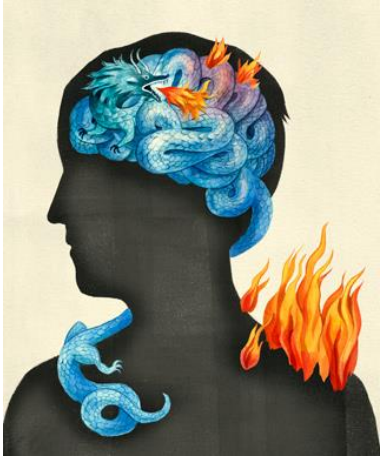
Neuro 148: The Neurobiology of Pain



Fall 2020
Location: Online
Times: To be announced (see 'Format' section below)

Instructor: Dr. Ryan W. Draft
Course website: https://canvas.harvard.edu/courses/77063
Prerequisites: Neuro/MCB 80

Instructor Contact Info

draft@fas.harvard.edu (preferred method of contact)
Office: 617-496-9908
Personal Page: *http://www.people.fas.harvard.edu/~draft/*
Office Hours:

- Monday 9-10 AM ET
- Friday 3-4 PM ET
- by appointment when needed

TF Contact Info:

- Ryann Fame (Ryan.Fame@childrens.harvard.edu)
- Vikrant (Vic) Kapoor (vic.kapoor@gmail.com)

Office Hours: both by appointment

Course details

Weekly Format:

1. (Wednesdays) 75 minutes live, interactive lecture (recorded; attendance optional)
    - Time to be determined after enrollment.

2. (Mondays 6 PM ET or Tuesdays 9 AM ET) 75 minute live, interactive section (attendance required)

Student Expectations: During weekly sections, students must keep web cameras on and participate in the breakout room/small group discussions as if you were in a live classroom. During synchronous class time I **highly recommend** that you turn off your phone, turn off your email, and close your internet browser.

Description: Neuro 148 will explore the neurobiological systems and mechanisms underlying both acute and chronic pain. Topics will include nociceptive/sensory systems, molecular basis and modulation of pain, neuroanatomy of peripheral and central pain circuits, pain pathologies, pharmacological and non-pharmacological treatments. The emphasis will be on understanding basic neurobiological concepts underlying pain systems and reading/discussing the primary scientific research in the field

Course Aims and Objectives

In this course we will follow the theme of 'Pain' from molecules to brain states to explore and learn the fundamentals of neurobiology.

Each lecture class, Dr. Draft will cover a different subfield in pain research by presenting classical research that underlies our current understanding. Lecture will include practice questions and break out activities for those who can attend live. We will cover critical content in neurobiology generally (e.g., molecular signaling, neural coding, neural modulation, central and peripheral anatomy, plasticity, immune and glial interactions, *etc*). Content from the lectures will be assessed through two quizzes and two exams (see 'grading' below).

Each section class, (one or two) student(s) will lead a discussion of a high-impact recent paper related to the previous lecture. The goal is to build critical skills in reading and deconstructing a research article, as well as to learn common methods used in different levels of neurobiological research (from RNAseq to fMRI). Students not presenting will work in small groups to present article figures and constructively evaluate the student presentations. Content from the research articles will be assessed in pre-class homework questions but will not appear on quizzes/exams (see 'grading' below).

Course Policies and Expectations

Attendance: Students are expected to attend all section classes. Participation credit will be given for discussion, critical feedback, and activities (see 'grading' below).

Excused Absences: Please make every attempt to inform Dr. Draft in advance of any planned absences (travel/interviewing, family/health emergencies, religious days, sports/extra-curriculars). Make up assignments can be given for up to two excused absences.

Unexcused Absences: One unexcused absence of a non-quiz/exam section may be made up for full credit. Beyond that, no credit will be given for missed classes without official documentation. Make up Exams/quizzes will not be given for unexcused absences and students will receive no credit if missed.

Late Assignments will not be accepted; no credit will be given. For credit, please have all assignments in prior to posted deadlines. If you have a legitimate medical/family emergency, you can turn in one homework assignment past the deadline.

Readings/Materials

- **Required Textbook:** Understanding Pain, Fernando Cervero (2014). Please either purchase a copy on Amazon ($20), or access it online through Harvard Hollis. You will be required to read chapters from this most lectures and turn in your reading notes before class (for credit).

- **Required Research Article Reading:** Each week, we will discuss a research article related to the lecture. You can find pdf of the reading (and associated HW) on the course website.

- **Supplementary Reading:** Each week, I have listed a supplementary review article for the lecture topic, if you wish to explore and learn more. This is not required.

- **Reference Textbook.** The reference textbook for the course can be accessed for free via this link. This is not required: Wall and Melzack. **Textbook of Pain** 6th Ed. (2013) http://nrs.harvard.edu/urn-3:hul.ebook:ELMED_20090526712

Assignments and Grading Procedures

Grading Scale	Assignment	Number of Assignments per Semester	Number of Points per Assignment	% total grade (weighting)
√, √–, 0	Pre-Lecture: Reading Notes	9	2 (√=100%)	5
√, √–, 0	Post-Lecture: Active Review	11	2 (√=100%)	5
Numeric	Pre-Discussion: Article Homework	11	8-10	20
Numeric	Paper Presentation	1	10	10
Numeric	Discussion Class: Participation	11	3	10
Numeric	Quiz 1 (open book)	1	12	5
Numeric	Quiz 2 (open book)	1	12	5
Numeric	Exam 1 (open book)	1	25	10
Numeric	Exam 2 (open book or oral)	1	50	10
√+, √, √–, 0	Project - Rough draft	1	2 (√=100%)	5
Numeric	Project - Peer Review	1	5	5
Numeric	Project - Final draft	1	20	10

Rubrics for grading paper presentation and mini-review will be discussed in class.

A: > 93.1%; A-: 90-93.0%
B+: 85-89.9%; B: 80-84.9%; B-: 75-79.9%
C+: 70-74.9%; C: 65-69.9%; C-: 60-64.9%
D+: 55-59.9%; D: 50-54.9%; D-: 45-49.9%
E: < 45

Assignments and Exams

Pre-Lecture Class Reading

Before most lecture classes, you read and take notes on chapters from the required textbook Understanding Pain (Cervero). The notes can be handwritten or digital. There is no length or specific format requirements, but the notes should highlight what you feel is the main/important concepts from the book chapters and cover the entire assigned material. Credit is all-or-nothing: if you complete it (on time), you will get full credit.

Post-Lecture Class Review Activity

By Friday, each student will be complete a short assignment reviewing the lecture material from the previous Wednesday using a different active studying technique (concept map, writing an exam question, outlining, short follow up question, *etc*.). Each week I will assign a different technique for you to use/try. You can work in groups of two or alone on each assignment.

Pre-Discussion Class Reading

Students are required to work entirely independently on research article pre-class assignments. No collaboration is allowed; evidence of collaboration will result in a zero for the assignment. Students will have a chance to discuss the articles in office hours and in class with other students.

Discussion Class Participation

Students will be expected to participate in small group work (break out rooms) and present aspects of key figures from the week's papers.

Discussion Class Presentation

Students will present one paper during the semester after working with a TF on their presentation. A grading rubric will be provided to help you structure your presentation.

Quizzes/Exams

Quizzes will be online, timed, and "open everything" (all resources allowed).

Exam 1 will be online, "open everything", and timed. We will take it together on Zoom.

Exam 2 will be comprehensive and similar to Exam 1. However, students have the option to take a 30-minute oral exam during the final week of class.

Project (Two Options)

Option 1: Mini-Review

Students must work entirely independently on the mini-review assignment. This is a literature review on a pain topic not covered in the course. No collaboration is allowed; evidence of collaboration will result in a zero for the assignment. A grading rubric will be provided.

Dr. Draft will review/provide feedback on your rough draft and the writing center is available for consultation/help with mechanics, structure, organization, and grammar.

Expectations for citation/reference formatting will be discussed in class. For a review of using sources in written assignments, please check out the guide to using sources: http://usingsources.fas.harvard.edu/icb/icb.do

Option 2: Podcast or Video
Students must work in pairs to create a short podcast or video (10-20 minutes) on a pain topic not covered in the course. The content of the media must be grounded in a scholarly literature review. A grading rubric will be provided.

Academic Integrity

The Harvard College Honor Code

Members of the Harvard College community commit themselves to producing academic work of integrity – that is, work that adheres to the scholarly and intellectual standards of accurate attribution of sources, appropriate collection and use of data, and transparent acknowledgement of the contribution of others to their ideas, discoveries, interpretations, and conclusions. Cheating on exams or problem sets, plagiarizing or misrepresenting the ideas or language of someone else as one's own, falsifying data, or any other instance of academic dishonesty violates the standards of our community, as well as the standards of the wider world of learning and affairs.

Accommodations for students with disabilities

Students needing academic adjustments or accommodations because of a documented disability must present their Faculty Letter from the Accessible Education Office (AEO) and speak with the professor by the end of the second week of the term. Failure to do so may result in the Course Head's inability to respond in a timely manner. All discussions will remain confidential, although Faculty are invited to contact AEO to discuss appropriate implementation.