

UPDATED SYLLABUS WEEK 2

Department of Biology

Course Title: “Animal models of the opioid epidemic.”

Course Number: 395 (undergrad); 535(grad)

Credit hrs: 3

Prerequisites: General Biology 2: 50:120:102

Meeting Time: R, 6-8:50 PM

Meeting Room: BSB-108

Office: Sci-233

Office hours: R, 4:30 – 6 PM

Instructors: Dr. Nathan T. Fried

Email: Nathan.Fried@rutgers.edu

Course Description:

This special topics course will approach the opioid epidemic from a basic science perspective. The course will cover the basic neuroanatomy, neurophysiology, and neuropharmacology of sensory systems and addiction. Students will first study how sensory systems work with a focus on pain sensation and then study drugs of abuse and addiction with a focus on opioids. The class will focus on the interplay between chronic pain and the opioid epidemic to approach this public health issue from a basic science perspective. Class will include a combination of lecture and discussion around recent scientific publications, editorials, and news of how the US is addressing these issues.

Note from the professor:

It is my hope to create a class that is informative and enjoyable. The topics in this course affect many individuals and their families and have a social stigma around them. It is my hope to create an atmosphere of understanding to facilitate constructive conversation surrounding these challenging topics. If there is anything that I can do as your professor, please do not hesitate to reach out to me.

Course Student Learning Objectives:

1. Develop an expertise in reviewing and presenting primary literature.
2. Develop an expertise in critically reviewing animal models used to answer basic science questions
3. Develop an understanding of sensory systems, in particular pain.
4. Develop an understanding of substances of abuse, in particular opioids.
5. Develop an understanding of how the chronic pain epidemic and opioid epidemic are interrelated.
6. Develop an ability to have informed discussions on these topics.

Tentative schedule for each class: This is only an approximation. Each week may be slightly different.

6:00-6:15 – Popular Press Discussion (15 min)

6:15-7:40 - Lecture/Discussion (~1.5 h)

7:40 – 7:50 - Break (~10 min)

7:50-8:05 – Animal Model Presentation (~15 min)

8:05 - 8:50 - Journal Club (~45 min)

Calculation of Final Grades:

Percentages

A = 90-100

B = 80-89

C = 70-79

D = 60-69

F = ≤59

Breakdown of points

Journal Club Presentation: 35%

Animal Model Critique: 25%

Journal Club Worksheet: 30%

Popular Press Discussion: 10%

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Assignments & Grading

Journal Club Presentation: Each student will prepare a **45-minute PowerPoint presentation**, with each one covering a relatively recent original research article selected by the instructor. *The student may also choose an article if they have one in mind, but it must be approved by the instructor.* These papers will highlight an active area of research on topics discussed in class. In preparation, students are encouraged to discuss the papers, as well as any issues related to their presentation, with the instructor in advance. **Your job as the presenter for the week is to essentially teach your peers and myself about the research article. You are the one who is the expert on the paper and thus, your goal is to guide us through it so that we all understand it.**

Structure of Journal Club Presentation Guide:

Introduction/Background (10 min): It is VITAL to frame your presentation of the article's research. Use their own introduction as your guide. Put their findings into context so that once you delve into the data, the audience will have all the information they need to actually understand the data.

Describe the following in your intro:

- 1) The field they are exploring
- 2) What is not known about the field
- 3) The question they are trying to answer with their research
- 4) How they propose to answer it.

Results (15 min): You should go figure by figure and describe the logic for doing that experiment, the way the experiment works (i.e., the methods used and whether it's molecular or behavioral), and what the conclusion is from each figure. This will let you move figure to figure. Consider the data as a story. Tell us the story.

Discussion/Conclusions (5 min): Now, take that data and put it into context with what you presented during the intro. Tell us how it solved the question they proposed in the intro. Put it into the bigger picture.

Next Steps (4 min): Discuss what the next steps are for their research. What is the next chapter in their trilogy? They might have even stated this in the discussion. Feel free to propose your own next steps for the research (even if it's pie-in-the-sky). Be bold!

Criticisms (3 min): State any criticisms you have of the paper. Try your best to critique the experimental logic in the paper and not necessarily the writing style. Did they not consider a control? Did they use the right type of method to answer the question they were interested in? Don't spend too much time on the animal model being used because we will go over that prior to your presentation in the "animal model critique".

Connecting it to the patient (2 min): Take one moment and propose how these findings might impact patients, the community, or the public. Feel free to state

Questions (6 min): Be ready to answer any questions from the audience. It is OK to say, "I do not know." Being a scientist means being comfortable with the unknown.

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Animal Model Critique: The student assigned to the animal model critique for the week will prepare a 15 minute presentation about any of the animal models used in the assigned journal club presentation for that week. In the presentation, the student will provide the following:

Structure of Animal Model Critique Guide:

Figure using animal model: Display a figure from that paper that uses the animal model you selected.

Name of animal model: Give us the name of the animal model. (i.e., Is it a condition place preference assay? Is it a reflex assay?)

Methods of using model: Tell us how the animal model is set up to run an experiment. Describe it as if you are telling a colleague how to run an experiment.

Name the controls: Describe the positive and negative controls in the animal model.

Interpretation: Give us a description of the interpretation of the animal model's results. (i.e., Does an increase in withdrawal rate mean that the animal is in pain? If the animal spends more time in a chamber, does that mean it likes whatever it experienced in that chamber?)

Critique: Give us your opinion/critique of the pros and cons of using this animal model to answer the questions it says it has the ability to answer.

Journal Club Worksheet: If you are not presenting a **journal club** or an **animal model critique** for the week, you should fill out a journal club worksheet. It is due by 11:59pm on SAKAI Wednesday, the night before class. In order for this class to actually work, it is ***IMPERATIVE*** that you have read the journal club assigned for the week. Part of this worksheet includes preparing two questions/points to ask the presenter. At the time of the presentation, students are encouraged to ask these questions and participate in the discussion. Consider this a safe place for practicing having the courage to ask questions!

Popular Press Discussion: Every week, at the beginning of class, the assigned student will present any news story written about a topic related to chronic pain, addiction, or the opioid epidemic. It should be within the past year, but if there is a particular historical perspective you are interested in (i.e., opioid epidemic in 1970s France), feel free to present it. The conversation is free-form. The student can choose whether or not to use a PowerPoint presentation.

Grading of Presentations: Your grade for the presentation will take into account whether you are an undergraduate or a graduate student. This means that I expect much more from the graduate students in terms of their mastery of the paper itself. The overall grade will reflect whether you made conveyed the information correctly, you included all relevant data from the paper, and if you generally followed the above structural format for the presentations.

Optional Textbook:

Principles of Neural Science, Fifth Edition / Edition 5 by Eric Kandel.

Online supplemental material:

Excellent online guide to pain pathways information: <http://nba.uth.tmc.edu/neuroscience/s2/chapter07.html>

Last Week Tonight, John Oliver's bit on Opioid Epidemic: <https://www.youtube.com/watch?v=5pdPrQFjo2o>

Elliot Krane: The mystery of chronic pain | TED Talk:

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https://www.ted.com/talks/elliott_krane_the_mystery_of_chronic_pain

Philly Voice article about pain & addiction in Riverside, NJ (Dr. Fried's hometown) and Philly:
<http://www.phillyvoice.com/south-jersey-mans-journey-from-pills-to-heroin/>

Welcome to Kensington, Philadelphia. Heroin Capitol of the USA- BBC special about Heroin and Philadelphia:
https://www.youtube.com/watch?v=teDnF_8WoRc&feature=youtu.be

Pain as an Art Form:
https://well.blogs.nytimes.com/2008/04/22/pain-as-an-art-form/?_r=0

The Long History of Discrimination in Pain Medicine:
<https://www.theatlantic.com/health/archive/2017/02/chronic-pain-stigma/517689/>

Pain, objectivity and history: understanding pain stigma: <http://mh.bmj.com/content/early/2017/02/21/medhum-2016-011133>

Sources for News on Pain Research
www.PainResearchForum.com and www.RELIEF.news

Classroom Policies

Attendance Policy: It is imperative that students do not miss class because this course only takes place on a single night each week. If a student expects to miss a class, the student should email the professor to let them know ahead of time. Students will only be able to make up the day's materials if there is a valid excuse and the professors were notified ahead of time. *This means that if you do not have a valid reason for missing class, you can not submit your JC worksheet!!!!*

Tardiness Policy: If you are going to be late, please email Dr. Fried alerting him. This is very important since it is such a small class.

Food Policy: Since this class takes place at night, feel free to bring food or drink to the classroom, but please be respectful of your fellow students.

Students with Disabilities Statement: Rutgers University complies with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990. Students requesting academic accommodations MUST register with the Office of Disability Services and are responsible for picking up their accommodation letters at the beginning of each semester to present to the instructor. We are available to discuss the necessary accommodations and will work directly with the student to find the best way to help.

University Academic Integrity Statement: The college regards academic dishonesty on the part of the students as unacceptable behavior that could result in dismissal. Every incident of academic dishonesty is required to be reported to the provost. These incidents will be kept in a confidential file by the provost so that a record of the infractions is available when reports are made.

Definitions:

Academic Dishonesty – includes, but is not limited to, plagiarism, cribbing, or cheating on exams.

Plagiarism – unacknowledged borrowing or duplication of an author's words or ideas whether intentional or not.
Common forms:

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- a. Text without quotation marks or proper documentation,
- b. With documentation but without quotation marks or correct quotation format,
- c. In paraphrase without proper documentation.

Animal Models of the Opioid Epidemic - Assignments							
Week	Day	Date	JC Presenter	Animal Model Critique	Popular Press Discussion	Worksheet Due	
1	R	9/6	na	na	FRIED		
2	R	9/13	FRIED	FRIED	FRIED	NO	
3	R	9/20	FRIED	FRIED	FRIED	If not presenting JC or Critique	
4	R	9/27	Christina	Savannah		If not presenting JC or Critique	
5	R	10/4	Morgan	Dan	Alexis	If not presenting JC or Critique	
6	R	10/11	GUEST LECTURE FROM CORIELL				
7	R	10/18	Cindy	Christina	Maddie	If not presenting JC or Critique	
8	R	10/25	Dan	Morgan	Stephanie	If not presenting JC or Critique	
9	R	10/1	Savannah	Cindy	Morgan	If not presenting JC or Critique	
10	R	11/8	Maddie	Marie	Evan Daisy	If not presenting JC or Critique	
11	R	11/15	Marie	Juan	Dan Savannah	If not presenting JC or Critique	
12	R	11/22	HOLIDAY - no class				
13	R	11/29	Juan Evan	Stephanie Daisy	Christina	If not presenting JC or Critique	
14	R	12/6	Stephanie	Alexis	Cindy Juan	If not presenting JC or Critique	
15	R	12/13	Alexis Daisy	Maddie Evan	Marie	If not presenting JC or Critique	
Finals			No final in this class				If not presenting JC or Critique

Animal Models of the Opioid Epidemic - Daily Topics				
Week	Day	Date	Lecture	JC paper
1	R	9/6	Introduction to the class and research presentations by Dr. Fried	na
2	R	9/13	Making sense of those pathways: the anatomy of the brain, spinal cord, and neuron	Title: "Bias Factor and Therapeutic Window Correlate to Predict Safer Opioid Analgesics." Journal: Cell, 2017
3	R	9/20	Sending the signal: the neurophysiology of the neuron and its action potential	Title: "Time-Resolved Fast Mammalian Behavior Reveals the Complexity of Protective Pain Responses." Journal: Cell Reports, 2017
4	R	9/27	How the brain in a vat interprets the outside world: the neurophysiology of our sensory systems	TBD
5	R	10/4	How do we know that hurts?: the neuroanatomy and neurophysiology of nociception and pain	TBD
6	R	10/11	GUEST LECTURE FROM CORIELL	
7	R	10/18	Pain in your back aint the same as pain in your head: the types of pain conditions and the animal models we use to study them.	TBD
8	R	10/25	Pathophysiology of Addiction: Brain circuitry and neuroadaptation	TBD
9	R	10/1	Opioids: Neurocircuitry and behavior	TBD
10	R	11/8	Opioids: Molecular and cellular effects	TBD
11	R	11/15	Nature vs Nurture: Genetic and environmental risk factors for substance abuse disorder	TBD
12	R	11/22	HOLIDAY - no class	
13	R	11/29	Neurobiological mechanisms of withdrawal	TBD
14	R	12/6	Treating Substance Use Disorder: Public health implications	TBD
15	R	12/13	Addressing the Opioid Epidemic as a Scientist	TBD
Finals	T	TBD	na	na