

Chem 417 - Neurochemistry Spring 2022

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 and a length of at least one full page. 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 14, March 4, April 1, 22

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 11.

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 April 8 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, May 6.

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).

Attendance: Class participation (PS discussion, OP and TP feedback) is worth 100 points. Attendance is *strongly encouraged* for all class meetings but is **mandatory** for the PS discussions and the group oral presentations. Likewise, arriving late or during the middle of a student presentation or PS discussion will result in a lowered class participation score.

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

Proposed Semester Schedule

January 26: The Neuron – an Overview – Lecture Template #1
Homework: skim chapters 1-3, 5-6, 10 of Brady et al.

January 28: The Neuron – Ion Channels - Lecture Template #2
Homework: read chapter 4 of Brady et al.

January 31: Intracellular Trafficking and Axonal Transport - Lecture Template #3
Homework: read chapters 7-8 of Brady et al.

February 2: Energy Metabolism of the Brain - Lecture Template #4
Homework: read chapter 11 of Brady et al.

February 4: Synaptic Transmission and Cellular Signaling - Lecture Template #5
Homework: read chapter 12 of Brady et al.

February 7: Modulation of Synaptic Transmission - Lecture Template #6
Homework: read chapter 12 of Brady et al. (cont'd)

February 9: Inhibitory Neurotransmitters - GABA and Glycine – Lecture Template #7
Homework: read chapter 18 of Brady et al.

February 11: Excitatory Amino Acid Neurotransmitters - Glutamate (and Aspartate?) – Lecture Template #8
Homework: read chapter 17 of Brady et al.

February 14: Acetylcholine – Lecture Template #9
Homework: read chapter 13 of Brady et al.

Problem set #1 is due at 4:30 – turn in at the main chemistry office (ISC 1039)

February 16: Norepinephrine, Epinephrine – Lecture Template #10/11
Homework: read chapter 14 of Brady et al.

February 18: Dopamine – Lecture Template #10/11
Homework: read parts of chapter 14 in Brady

February 21: Serotonin – Lecture Template #12
Homework: read chapter 15 of Brady et al.

February 23: Discussion of PS #1 Answers (REQUIRED ATTENDANCE)

February 25: Histamine – Lecture Template #13
Homework: read chapter 16 of Brady

February 28: Purinergics (ATP, Adenosine etc.) – Lecture Template #14
Homework: read chapter 19 of Brady et al.

March 2: The Peptides –Lecture Template #15
Homework: read chapter 20 of Brady et al.

March 4: G Proteins –Lecture Template #17
Homework: read chapter 21 of Brady et al

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

March 7: Cyclic Nucleotides – Lecture Template #19
Homework: read chapter 22 of Brady et al.

March 9: Phospho-Inositides – Lecture Template #18
Homework: read chapter 23 of Brady et al

March 11: Calcium –Lecture Template #20
Homework: read chapter 24 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 21: Discussion of PS #2 Answers (REQUIRED ATTENDANCE)

March 23: Serine/Threonine Phosphorylation – Lecture Template #21
Homework: read chapter 25 of Brady et al.

March 25: Tyrosine Phosphorylation – Lecture Template #22
Homework: read chapter 26 of Brady et al.

Beginning March 28 there will be a student oral presentation on each day except as indicated. Attendance is mandatory for all student oral presentations!

March 28: Transcription Factors in the CNS – Student Lecture #1

March 30: Growth Factors – Student Lecture #2

April 1: Immune CNS Interactions – Student Lecture #3

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

April 4: Neuroinflammation – Student Lecture #4

April 6: Brain Ischemia/Stroke – Student Lecture #5

April 8: Discussion of PS #3 Answers (REQUIRED ATTENDANCE)

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

April 11: Lipid Mediators – Student Lecture #6

April 13: Motor Neuron Diseases – Student Lecture #7

April 15: Alzheimer’s Disease – Student Lecture #8

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

April 18: Synucleopathies & Tauopathies – Student Lecture #9

April 20: Pain – Student Lecture #10

April 22: Inborn Metabolic Defects – Student Lecture #11

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

April 25: Schizophrenia & Autism – Student Lecture #12

April 27: Mood & Anxiety Disorders – Student Lecture #13

April 29: Addiction – Student Lecture #14

May 2: Discussion of PS #4 Answers (REQUIRED ATTENDANCE)

May 4: RAC Lecture – Topic TBD

May 6: Last Day of Class – Wrap-up/Discussion

**FINAL PAPER and non-technical summary due Friday, May 6, by 4:30 pm
Turn in at the main office (ISC 1039). Upload PDF or Word document to Bb by 11:59 pm.**