FA

BIOLOGY 4850 - NEUROCHEMISTRY
2015 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.

(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 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. 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**. 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, which covers all course material, to be arranged with Lakehead University Scheduling. Students' term marks will be prorated to 50% of the course mark; the Special Exam will be valued at 50% of the final mark. **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.**

b. Tentative Outline.

Serial	Reading	Discussion Date (week of)	Assignment Deadline (week of)
1	Chapter 12: Synaptic transmission and cellular signaling: an overview.	14 Sep	21 Sep
2	Chapter 13: Acetylcholine (Part 1).	21 Sep	28 Sep
3	Chapter 13: Acetylcholine (Part 2).	28 Sep	05 Oct
4	Chapter 14: Catecholamines.	05 Oct	12 Oct
5	Chapter 15: Serotonin.	12 Oct	19 Oct
6	Chapter 16: Histamine.	19 Oct	26 Oct
7	Chapter 17: Glutamate and glutamate receptors.	26 Oct	02 Nov
8	Chapter 18: GABA; and Chapter 15: Purinergic signaling.	02 Nov	09 Nov
9	Chapter 20: Peptides.	09 Nov	16 Nov
10	Relevant sections Chapters 13, 14, 15, 16, 17, 18 and 19.	16 Nov	23 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 messangers. (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 complimentarity 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).