

Chem 417 - Neurochemistry Spring 2019

Instructor: R. A. Coleman. My office is in ISC-3, room 1289
My weekly schedule is sufficiently hectic to not allow me to schedule regular office hours.
However, I am happy to have you email me with your available times. I'll pick one for an
appointment and let you know by return email. My e-mail address is: RACOLE@WM.EDU.
My office phone is 221-2679

Text: *Basic Neurochemistry, 8th ed.*, Brady et al., 2012

Description: A study of the biochemical mechanisms and pharmacology of the nervous system, with particular emphasis on the human brain. Topics include excitatory and inhibitory neurotransmitters, the molecular structure and function of neurotransmitter receptors, reuptake transporters, and second messenger systems. The biochemical basis of neuroactive drugs, toxins, and diseases will be discussed.

Grading: Four (4) problem sets worth a maximum of 240 points. To earn maximum points, answers must have *significant* details drawn from the *recent* literature. Shorter, but correct, answers will earn no more than one-half credit. Problem sets will be distributed in class at least one week prior to the due date. Hardcopy printouts must be turned in to my mailbox in the chemistry main office (ISC 1039) by 4:30 on the date due.

Problem sets are due by 4:30 p.m. on February 4, 22, March 22, April 12

One short paper / literature review of 4 – 5 pages worth 130 points. This paper must be on a topic *relevant to this course*. *If you can relate your topic to ANY of the 61 chapters in the textbook, the topic is acceptable*. Hardcopy printouts must be turned in to my mailbox in the chemistry main office (ISC 1039) by 4:30 on the date due. Additionally, a PDF or Word version must be uploaded to Bb by 11:59 pm on the date due.

The short paper is due by 4:30 p.m. on March 1.

An oral presentation by a **team of three** classmates worth 210 points. *Student teams and topics will be assigned during the first two weeks of class*. Presentations must be at least **40** minutes long and no more than **45** minutes with a 5 minute Q/A discussion following the talk. On the day of the talk, the following items are also due and must be emailed as attachments to racole@wm.edu: (1) A PPT copy of the talk; (2) A list of *recent* literature references used in the talk sorted by team member. Each team member must have *recent* references for his/her portion of the presentation!

One final paper of 8 – 10 pages worth 250 points. *Topic approval statement for short paper also applies to term paper*. A rough draft is due on March 29 and is to be given to a designated peer for review and comment. The peer-reviewed paper must be returned to the original author *within one week*. Final version hardcopy printouts must be turned in at the chemistry main office (ISC 1039) by 4:30 on the date due. Additionally, a PDF or Word version must be uploaded to Bb by 11:59 pm on the date due.

The term paper is due by 4:30 p.m. on Friday, April 26.

This course now carries the **Coll 400** designation as a capstone course in the curriculum. To meet this requirement, at least one assignment requires communication with diverse audiences (the general public, non-science peers, etc.) In this course, I am requiring you to do two assignments to meet this requirement: (1) take your short paper topic and prepare a one-half to one page non-technical summary of the important ideas in your paper that could be easily understood by your high school English teacher, and (2) take your term paper topic and write a one-half to one page non-technical summary of it that any lay person could understand. You might think of this as a summary of your work in a job interview with a non-technical interviewer. These assignments are worth 35 points each for a total of 70 points.

These non-technical papers are due at the same time as the short paper and term paper and should appear as the LAST page of those documents (after your reference page).

Class participation (PS discussion, OP and TP feedback) is worth 100 points. Attendance is **mandatory** and will be checked each meeting period. ANY unexcused absence will result in a lower class participation score. If you aren't here, you can't participate. Likewise, arriving late or during the middle of a student presentation will result in a lower class participation score.

More than two (2) unexcused absences or four (4) late arrivals will result in a lower **final grade!**

To sum up, the course is worth 1000 points. **There are no exams.**

Proposed Semester Schedule

January 16: The Neuron – an Overview – Lecture Template #1
Homework: skim chapters 1-3, 5-6, 10 of Brady et al.

January 18: The Neuron – Ion Channels - Lecture Template #2
Homework: read chapter 4 of Brady et al.

January 21: MLK Holiday. No class.

January 23: Intracellular Trafficking and Axonal Transport - Lecture Template #3
Homework: read chapters 7-8 of Brady et al.

January 25: Energy Metabolism of the Brain - Lecture Template #4
Homework: read chapter 11 of Brady et al.

January 28: Synaptic Transmission and Cellular Signaling - Lecture Template #5
Homework: read chapter 12 of Brady et al.

January 30: Modulation of Synaptic Transmission - Lecture Template #6
Homework: read chapter 12 of Brady et al. (cont'd)

February 1: Inhibitory Neurotransmitters - GABA and Glycine – Lecture Template #7
Homework: read chapter 18 of Brady et al.

February 4: Excitatory Amino Acid Neurotransmitters - Glutamate (and Aspartate?) – Lecture Template #8
Homework: read chapter 17 of Brady et al.
Problem set #1 is due at 4:30 – turn in at the main chemistry office (ISC 1039)

February 6: Acetylcholine – Lecture Template #9
Homework: read chapter 13 of Brady et al.

February 8: Norepinephrine, Epinephrine – Lecture Template #10
Homework: read chapter 14 of Brady et al.

February 11: Dopamine – Lecture Template #11
Homework: read parts of chapter 14 in Brady

February 13: Discussion of PS #1 Answers

February 15: Serotonin – Lecture Template #12
Homework: read chapter 15 of Brady et al.

February 18: Histamine – Lecture Template #13
Homework: read chapter 16 of Brady

February 20: Purinergics (ATP, Adenosine etc.) – Lecture Template #14
Homework: read chapter 19 of Brady et al.

Beginning February 19 there will be a student oral presentation on each day except as indicated.

February 22: The Peptides – Student Lecture #1

Problem set #2 is due at 4:30 – turn in at the main chemistry office (ISC 1039)

February 25: G Proteins – Student Lecture #2

February 27: Cyclic Nucleotides – Student Lecture #3

March 1: Phospho-Inositides – RAC Lecture Template #18
Homework: read chapter 23 of Brady et al.

Short paper/literature review and non-technical summary due at 4:30 – turn in at the main chemistry office (ISC 1039). Upload PDF or Word document to Bb by 11:59 pm.

<<< SPRING BREAK >>>

March 11: Discussion of PS #2 Answers

March 13: Calcium – Student Lecture #4

March 15: Serine and Threonine Phosphorylation – Student Lecture #5

March 18: Tyrosine Phosphorylation – Student Lecture #6

March 20: Transcription Factors in the CNS – Student Lecture #7

March 22: Growth Factors – Student Lecture #8

Problem set #3 is due at 4:30 – turn in at the main chemistry office (ISC 1039)

March 25: Immune CNS Interactions – Student Lecture #9

March 27: Neuroinflammation – Student Lecture #10

March 29: Brain Ischemia/Stroke – Student Lecture #11

Term paper rough draft is due. Please exchange hard copy with assigned peer review partner.

April 1: Discussion of PS #3 Answers

April 3: Lipid Mediators – Student Lecture #12

April 5: Motor Neuron Diseases – Student Lecture #13

Annotated/peer-reviewed term paper to be returned to original author.

April 8: Alzheimer’s Disease – Student Lecture #14

April 10: Synucleopathies & Taupathies – Student Lecture #15

April 12: Pain – Student Lecture #16

Problem set #4 is due at 4:30 – turn in at the main chemistry office (ISC 1039)

April 15: Learning & Memory – Student Lecture #17

April 17: Mood & Anxiety Disorders – Student Lecture #18

April 19: Addiction – Student Lecture #19

April 22: Discussion of PS #4 Answers

April 24: RAC Lecture – Topic TBD

April 26: Last Day of Class – Wrap-up/Discussion

**FINAL PAPER and non-technical summary due Friday, April 26, by 4:30 pm
Turn in at the main office (ISC 1039). Upload PDF or Word document to Bb by 11:59 pm.**