

BIOLOGY 4850 - NEUROCHEMISTRY
2023 Serial

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 neurochemistry in a directed study approach.
3. Marking Scheme. 10 Assignments and/or seminars valued at 10 final marks each = 100 final marks.
4. Execution.
 - a. General.
 - (1) 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 discussions on a weekly basis. ***In the event that coordination meetings cannot take place, students should field their questions to the instructor either in person (if permitted), or by telephone or e-mail.***
 - (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.

Answers to assigned questions may take any neatly presented word-processed format and 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 figures and tables submitted will be prepared in the students' own hand; no photocopies or scanned/printed images are permitted. NOTE: Absolutely NO electronic assistance of any kind is authorized in the preparation of figures and tables. Any indication of any electronic assistance used in this regard will result in the return of the entire assignment with a mark of zero, with no provision for resubmission.

Page limits refer to narrative and not to figures or tables; assignment answers exceeding page limits will not be marked. In many cases, the preparation of an answer will require sourcing information from several sections of the textbook.
 - (3) All assignments must be credibly completed; **class attendance is mandatory if permitted.**

If group gatherings are not permitted, then students must check-in with the instructor by sending an e-mail message confirming their continued participation in the course.

As this course is assignment based, there is no provision for any supplementary or Special Exams.

Assignments are due no later than 1200 hrs on the Friday of the week identified in the Tentative Outline below and are to be submitted into the appropriate assignment box on the third floor of the Biology area of the Centennial Building in the vicinity of CB3013 (an undergraduate laboratory).

b. Tentative Outline.

Serial	Reading	Discussion Date (week of)	Assignment Deadline (week of)
1	Chapter 12: Synaptic transmission and cellular signaling: an overview.	04 Sep	11 Sep
2	Chapter 13: Acetylcholine (Part 1).	11 Sep	18 Sep
3	Chapter 13: Acetylcholine (Part 2).	18 Sep	25 Sep
4	Chapter 14: Catecholamines.	25 Sep	02 Oct
5	Chapter 15: Serotonin.	02 Oct	09 Oct
6	Chapter 16: Histamine.	09 Oct Study Wk No Mtg	16 Oct Study Wk
7	Chapter 17: Glutamate and glutamate receptors.	16 Oct	23 Oct
8	Chapter 18: GABA; and Chapter 15: Purinergic signaling.	23 Oct	30 Oct
9	Chapter 20: Peptides.	30 Oct	06 Nov
10	Relevant sections Chapters 13, 14, 15, 16, 17, 18 and 19.	06 Nov	13 Nov

5. Textbook.

Basic Neurochemistry - Principles of molecular, cellular, and medical neurobiology. 8th ed. S. T. Brady, G.J. Siegel, R.W. Albers, and D.L. Price (eds). Academic Press. New York. 1096 pp. 2012.

Assignment 1.

1. Describe and discuss synaptic transmission. (5 p. narrative limit; 5 final marks).
2. Consider the diversity of cellular (ie. intracellular) signaling systems. (4 p. narrative limit; 5 final marks).

Assignment 2.

1. Consider the biosynthesis, chemistry and metabolism of acetylcholine. (5 p. narrative limit; 5 final marks).
2. Describe and discuss the structure, operation, and pharmacology of the nicotinic-cholinergic receptor. (5 p. narrative limit; 5 final marks).

Assignment 3.

1. Consider the structure, pharmacology, and signaling mechanisms associated with the muscarinic cholinergic receptor. (8 p. narrative limit; 10 final marks).

Assignment 4.

1. Describe the biosynthesis and chemistry of the catecholamines. (3 p. narrative limit; 3 final marks).
2. Describe and discuss the secretion, metabolism and inactivation of catecholamines. (3 p. narrative limit; 2 final marks).
3. Consider catecholamine receptor signaling, pharmacology and receptor regulation. (4 p. narrative limit; 5 final marks).

Assignment 5.

1. Consider the biosynthesis, chemistry, and metabolism of the indoleamine primary messengers. (3 p. narrative limit; 3 final marks).
2. Describe serotonin receptor structure and pharmacology. (6 p. narrative limit; 7 final marks).

Assignment 6.

1. Consider the biosynthesis, chemistry and metabolism of histamine. (2 p. narrative limit; 2 final marks).
2. Resolve the histamine receptors on the basis of their pharmacology. (1 p. narrative limit; 2 final marks).
3. Describe and compare the mechanisms of action of the histamine receptor subtypes. (4 p. narrative limit; 6 final marks).

Assignment 7.

1. Describe the structure, biosynthesis and fates of glutamate. (3 p. narrative limit; 3 final marks).
2. Describe and discuss the pharmacology and mechanisms of action of the glutamate receptor subtypes. (4 p. narrative limit; 7 final marks).

Assignment 8.

1. Describe the structure and pharmacology of the GABA receptor subtypes. (4 p. narrative limit; 4 final marks).
2. Consider the structure and biosynthesis/metabolism of the purine-derived messengers. (3 p. narrative limit; 3 final marks).
3. Discuss the pharmacologic resolution of purine receptor subtypes and their respective biological activities. (3 p. narrative limit; 3 final marks).

Assignment 9.

1. Overview the diversity of peptide neurotransmitters and consider their respective biosyntheses. NOTE: Figures and flow-charts are a great way to reduce narrative in this response. (3 p. narrative limit; 6 final marks).
2. Overview neuropeptide transmitter receptors. (3 p. narrative limit; 4 final marks).

Assignment 10.

1. Define and compare the primary messenger tracts in the brain. The bulk of this answer consists of relevant figures. Please provide appropriate commentary on the geographical overlap and/or complementarity of these tracts. You do not need to speculate beyond that point. Your narrative should be composed to help and serve as a useful reference if ever you need to teach a course in Neurochemistry, or Neurochemical Anatomy. (10 final marks).