BIOLOGY 4855 - PHARMACOLOGY
2016 Serial

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Winter 2016

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, 343-8236

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. Attendance at coordination and discussion meetings is required. 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. 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. All assignments must be credibly completed; in the event a student completes the course with a mark between 40 and 49 %, they will be eligible to apply for a Special Exam to be arranged with Lakehead University Scheduling. The examination will cover the entire course material and the examination mark will take the place of the course mark. **Attendance to all scheduled coordination meetings is mandatory; absences for which there is not a satisfactory explanation may result in the respective assignment being returned unmarked and graded zero.**

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 7: Method and measurement in pharmacology; Chapter 8: Absorption and distribution of drugs.	04 Jan	11 Jan
2	Chapter 9: Drug metabolism and elimination; Chapter 10: Pharmokinetics.	11 Jan	18 Jan
3	Chapter 2: How drugs act: general principles.	18 Jan	25 Jan
4	Chapter 3: How drugs act: molecular aspects.	25 Jan	01 Feb
5	Chapter 12: Chemical mediators and the autonomic nervous system.	01 Feb	08 Feb
6	Chapter 13: Cholinergic transmission	08 Feb	15 Feb
7	Chapter 14: Noradrenergic transmission	Self-Study	22 Feb
8	Chapter 21: The heart; Chapter 22: The vascular system.	22 Feb	29 Feb
9	Chapter 24: Haemostasis and thrombosis; Chapter 25: Haemopoietic system and treatment of anaemia.	29	07 Mar
10	Chapter 28: Respiratory system; Chapter 29: The kidney and urinary system; Chapter 36: Bone metabolism.	07 Mar	15 Mar

5. Textbook.

Rang & Dale's Pharmacology (8th ed). H.P. Rang, Ritter, J.M., Flower, R.J. and Henderson, G. Elsevier Churchill Livingstone. Toronto. 760 pp. 2016.

Assignment 1.

1. Discuss the organization and design of bioassays. As well, identify and define critical parameters and contrast design limits between bioassays in man versus other living systems. (3 page narrative limit, 3 marks).

2. Identify and discuss the critical elements of clinical trials. (3 page narrative limit, 3 marks).

3. Discuss the movement of drugs across membranes and comment on the role of ionization on drug partitioning between compartments and clearance implications. (3 page narrative limit, 3 marks).

4. Consider different routes of administration and their advantages and disadvantages. (1 page narrative limit, 1 marks).

5. Discuss the factors that influence the distribution of drugs in the body. (2 page narrative limit, 2 marks).

Assignment 2.

Note: The material in this chapter is very important to your understanding of pharmacology.

1. Consider the elements of drug metabolism. (4 page narrative limit, 4 marks).

2. Summarize the factors influencing drug and metabolite excretion. (2 page narrative limit, 1 marks).

3. Pharmacokinetics. (This is the most critical part of this chapter.).

Provide a mechanistic and mathematical explanation of drug elimination accounting for the most commonly used models. (6 page narrative limit, 5 marks).

Assignment 3.

1. Consider the interaction of drugs with target molecules and in particular, drug receptors. (1 page narrative limit, 1 marks)

2. Explain how the law of mass action (first order) can be used to predict receptor occupancy and the measurement of drug binding to receptors. (4 page narrative limit, 4 marks).

3. Define, describe and mechanistically explain the varied agonism- and antagonism-mechanisms. (6 page narrative limit, 5 marks).

Assignment 4.

1. Discuss and compare the organization and operation of the Channel-linked receptors with the G-protein-coupled receptors. Cite appropriate examples and illustrate mechanisms to substantiate comparisons. (7 page narrative limit, 5 marks).

2. Discuss and compare the organization and operation of the Kinase-linked receptors with the receptors that regulate gene expression. Cite appropriate examples and illustrate mechanisms to substantiate comparisons. (8 page narrative limit, 5 marks).

Assignment 5.

1. Describe the neuroanatomic organization and basic neurochemistry of the autonomic nervous system. (5 page narrative limit, 5 marks).

2. Identify and discuss the principles of chemical neurotransmission. (5 page narrative limit, 5 marks).

Assignment 6.

1. In narrative form, define and compare the operational and pharmacological characteristics of cholinergic receptor classes. (3 page narrative limit, 2 marks).

2. Describe the important features of acetylcholine synthesis and secretion. (1 page narrative limit, 2 marks).

3. Identify and compare the pharmacological determinates of muscarinic- and nicotinic-receptor pharmacology. (2 page narrative limit, 2 marks).

4. Describe the operation and pharmacological modulation of cholinergic transmission. (5 page narrative limit, 4 marks).

Assignment 7.

1. Consider the elements of noradrenergic transmission. (4 page narrative limit, 4 marks).

2. Describe and compare the pharmacology of adrenoreceptor agonists and antagonists. (3 page narrative limit, 3 marks).

4. Discuss the variable means by which noradrenergic transmission can be manipulated. Use illustrative examples sparingly. Use of additional material from Table 14.4 is advisable as a source of examples for specific pharmacologic probes. (3 page narrative limit, 3 marks).

Assignment 8.

1. Describe the mechanical and electrical components of heart operation. As well, provide a methodical analysis of cardiac dysfunction. (3 page narrative limit, 3 marks).

2. Consider the factors which routinely affect heart operation. (2 page narrative limit, 2 marks).

3. Define anomalies in heart operation, their substrates, and briefly identify possible routes of pharmacologic remediation. (3 page narrative limit, 3 marks).

4. Consider the factors associated with regulation of vascular smooth muscle tone. (3 page narrative limit, 3 marks).

5. Describe and discuss the diversity and biological effects of vasoactive drugs. A consideration of clinical applications is not necessary. (3 page narrative limit, 3 marks).

Assignment 9.

1. Describe and discuss the factors and mechanisms associated wtih blood coagulation and fibrinolysis. (3 page narrative limit, 3 marks).

2. Succinctly review pharmacologic intervention strategies for blood coagulation. (1 page narrative limit, 1 marks).

3. Describe and discuss the factors and mechanisms associated with platelet adhesion and activation, as well as their pharmacological modulation. (3 page narrative limit, 3 marks).

4. Differentiate the diversity of anaemias and their origins. (1 page narrative limit, 1 marks).

5. Consider iron homeostasis and possible pharmacological interventions. (1 page narrative limit, 1 marks).

6. Discuss the roles of hematopoietic growth factors in hematopoiesis. (1 page narrative limit, 1 marks).

Assignment 10.

1. Describe the structure and function of the nephron and juxtaglomerular apparatus. (2 page narrative limit, 2 marks).

2. Discuss the operation, regulation and functions of the renal tubule. (4 page narrative limit, 3 marks).

3. Overview differential pharmacological modulation of renal function. (3 page narrative limit, 3 marks).

4. Describe and discuss bone structure and composition as well as bone remodelling. (4 page narrative limit, 3 marks).

5. Overview bone disorders and respective pharmacological therapies. (3 page narrative limit, 2 marks).