BIOLOGY 4855 - PHARMACOLOGY
2026 Serial
Dr. Robert J. Omeljaniuk (CB-4013)

Preface. This serial of this course represents a significant change from previous serials. The intent of the selected readings and assigned questions is to direct students into basic pharmacological principles and illustrate them with practical examples of pharmacologic regulation of physiological systems. It is very important to me to have real-time awareness of how each student is doing in order to adjust the workload if necessary. This serial of this course is a substantive undertaking and it is my intent to ensure that students learn this material effectively but do not become overwhelmed.

1. Instructor. Dr. Robert J. Omeljaniuk, CB-4013

2. Intent. To provide senior undergraduate students with an opportunity to study selected aspects of pharmacology in a directed study approach.

3. Marking Scheme. 10 Assignments valued at 10 final marks each = 100 final marks. Assignments are due as indicated; late assignments will not be accepted. In the event of extenuating circumstances, students are encouraged to request extensions on an individual basis in writing. **Assignments are to be submitted into the Assignment box no later than 1200 hrs on the Friday of the Assignment Deadline week**.

4. Execution.

a. General. Students will be assigned specific readings from the course textbook and will be prepared to discuss the subject matter and any difficulties they may have with it in group discussion on a weekly basis.

(1) Attendance to all scheduled coordination meetings is mandatory; students may "check-in" by submitting a very brief e-mail to the instructor. Absences for which there is not a satisfactory explanation may result in the respective assignment being returned unmarked and graded zero.
(2) Students' comprehension and mastery of the material will be evaluated on the basis of assignments submitted no later than one week following discussion of the subject matter.
(3) Answers to assigned questions may take any neatly presented format including text, figures and tables submitted as a hard copy; paragraph and short-essay answers supported by diagrams of the student's own design will be most appropriate. Submit hard copy assignments into the assignment box outside CB3013. Marked assignments will be returned in envelopes and placed on the table adjacent to the assignment box.
(4) Assignments will conform to the Instructions to Authors of The Canadian Journal of Zoology without exception. Assignments inconsistent with these directions will be returned unmarked and a score of zero will be attributed.
(5) All assignments must be credibly completed.

b. Timings. Assignments are due as indicated. Late assignments will not be accepted. Students experiencing unusual circumstances are nonetheless encouraged to request extensions in writing prior to submitting assignments.

c. Tentative Outline.

Serial	Reading	Discussion Date (week of)	Assignment Deadline (week of)
1	Chapter 2: How drugs act: general principles.	05 Jan	12 Jan
2	Chapter 3: How drugs act: molecular aspects.	12 Jan	19 Jan
3	Chapter 4: How drugs act: cellular aspects - excitation, contraction and secretion.	19 Jan	26 Jan
4	Chapter 9: Absorption and distribution of drugs.	26 Jan	02 Feb
5	Chapter 10: Drug metabolism and elimination; Chapter 11: Pharmacokinetics.	02 Feb	09 Feb
6	Chapter 58: Harmful effects of drugs.	09 Feb	16 Feb (Submit in Study Week)
7	Chapter 22: The Heart.	16 Feb (Self Study)	23 Feb
8	Chapter 23: The Vascular System.	23 Feb	02 Mar
9	Chapter 29: Respiratory System.	02 Mar	09 Mar
10	Chapter 49: Psychoactive Drugs.	09 Mar	16 Mar

5. Textbook.

Rang & Dale's Pharmacology (9th ed). J.M Ritter, R. Flower, G. Henderson, Y.K. Loke, D. MacEwan, and H.P Rang. Elsevier, 788 pp, 2020. $78.99

Assignment 1.

Provide a comprehensive review of drug-receptor interactions. Among the topics to be covered a methodical treatment of the following topics is essential.

a. Graphical and mathematical analysis of ligand-receptor interaction;
b. Relationships between ligand-residency at the receptor and ligand-biological activity;
c. The types and mechanistic bases for receptor antagonism; and
d. Modulation of receptor operation and adaptation of receptors to ligand exposure.

(10 Final Marks).

Assignment 2.

Provide a thorough consideration of the fundamental categories and subcategories of receptors providing specific examples.

As well, provide relevant and detailed information regarding cognate intracellular signaling systems.

(10 Final Marks).

Assignment 3.

a. Consider the regulation of intracellular Ca^{++}-homeostasis; and
b. Consider factors associated with the regulation of membrane voltage.

(10 Final Marks).

Assignment 4.

a. Consider the physical processes associated with drug disposition; and
b. Discuss the factors relevant in the distribution of drugs in the body.

(10 Final Marks).

Assignment 5.

a. Describe and compare Phase 1 and Phase 2 reaction;
b. Consider the routes and mathematical models of drug and drug metabolite excretion; and
c. Discuss drug elimination in the context of "clearance". Ensure a careful consideration of the various "models".

(10 Final Marks).

Assignment 6.

Give careful consideration of the diverse forms of immediate- and long(er)-term harmful effects of drugs and the mechanisms supporting these toxicities.

(10 Final Marks).

Assignment 7.

a. Define the normal operation and regulation of the heart. (3 Final Marks); and
b. Provide a comprehensive examination of drugs which affect cardiac function. (7 Final Marks).

Assignment 8.

a. Consider the integrated regulation of vascular smooth muscle tone. (4 Final Marks); and
b. Describe and discuss the mechanisms of action and clinical applications of vasoactive drugs. (6 Final Marks).

Assignment 9.

a. Briefly describe the basic elements of the physiology of breathing. (2 Final Marks); and
b. Consider in detail the drugs and their mechanisms of action used to treat asthma and COPD. (8 Final Marks).

Assignment 10.

Provide a detailed but concise assessment of the mechanisms of action and biological activities of the principal categories of psychotropic drugs using specific pharmacophores as examples.

Note. This chapter provides a very wide survey of multiple drugs; avoid simply reiterating a litany of these drugs. Employ the principles of Class of Drug, Principal Biological Effect of Class, Specific Example(s) with mechanism(s) of action and Biological Activity and Contraindications.
(10 Final Marks).