

COURSE DETAILS

Course Description:

Time: Monday/Wednesday 2:05-3:25

Virtual Location: [Neuro Zoom Room](#) (you can gain access in canvas)

This special honors college seminar 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 explore 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 discussion-based lectures, student presentations, a unique semester-long authentic research project using fruit flies conducted virtually (yes, we'll send you the necessary equipment and flies!), and participation in a national scientific conference that will be virtual this year. Ultimately, there is a mixture of individual and group work and you should all view each other as members of a large lab working together on a single research goal.

Uniquely, this course will be taught by two neuroscientists who have a strong focus on both research and education. Dr. Fried is at Rutgers-Camden and trained in a special postdoctoral research/education program at the University of Pennsylvania called IRACDA. Dr. Waddell is currently an IRACDA fellow. Both have a strong dedication to breaking down barriers in science for students of all levels and backgrounds, a drive they both developed coming from first-generation and/or low-income backgrounds. Together, they hope this class can give you a taste of what it's like to be a scientist.

Professors:

[Nathan T. Fried, PhD](#) (neuro.fried@rutgers.edu)

Assistant Teaching Professor, Department of Biology, Rutgers Camden

Research Area: Neuroscience, Pain, Opioids, Sleep, Biology Education

Office Hours: M (11am-1pm) & W (3:30-5:30pm) [Virtual Office](#) | [Bookings Page](#) (you can pop in during office hours, but an appointment blocks YOUR time)

Edward Waddell, PhD (ew389@scarletmail.rutgers.edu)

NIH IRACDA PennPORT Postdoctoral Fellow, Department of Neuroscience, University of Pennsylvania

Research Area: Neuroscience, Genetics, Molecular Biology, Developmental Biology, Biology Education

Office Hours: M (3:30-5:00pm) & W (11am-1pm) [Virtual Office](#)

Note from the professors:

It is our hope to create a class that is challenging, informative, and enjoyable. The topics in this course, however, may affect some students more than others since the opioid epidemic is widely experienced by so many of us in different ways throughout the Philly/Jersey area. Given the stigma behind some of these topics (whether it be the personal experience of chronic pain or addiction), we ask all students to be respectful of one another's experiences to create a safe atmosphere to engage in these challenging topics.

Further, given COVID turning this course into a virtual experience, it's paramount that you, as the student, are as engaged as possible. We will be understanding of missed classes, distractions at home, or other challenges, but the class will only work if you throw yourself into the material. We're also always open to your suggestions on how to better run the course, so be vocal about your feedback! We're here to listen and improve your experience. So, please, be engaged, speak up, speak out, and let's make this semester a memorable one.

Learning Objectives:

Understand the molecular mechanisms of addiction. (Comprehension)
Describe the molecular mechanisms by which pain is governed. (Comprehension)
Demonstrate how to perform a search for primary literature. (Application)
Use laboratory techniques specific for working with *Drosophila melanogaster* to address research questions. (Application)
Apply laboratory techniques to test hypotheses. (Application)
Generate a hypothesis based on primary literature. (Synthesis)
Critique selected scientific talks from a national conference. (Synthesis)
Support hypothesis with data. (Evaluation)

Learning Outcomes:

Describe the neurological concepts of pain. (Comprehension)
Explain the neurological concepts of addiction. (Comprehension)
Identify potential interest in scientific research. (Comprehension)
Compile scientific data to present to a scientific audience and peers. (Synthesis)
Formulate an original hypothesis based on scientific literature. (Evaluation)

Note regarding learning objectives and outcomes:

It's important to understand the difference between expected learning objectives and expected learning outcomes of this course. The learning objectives serve as a means to organize the accomplishment of certain tasks in order to progress throughout this course. The learning outcomes instead represent the end goals of this course (what we want and hope that you take with you after the course ends). The outcomes of this course are considered to be goal-directed, meaning that they are designed with **YOUR** goals in mind. By taking this course, it can be assumed that you have an interest in Neurobiology, whether that be clinical or laboratory. Therefore, the outcomes of this course highlight critical skills and knowledge that are essential for your future studies and training in this field.

COURSE MATERIALS

This course does not have a textbook. Instead, we will use online resources. All class sessions will be recorded and put online.

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

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

Neuroscience Virtual Textbook (Free): <https://nba.uth.tmc.edu/neuroscience/>

Harvard Fundamentals in Neuroscience Online course (Free): <https://www.mcb80x.org/lessons>

Zoom: We'll use Zoom to meet. Give it a try.

Canvas: We'll organize the class in canvas.

Computer: You should have a computer and reliable internet access. If you don't, please let me know.

CLASS STRUCTURE

See excel sheet for each week's topic/plan/due dates. Below is an example of how each week will run.

Weekend: Students watch pre-module videos, complete the week's 5 question quiz, and complete their journal club worksheet (if due for the module) before coming to class.

Mondays (content days): Student-led News story (2:05 - 2:15 pm)
Break-out room conversations (2:15 - 2:25 pm)
Lecture (2:25 – 3:25 pm)

Wednesdays (lab meeting days): Journal Club or Presentations or Research Demos

COURSE ASSIGNMENTS, ACTIVITIES, & DETAILS

This class is designed to be hands-on. As such, there are several activities students will participate in. All of these activities will help us finish our research study together as a collective lab.

Individual Work: Some work will be conducted on your own.

Weekly Quizzes (due Sunday night at 11:59 pm): Each week, there will be a 5-question quiz you can answer from the pre-lecture videos or other resources on the internet. Some questions will be harder than others and will require you to do some digging. You will have the entire previous week to take the quiz and it will not be timed.

Arts & Science Curator of the Week: The arts and sciences go hand in hand for a reason. Check out Greg Dunn’s work; He got his PhD in Neuroscience at Penn and then started a fantastic art career with it. Each week, 1-2 students will be assigned as a “curator of the week” where they will participate in/lead the following activities.

Monday News Presentation: Each Monday, the “curator of the week” will present a 5-7 minute PowerPoint (or google slides) presentation about a news story from www.The-Scientist.com related to the week’s topic.

Grading Rubric:

- Show us the news story and explain what research was conducted. Try to identify the a) field, b) hypothesis, c) results, and d) how this advances the field. The news story must be from www.The-Scientist.com. (50%)
- Explain why you chose the news story for the week’s topic. (20%)
- Include 1-2 questions at the end of the presentation to prompt conversation for the class. (20%)
- Presentation is between 5-7 minutes long (10%)

Canvas Discussion Moderator (due Monday morning): The “curator of the week” must make a post in Canvas Discussion that includes the link to the article they presented on along with the questions they used to generate conversation and an art piece they find on the internet that is somehow related to the week’s topic, along with a) the artist’s name and b) the reason you chose the art piece. You should monitor the class’s comments on the posts and try to engage your peers.

Dr. Fried will also share both posts on his Instagram (@neuronate) to generate conversation with the public. You will be credited as the “curator of the week”.

Arts & Science Online Conversation: What’s the point in posting things if it doesn’t generate conversation, right? Each week’s Arts & Science News Curator will post their news story and art piece to Canvas. You will each be required to contribute to the conversation on Canvas and should be active at least 70% of the semester’s weeks. Although this will be monitored for your activity, the goal is to generate insightful and meaningful conversation, not just busy work.

Journal Club Worksheet (due Tues nights): If you are not presenting a journal club for the week, you should fill out a journal club worksheet. For this class to 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!

Drosophila Research Study: You will each receive a vial of drosophila to conduct a series of experiments that will test the effects of chronic pain on behavior and addiction. You are expected to participate in the demos and run your experiments independently on your own time. You will not be graded on this, but the class presentations rely on you completing the research and providing your results.

Group Work: We will pre-assign 4 groups of 5 students to complete various assignments. Each member of the group is required to equally contribute to both the oral presentation and presentation preparation. You should create a group name.

Monday Break-out Rooms: The break-out rooms will not be graded, but they're an opportunity to "prime yourselves" to be active learners, instead of passive ones, regarding the week's material. During this brief time, you'll be able to chat with your group about the "arts and sciences" presentation or the day's lecture material. Discuss anything you don't understand so that you're ready to discuss them with us during the lecture.

Journal Club Presentation: Student groups will prepare a 30-minute PowerPoint presentation on an assigned research article. Each group will present once. 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 instructors in advance. For reference, when we give journal clubs in our own lab meetings, it takes us about 5 hours to read, distill down the info, and make nice slides. At your early stage in your research career, it can take much longer so don't delay getting started.

A lot of this is going to be above your head because many of you are first-year students who have never read research articles. But give it your best shot. We'll grade fairly. Your job as the presenter for the week is to essentially teach your peers about the research article. You are 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/Rubric (remember, ~2 min for every slide):

Introduction/Background (~10 min) (50%): It is VITAL to frame your presentation of the article. 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 the authors are exploring.
- 2) What is not known about the field.
- 3) The question they are trying to answer with their research, review, or theoretical paper.
- 4) How they propose to answer or approach the question.

Where does it fit? (~2 min) (10%): Now, discuss how this paper fits into the context of the course.

Results (~10 min) (10%): 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 what the conclusion is from each figure. This will let you move figure to figure smoothly. Consider the data as a story. Tell us the story.

Conclusions (~2 min) (20%): Now, take that data or theoretical framework and put it into context with what you presented during the intro. Tell us how it solved the question they proposed in the intro.

Questions/Discussion (~6 min) (5%): 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. You should also prepare your own intellectual questions to ask the audience to generate conversation.

Class Score (5%): Receiving critical feedback from your peers is essential to become a stronger presenter. All students in the class will give you critiques and a final score for your presentation. Please see provided rubric for details on the assessment.

Journal Club Moderators: One group will be assigned to be the moderator for the week’s journal club. Each group will be the moderator once. It’s their job to keep the conversation going and active. Your group should prepare at least 3 questions to ask the presenters.

Research Project Presentations: Throughout a research project, you’ll give a whole range of presentation types. Each group will be assigned to present **one of the following four presentations**. Each presentation is designed to build off each other, therefore by the end of the course, we’ll have a full series of presentations that was created by all course students.

Students not presenting are expected to ask questions during the presentations. This not only builds your skills in asking relevant, thought provoking questions, but also allows each presenter to build their skills in thinking critically about what they are presenting.

Grading Rubric: Each presentation will be different, but you can see the “goal” of each below. We leave it to your group’s discretion and creativity to decide how you’ll achieve that. Your grade will be dictated 90% by faculty assessment of whether you achieved that goal and 10% by whether the class believes you achieved the goal. Please see provided rubric for details on the assessment.

Proposal Presentation (10/14/2020): In this presentation, students are expected to present a thorough background of the course’s research project including the scientific rationale for the research question, hypothesis (or hypotheses), and all relevant background knowledge needed to understand the project. Additionally, students are expected to outline the research project including a timeline of experiments and what research question each experiment is designed to address.

Goal: Fully describe why and how the project is being pursued in such a way that stimulates interest in the work.

Data Presentation I (11/4/2020): Students will present the class-aggregated results from the climbing and sensitivity assays. This will require collecting data from each class member’s experiments, aggregating it, analyzing it, and making a conclusion based off it. Students will describe the experimental design, the scientific rationale for each specific experiment, and the results (in an appropriate graph or chart). Additionally, students should provide a brief reintroduction to the work including their scientific background, question and hypothesis (or hypotheses).

Goal: Provide an update on the first set of results and determine a conclusion for us to make decisions on the next steps of the project.

Data Presentation II (12/2/2020): Students will present the class-aggregated results from the tolerance and preference assays. This will require collecting data from each class member’s experiments, aggregating it, analyzing it, and making a conclusion based off it. Students will describe the experimental design, the scientific rationale for each specific experiment, and the results (in an appropriate graph or chart). Additionally, students should provide a brief reintroduction to the work including their scientific background, question and hypothesis (or hypotheses).

Goal: Provide an update on the second set of results and determine a conclusion for us to make final conclusions on the project.

Thesis Presentation (12/9/2020): Students will create a final conclusion presentation about what these experiments conclude. Students are expected to present all data collected throughout the term. Students will describe the experimental design, the scientific rationale for each specific experiment, and the results (in an appropriate graph or chart). Additionally, students should provide a brief reintroduction to the work including their scientific question and hypothesis (or hypotheses). Finally, students will highlight the major conclusions of their work and potential future directions and implications of their work.

Goal: Describe the full picture of the project, it's conclusions, and future directions so we can assess where to go after this class is over.

Conference Debrief Presentation (During Finals Period: Monday, Dec. 21, 2020 2:45pm-5:45pm): An amazing opportunity within this course is that each student will receive a one-year undergraduate membership to the American Society of Cell Biology (ASCB). As a part of this, each student will be expected to attend the virtual ASCB conference this year from December 2-16. Each group of students are responsible for selecting one talk to present to the class. To accomplish this, students will need to view the conference schedule and select a single talk they would like to present on. We encourage you all to attend several talks, however, so you can learn and explore! We'll curate a recommended schedule for you once the agenda is released.

Structure of Conference Debrief Presentation/Rubric (remember, ~2 min for every slide):

Introduction/Background (~10 min) (50%): It is VITAL to frame the narrative of the presentation. Use their own introduction as your guide but add information as needed. 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 the presenter is exploring.
- 2) What is not known about the field.
- 3) The question(s) they are trying to answer with their research.
- 4) How they propose to answer or approach the question(s).

Where does it fit? (~2 min) (10%): Now, discuss how this presentation fits into the context of the course material.

Results (~10 min) (10%): You should go major experiment by experiment and describe the logic for doing that experiment, the way the experiment works (i.e., the methods used), and what the conclusion is from each. For figures, search the authors name using a literature search to see if their work is published. If there are no figures available, you should present their logical flow. Consider the data as a story. Tell us the story.

Conclusions (~2 min) (20%): Now, take that data or theoretical framework and put it into context with what you presented during the intro. Tell us how it solved the question(s) they proposed.

Questions/Discussion (~6 min) (10%): 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. Also, you should prepare your own intellectual questions to ask the audience to generate conversation.

Peer Evaluation: You will have the opportunity to evaluate your group members twice (middle of course and end of course). The first evaluation will help you improve your team-work and the second will be a final evaluation of your participation in the group. Your grade will be an average of all your group member's assessment of you.

Faculty Work (extra credit): Dr. Fried and Dr. Waddell will conduct a final experiment to test the effects of pain on addiction. We are your colleagues, so we will also have to present our data to you. We'll present this data on the last day of class and you'll all collectively grade us. You should be hard on us! Each question that your group asks will have

the opportunity to gain extra credit points, but the question has to be a good one to receive full points. More details to come!

Other Extra Credit for individuals: You will be able to gain up to 3 pts extra credit for completing either of the two options:

Completing a Research Survey: We will provide a link to a survey during the first and last weeks of the class. If you complete both surveys (a total of 1 hr), we will provide you with 3 pts extra credit.

Writing a 2-page paper: You can alternatively write a 1-2 page paper about pain/opioid epidemic. It should be formatted as an essay. We will provide you with 3 pts extra credit.

CALCULATION OF FINAL GRADES

Individual Work

Weekly Quizzes (1 pts each x 14)	14 pts
Monday News Presentation	10 pts
Canvas Forum Moderator	10 pts
Arts & Sciences Online Conversation	10 pts
Journal Club Worksheet (2 pts each x 3)	6 pts

Group Work

Journal Club Presentation	10 pts
Journal Club Moderator	10 pts
Research Project Presentation	10 pts
Conference Debrief Presentation	10 pts
First Peer Evaluation	3 pts
Second Peer Evaluation	7 pts

Faculty Work

Our Presentation	Potential 5 extra credit pts
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Other extra credit

Survey or paper	Potential 3 extra credit pts
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Total	100 pts
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CLASSROOM POLICIES

Microphone and Video Policy: When we can put a name to a face, it can be really helpful for all of us to connect virtually. We therefore strongly encourage you to have your video on. For your privacy, you can use a [virtual background in Zoom](#). However, it is ultimately your choice whether to have your video on or not and we will respect that choice. Additionally, please keep your microphone off when not speaking. Background noise can obscure the conversation.

Mental Health Statement: Simply put, college and life are stressful and hard. The demands on you are immense, especially for those balancing a part-time job. If you are struggling or need someone to talk with, please reach out to me or visit the [Rutgers Camden Student Wellness Center](#). We are here to help.

Attendance/Tardiness: We will not take attendance, but the course only works well if everyone participates. During these unprecedented times, we will have to work through days of unreliable internet access and family or loved ones who may be in challenging situations or sick/affected with COVID19. There is no need to alert us to any absences unless you are scheduled to present.

Students with Disabilities Statement: Rutgers University welcomes students with disabilities into all of the University's educational programs. To receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: <https://ods.rutgers.edu/students/documentation-guidelines>. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with us to discuss the accommodations needed as early in your course as possible. To begin this process, please complete the Registration form [here](#).

University Academic Integrity Statement: Rutgers University takes academic dishonesty very seriously. By enrolling in this course, you assume responsibility for familiarizing yourself with the Academic Integrity Policy and the possible penalties (including suspension and expulsion) for violating the policy. As per the policy, all suspected violations will be reported to the Office of Community Standards. If in doubt, please consult the instructor and review the [Academic Integrity Policy](#).

Academic dishonesty includes (but is not limited to):

- cheating
- plagiarism
- aiding others in committing a violation or allowing others to use your work
- failure to cite sources correctly
- fabrication
- using another person's ideas or words without attribution
- re-using a previous assignment
- unauthorized collaboration
- sabotaging another student's work

Office hours policy: Please don't email me to tell me you're coming to office hours. I can so many emails so it'll be hard to keep track of it. Instead, just use the bookings link I have at the beginning of this syllabus to book a 20 minute chunk (or more!) of time to meet with me. Booking helps me know if someone is coming so I don't walk away from my computer and to ensure other students aren't eating into your time. These office hours are time for me to chat with you about anything under the sun. Use them liberally. They're your time!!!

Dr. Fried's Email policy: I get a lot of emails every day. I teach all day/night on Mon and Wed so I won't respond to your email until Wed or Thurs (usually within 24-48 hrs). But if you haven't received a response, feel free to "ping me" again. Sometimes the flood of emails might bury yours. Pinging the message again is common in academia. Always feel free to remind someone of your email. Often, if they don't respond, it's just because they missed it; not because they are ignoring you.

Dr. Waddell's Office hours policy: If you know that you want to meet with me during my office hour periods, please email me ahead of time so that I can prepare for our discussion. My office hours will be open access; however, I will give priority to those who schedule ahead of time with me. Scheduling also allows me to divide meeting times so that I can provide ample individual time to each student.

Dr. Waddell's Email policy: Please feel free to email me with any and all questions you have. I will reply to emails within 24 hours (usually within an hour or so). I will not respond to any emails after 8pm, so if you email later at night, expect a reply first thing in the morning.