

CNS Diseases (BIOH 441)
Fall 2016, 3 credits
Tuesday/Thursdays 1:00-2:20 pm

Course Information:

Term: Fall 2016
CRN: 75072
TTh: 1:00 – 2:20
Room: Skaggs Building, SB 387

Instructors:

Richard Bridges, PhD (Department of Biomedical & Pharmaceutical Sciences)
Office: SB 390 Phone: 243-4972
Office hours: TBA

Sarah Certel, PhD (Division of Biological Sciences)
Office: SB 393 Phone: 243-6479
Office hours: T/TH 2:30-3:30

Course Description:

This course is designed as a special topics course within neuroscience that focuses on developing an understanding of common diseases affecting the Central Nervous System (CNS), such as traumatic brain injury, Alzheimer disease, Parkinson's disease, psychiatric disorders, amyotrophic lateral sclerosis, epilepsy, developmental disorders, etc.) For each of the CNS disorders surveyed (which will vary from year to year), an emphasis will be placed on framing the symptoms and etiology of the disease within the context of the normal neuronal function at the anatomical, cellular and molecular levels. Where feasible, lectures will be supplemented with presentations by clinicians with expertise in the field. Students will also develop an appreciation for the linkages between basic and translational research in neurological diseases as well as the importance of disease models in the development of new therapies.

Course goals and Objectives:

1. To understand the basic symptoms and etiology of common diseases and disorders of the CNS
2. To understand the link between neuropathology and CNS function
3. To understand the concepts of how dysfunction at the level of neuronal development, differentiation or output can lead to specific symptoms
4. To understand the fundamental aspects of neuronal signaling and how dysfunction at this level can lead to specific symptoms
5. To understand the role that genetics play in specific CNS disorders
6. To appreciate the significance of disease models in understanding both normal and abnormal CNS function, as well as in the development of new therapies

Prerequisites: Principles of Living systems (BIOB 160N), College Chemistry I and II (CHMY 141N or 161; CHMY 143 or 162), Organic Chemistry I and II (CHMY 221; CHMY 223), Fundamentals of Biological Psychology (PSYX 250) or Fundamentals of Neuroscience (BIOH 280),

Recommended: Cellular and Molecular Neuroscience (BIOH 380)

Co-convening course: BIOH 460 will co-convene with BMED 667 / BIOB 595. These graduate courses will include an additional increment primarily consisting of written or oral presentations of primary literature publications associated with each disease topic.

Required Textbook: It is anticipated that reading materials will mostly consist of review articles supplemented with articles from the primary literature. Materials will be posted on Moodle.

Professionalism and Student Conduct: All students must act professionally and practice academic honesty. Academic misconduct is subject to academic penalty by the course instructors and/or disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code. The Student Conduct Code can be found at http://www.umt.edu/vpsa/policies/student_conduct.php.

Plagiarism: Plagiarism is a form of academic dishonesty. This is using anyone else's work as your own. This includes another student's, another author's, etc. If you plagiarize anyone else's work in this class, you WILL fail the assignment, and you may fail the course. What is plagiarism? While everyone has their own concept of this, the guide that will be used for this class is either copying more than six consecutive words verbatim or using more than two sentences in an assignment that reflect the original author's phrasing, sentence structure, and meaning rather than the student's own thoughts, with or without proper citation.

Students with Disabilities: Students with disabilities may request reasonable accommodations by contacting the course coordinator. The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students (DSS). "Reasonable" means the University permits no fundamental alterations of academic standards or retroactive modifications. For more information, consult http://www.umt.edu/dss/Current_Students/default.php.

Course Materials: Instructors will place course materials online in Moodle. Students are responsible for online material in addition to the assigned readings and information presented in class.

Evaluations: Students will evaluate the instructors online. The evaluations will be available to students during the last week of the semester.

Attendance Policy: Attendance at all lectures is expected of students. Contact the course coordinator if absences are anticipated or in case of illness or emergency. Instructors may deduct points for lecture absences at their discretion. Seminar attendance may be assigned and available for extra credit at the discretion of the instructors.

Test Policy: No tests will be given early. Only under extraordinary circumstances will an excused absence from a test be permitted. When such an exception is granted, the appropriate form must be filed with the Office of Student Services. A makeup test that can be either in written or oral format must be taken within one week of the original test date. Students have **one week** from the time the test is returned to resolve any grading questions. Such requests must be written, attached to the original test and submitted to the course instructors.

2016 Course Schedule:

Each disease topic will typically be distributed over multiple class meetings. During these class sessions material will cover symptoms, etiology, anatomy, pathology, cellular & molecular mechanisms, therapies and intervention.

General Section Outline:

Class 1 - Disease overview: case Studies, history, etiology and pathology

Class 2 - Disease mechanisms - genetic, nuclear, neuronal function

Class 3 - Physician presentation or student-led paper presentation

Neuroscience in the news:

One student will lead the class meeting by discussing a recent news article regarding a class-related neuroscience-related finding and answer four questions: 1) what question did the research address, 2) how did the research address this question, 3) why should we care, 4) why do you care?

This short presentation is designed to take 10 minutes with the article and questions presented in Powerpoint format. Arrive early to class to get set-up if you are presenting.

Writing Essay:

Answer the assigned question and defend your position in a 350-400 word persuasive essay. To support your position, you will need to include information from sources outside of class material. Type and provide word count.

Class Participation/Questions: 5 pts each/75 pts (out of 90 pts assigned)

Bring one question based on the assigned reading to class. Questions will be placed in the middle of the table and each student will draw one question, which he or she will answer to the best of their ability. 5 pts will be received based on the question AND the answer.

Grading:

Two Exams: 75 pts/each = 150

Cumulative Final Exam: 80 pts = 80

Class Participation/Questions: 75 pts (out of 90 pts assigned)

Writing essay = 75 (revise for 10 pts extra credit)

Neuroscience in the news = 10 pts/2 = 20

Paper presentations: 4/25 pts = 100 pts

Total Class points: 500

Lecture and Discussion Schedule:

Section 1: Structure/Anatomy to Function

<i>Date</i>	<i>Instructor</i>	<i>Topic</i>
Aug. 30	Certel/Bridges	Introduction and Discussion <i>Why are diseases of the nervous system different from a medical and social perspective?</i>
<i>How the Anatomical Vulnerability of Neurons Leads to Functional Losses</i>		
Sept. 1	Bridges	Trauma: traumatic injury to neuronal structure <i>Why are neurons so vulnerable to traumatic insults?</i> <i>Why are only certain functions lost in an injury?</i> <i>Can neurons regrow to recover function?</i>
Sept. 6	Bridges	Trauma: traumatic injury to neuronal structure
Sept. 8	Bridges/Sarj Patel	Trauma: traumatic injury to neuronal structure
<i>The Nucleus and its Role in CNS Diseases</i>		
Sept. 13	Certel	Epigenetic mechanisms: DNA to Neuron Function (MeCP2-related disorders)
Sept. 15	Certel	Epigenetic mechanisms: MeCP2-related disorders
Sept. 20	Certel	Depression (microRNAs)
Sept. 22	Certel	Depression (chromatin)
Sept. 27	Certel	Depression (mitochondrial function and neuronal bioenergetics)
Sept. 29	Certel/Students	Disease and the Nucleus (Student Presentations)
Oct. 4	EXAM 1	
<i>How the Molecular Vulnerability of Neurons Leads to Functional Losses</i>		
Oct. 6	Bridges	Amyotrophic Lateral Sclerosis
Oct. 11	Bridges	Amyotrophic Lateral Sclerosis
Oct. 13	Bridges	Amyotrophic Lateral Sclerosis
Oct. 18	Certel	Motor system control: when it goes awry - Parkinson's Disease <i>Can we use genetics to understand Parkinson's?</i> <i>Is there a link between lysosomal dysfunction and Parkinson's?</i> <i>How does neurodegeneration change neural circuit function?</i>
Oct. 20	Certel	Parkinson's Disease
Oct. 25	Certel/Students	Parkinson's paper (Student presentations)
Oct. 27	Bridges	Alzheimer's
Nov. 1	Bridges	Alzheimer's
Nov. 3	Bridges	Alzheimer's

Nov. 8		No class
Nov. 10	EXAM 2	
	<i>Neurons Are Not Alone: the Role of Other Cells in CNS Diseases</i>	
Nov. 15	Certel	Writing Essay Intro, Gut the Second Brain
Nov. 17	Certel	Multiple Sclerosis and the gut microbiota
Nov. 22	TBA	
Nov. 24	Thanksgiving Holiday	
Nov. 29	Bridges	Seizures and Epilepsy
Dec. 1	Bridges	Seizures and Epilepsy
Dec. 6	Bridges	Seizures and Epilepsy (Student Presentations)
Dec. 8	Certel/Bridges	Review
Dec. 16	Final Exam	3:20-5:20 pm