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BIOH 441.01: CNS Diseases

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BIOH 441 CNS Diseases
Fall 2020, 3 credits
Tuesday/Thursdays 11:00-12:20 pm

Course Information:

Term: Fall 2020, CRN: 73212
T/Th: 11:00 – 12:20 pm
Room: Forestry 305

Instructor:

Sarah Certel, PhD (Division of Biological Sciences)
Office: HS 303A email: sarah.certel@umontana.edu,
Office hours: Zoom by appointment

TA: Lauren Cornelison

Course Description:

This course is designed as a special topics course within neuroscience that focuses on developing an understanding of common disorders affecting the central nervous system (CNS). Neurodevelopmental disorders that have an epigenetic component; neuropsychiatric disorders including depression; neurodegenerative diseases such as Parkinson's and Alzheimer's; autoimmune disorders including multiple sclerosis will be covered. Diagnostic criteria, clinical and pathological findings, genetics, model systems, pathophysiology, and treatment are discussed for individual disorders and diseases. Where feasible, lectures will be supplemented with presentations by researchers 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.

Learning Outcomes:

1. Students will be able to understand the basic symptoms and etiology of common diseases and disorders of the CNS
2. Students will connect the links between pathophysiology and CNS function
3. Students will understand the concepts of how dysfunction at the level of neuronal development, differentiation or output can lead to specific symptoms
4. Students will appreciate the fundamental aspects of neuron communication and how dysfunction at this level can lead to specific symptoms
5. Students will understand and be able to describe the role that genetics play in specific CNS disorders
6. Students will 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 instructor. The evaluations will be available to students during the last week of the semester.

Attendance and Exam Policy: The Covid-19 situation requires flexibility and a team mentality. If you are in quarantine or ill, communicate when you can and we will get the situation sorted out. Attendance (virtual or in person) at lectures is expected of students. Seminar attendance may be assigned and available for extra credit at the discretion of the instructor. No exams will be given early. Students have **one week** from the time the test is returned to resolve any grading questions unless a medical situation warrants extended time. Such requests must be written, attached to the original test and submitted to the course instructor.

Safety messaging for Covid-19 situation:

- **Mask use is required within the classroom**
- Each student is provided with a cleaning kit. The expectation is that students will clean their personal work space when they arrive for class, and before they leave the classroom
- Classrooms may have one-way entrances / exits to minimize crowding
- Students should be discouraged from congregating outside the classroom before and after class
- Specific seating arrangements will be used to ensure social distancing and support contact tracing efforts
- Class attendance will be recorded to support contact tracing efforts
- Drinking liquids and eating food is discouraged within the classroom (which requires mask removal)
- Information on the nearest "refill" stations for cleaning supplies/hand sanitizer if applicable
- If the class is being recorded, students must be notified of the recording
- Stay home if you feel sick and/or if exhibiting COVID-19 symptoms
- If the student is sick or displaying symptoms, please contact the Curry Health Center at (406) 243-4330
- Up-to-Date COVID-19 Information from the University of Montana
 - UM Coronavirus Website: <https://www.umt.edu/coronavirus>
 - UM COVID-19 Fall 2020 website: <https://www.umt.edu/coronavirus/fall2020.php>

- Strongly encourage students to remain vigilant outside the classroom in mitigating the spread of COVID-19

2020 Section Outline:

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

Class 1 - Disease overview: case studies, history, etiology and pathophysiology

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

Class 3 - Researcher 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 slide format. Arrive early to class to get set-up if you are presenting.

Writing Essay:

Details to follow.

Class Participation/Questions: 5-10 pts each/30 pts (out of 40 pts assigned)

Questions to bring or to answer will be assigned a class period in advance. Questions will be to the best of each student’s ability. 5 or 10 pts will be received based on the question AND the answer.

Grading:

Two Exams: 75 pts/each = 150

Class Participation/Questions: 30 pts (30 pts out of 40 pts possible)

Writing essay = 50 (revise for up to 5 pts extra credit)

Neuroscience in the news = 5 pts/2 = 10

Paper presentations: 3/20 pts = 60 pts

Total Class points: 300

The top 10 to 20%-tile of students will receive a grade of **A** or **A-**. The median score of the class will approximately define the partition between grades of **B** and **C**. A total score of 179.7 points (59.9%) or less will be failing (grade of **F**). Pluses (+) and minuses (-) will be used (**A**, **A-**, **B+**, **B**, **B-**, **C+**, **C**, **C-**, **D+**, **D**, and **D-**).

These cutoffs may be adjusted downward (in favor of the student) to better reflect natural breaks in the class scores.

Lecture and Discussion Schedule:

<i>Date</i>	<i>Instructor</i>	<i>Topic</i>
Th Aug. 20	Certel	Introduction and Discussion <i>Why are diseases of the nervous system different from a medical and social perspective?</i>
T Aug. 25	Certel	Model organisms : Traumatic Brain Injury

Th Aug. 27	Certel	Techniques and approaches
T Sept. 1	Certel	Epigenetic mechanisms: MeCP2-related disorders
Th Sept 3	Certel	Epigenetic mechanisms: MeCP2-related disorders
T Sept 8	Certel	Epigenetic mechanisms: Student Presentations
Th Sept 10	Certel	Parkinson's
T Sept 15	Hay	Parkinson's: Golgi pathology
Th Sept 17	Certel	Parkinson's: Student presentations
T Sept 22	Certel	Synaptic dysfunction: autism
Th Sept 24	Certel	Synaptic dysfunction: autism
T Sept 29	Certel	Multiple Sclerosis
Th Oct 1	Certel	Multiple Sclerosis – Gut to Brain axis
T Oct 6		Exam 1
Th Oct 8	Certel	ALS
T Oct 13	Bridges	ALS: electrical activity
Th Oct 15	Certel	ALS's: Student presentations
T Oct 20	Certel/Voronina	Brain regeneration
Th Oct 22	Grimes	Brain cancer vs. regeneration, organoids
T Oct 27	Certel	Grant writing and writing essay assignment
Th Oct 29	Certel	Depression and stress
T Nov 3		Election Day holiday
Th Nov 5	Hansen	Depression
T Nov 10	Certel	Alzheimer's
Th Nov 12	Hall	Alzheimer's
T Nov 17	Certel	Alzheimer's: Student presentations
Th Nov 19	Certel	Review
		Exam II