is described in section F.2 of the 2019-2020 Calendar.
In determining the overall grade in the course, the following weights will be used:

- Worksheet 1 (Basic Principles) 1.5% (Oct. 7, 2019)
- In Class Test 1 (Basic Principles) 24% (Oct. 16, 1019)
- Worksheet 2 (Major Organ Systems) 1.5% (Nov. 2, 2019)
- In Class Test 2 (Major Organ Systems) 18% (Nov. 6, 2019)
- In Class Test 3 (Special Topics) 15% (Dec. 4, 2019)
- Drug Evaluation Report (draft with annotated refs) 10% (Nov. 20, 2019)
- Final Drug Evaluation Report (5-page max plus refs/figs) 30% (Dec. 11, 2019)

A student's final grade for the course is the sum of the in-class tests and assignments. It is not necessary pass each assignment separately to pass the course.

The use of aids (open book, programmable calculator) will be not be permitted in the in-class tests

- Details for the Drug Evaluation Report will be discussed in class and provided on D2L
- Worksheets provide examples of past test questions, to be handed in on D2L in advance of each tutorial session (due dates: Oct 7, 5pm; Nov 2, 5pm)

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 2019-20 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). 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
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:
Late assignments will lose 5% per day late past the deadline for the drug evaluation report (draft and final). These 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. Late submission of worksheets is not accepted. Students who do not hand in a worksheet by the posted deadline 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.***

It is the agreement of all Faculty involved in MDSC 501 that **extensions will NOT be granted** on any assignment or in class tests. The only exceptions to this are those in keeping with the University Calendar (debilitating illness, religious conviction, or severe domestic affliction) that are received in writing and with supporting documentation. Please be advised that students should notify the instructor before the assignment deadline to discuss. 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 (14-day) 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).

Brightspace by Desire2Learn (D2L)
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/.

Policies Governing the Course:

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 and in class tests.

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 conduct themselves in a mature and courteous manner during ALL lectures. Students are expected to frame their comments and questions to lecturers in respectful and appropriate language, always maintaining sensitivity towards the topic.

Students are expected to take notes during each session and should not rely solely on handout material supplied by the instructors.

Electronic Devices
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 both

the user and those sitting nearby. Students are to refrain from accessing websites that may be distracting for fellow learners (i.e. personal email, Facebook, YouTube).

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

Cell phones (or similar devices) should **be turned off** (not merely silent) upon entering the classroom. Sending/receiving text messages or leaving the class to take calls is disruptive to the entire class and will not be tolerated unless absolutely necessary. Students who disregard this rule during lectures or tutorials will be asked to leave. These items are not permitted under any circumstance during exams/quizzes, etc.

Copyright
It is the responsibility of students and professors to ensure that materials they post or distribute to others comply with the Copyright Act and the University's Fair Dealing Guidance for Students (library.ucalgary.ca/files/library/guidance_for_students.pdf). Further information for students is available on the Copyright Office web page (http://library.ucalgary.ca/copyright)

A Note Regarding Instructor Intellectual Property
Generally speaking, course materials created by professor(s) (including course outlines, presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the professor(s). 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 Based on Disability or Medical Condition
Students seeking an accommodation based on disability or medical concerns should contact Student Accessibility Services; SAS will process the request and issue letters of accommodation to instructors. For additional information on support services and accommodations for students with disabilities, visit www.ucalgary.ca/access/.

Accommodations on Protected Grounds other than Disability
Students who require an accommodation in relation to their coursework based on a protected ground other than disability, should communicate this need, preferably in writing, to their instructor or to the designated BHSc program contact, Mrs. Jennifer Logan (jljlogan@ucalgary.ca), or to Dr. Ebba Kurz, Associate Dean, Undergraduate Health and Science Education, Cumming School of Medicine. The full policy on Student Accommodations is available at
http://www.ucalgary.ca/policies/files/policies/student-accommodation-policy.pdf.

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. For information on academic misconduct and its consequences, please see the University of Calgary Calendar at
http://www.ucalgary.ca/pubs/calendar/current/k.html Students are expected to be familiar with these standards and to uphold the policies of the University in this respect. Please know that the University and the Cumming School of Medicine take these rules seriously. **All incidences of academic dishonesty**

in this course, such as cheating and plagiarism, will be reported to the Associate Dean for investigation; infractions will be noted on the record of a student found to be guilty.

Recording of Lectures
Audio or video recording of lectures is **prohibited** except where explicit permission has been received from the instructor.

Other Important Information

Freedom of Information and Protection of Privacy Act
This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIP); students should identify themselves on written assignments (exams and term work) by their name and ID number on the front page and ID on each subsequent page. Work assigned to you by your course instructor will remain confidential unless otherwise stated before submission. The assignment cannot be returned to anyone else without your expressed permission to the instructor. Grades will be made available on an individual basis and students will not have access to other students' grades without expressed consent. Similarly, any information about yourself that you share with your course instructor will not be given to anyone else without your permission. For more information see http://www.ucalgary.ca/policies/files/policies/privacy-policy-2011.pdf

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

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 (Room 370 MacEwan Student 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 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, 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 in-class test dates are firm and will not be altered.

Date	Module / Topics – in Clara Christie	Lecturer	Notes
Sept 9 (M)	Overview - Introduction Principles of Drug Action. *Discuss assignment expectations*	DMS	
	BASIC PRINCIPLES		
Sept. 11 (W)	Pharmacodynamics I	MG	
Sept. 16 (M)	Pharmacodynamics II	MG	
Sept. 18 (W)	Targets for Drug Action I: Receptors	DMS	
Sept. 23 (M)	Targets for Drug Action II: Enzymes, Ion Channels, Transporters	DMS	
Sept. 25 (W)	Pharmacokinetics I (**AD**M**E**)	DMS	
Sept. 30 (M)	Pharmacokinetics II (AD**M**E)	DMS	
Oct. 2 (W)	Personalised medicine I: Drugs in Pregnancy, Children & the Elderly	DMS	
Oct. 7 (M)	Personalised Medicine II: Pharmacogenomics	CB	(1.5%) worksheet
Oct. 9 (W)	Tutorial / Practice Qs / Case Studies	DMS	
Oct. 14 (M)	*THANKSGIVING HOLIDAY*	*No Class*	
Oct. 16 (W)	**In class test**	DMS	(24%)
	DRUGS AFFECTING MAJOR ORGAN SYSTEMS (RESPIRATORY, CV & KIDNEY)		
Oct. 21 (M)	Drugs used for Asthma and COPD	MG	
Oct. 23 (W)	Blood Pressure Control and Hypertension I	WC	
Oct. 28 (M)	Blood Pressure Control and Hypertension II	WC	
Oct. 30 (W)	Blood Pressure Control and Hypertension III: Kidney Diuretics	WC	(1.5%) worksheet due Nov 2nd, 5:00pm
Nov. 4 (M)	Tutorial / Practice Qs / Case Studies	DMS	
Nov. 6 (W)	**In class test**	DMS	(18%)
Nov. 11-15	*No Class Reading Week*	*No Class*	
	SPECIAL TOPICS		
Nov. 18 (M)	Analgesia: Role of the Opioids and Cannabinoids	TT	
Nov. 20 (W)	Inflammatory Mediators and Anti-inflammatory Drugs	DMS	Annotated draft of Term Paper (10%)
Nov. 25 (M)	Health Complications in Reproduction, Pregnancy and Parturition	DMS	
Nov. 27 (W)	Biologics / biosimilars	EK	
Dec. 2 (M)	Drug Overdose and Managing the Poisoned Patient	DMS	
Dec. 4 (W)	*In Class Test - Class wrap up*	DMS	(15%)
Dec. 11 (W)			Final Report due (30%)

Assignments in Brief – see D2L for details and rubric as appropriate

1. In-Class test 1: Short answer format on lectures (highlighted) Sept 11- Oct 12
2. Worksheet 1 due in or before class on Oct 7.
3. In-Class test 2: Short answer format on lectures (highlighted) Oct 21 – Oct 30
4. Worksheet 2 due 5pm on Nov 2.
5. In-Class test 3: Short answer format on lectures (highlighted) Nov 18 – Dec 2

6. Term Paper: Drug Evaluation Report (total 40%)
    a. 1-page draft with annotated references (10%) Nov. 20, 2019
    b. Final Drug Evaluation Report (30%) Dec. 11, 2019