

NEUROBIOLOGY I: CELL & MOLECULAR

COURSE DETAILS

Course Description:

Time: Monday/Wednesday 8:00 - 9:20 (ouch that's early!)

Physical Location: FA-219

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

This course will provide students with the essential background to understand the nervous system. Students will apply these fundamentals to further study of the nervous system whether it be neurophysiology, behavior, psychology, or human health. Students should note that much of this content is directly found on the MCAT. Thus, this course is helpful for students going into the workforce, graduate school, or medical school.

The course is broken into 4 sections:

- 1) Electrical properties of neurons
- 2) Communication between neurons
- 3) CNS, PNS, and sensory systems
- 4) When it comes together and when it falls apart

This course has received an 'Open and Affordable Textbooks Program award from the Rutgers University Libraries. The OAT Program supports textbook affordability at Rutgers by encouraging courses to adopt educational materials that are freely available, available at a low cost (compared to similar courses), or part of the Rutgers University Libraries' electronic collections, and thereby free of charge to Rutgers University students. As a student in this course, you may be asked to provide feedback on this initiative at the end of the semester.

Professor:

Dr. Nathan T. Fried (neuro.fried@rutgers.edu | www.NeuroFriedLab.com)

Assistant Teaching Professor, Department of Biology, Rutgers Camden

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

Office Hours: M (12:30 – 5:00 pm) [Office Hours Sign-up](#) | [Virtual Office](#)

Note from the professor:

This is one of my favorite course offerings here at Rutgers Camden. I launched it in the Spring of 2019 and have modified it every semester it's been taught to refine it. As a neuroscientist myself, every component is drawn from my own experiences running rodent behavior with optogenetics, patching neurons with electrophysiology, or watching neurons send signals with calcium imaging. I pride myself on only including content and activities that are worth your time in the learning process and don't rely on brute force memorization. That being said, my exam/quiz questions test your understanding of concepts, not just memorization. Keeping up with the material each week is KEY to getting a good grade. To facilitate this, I've flipped the entire classroom by pre-recording all the lectures and focused in-class time on problem-based learning. New this semester is the removal of attendance and alternative assignments to introduce as much flexibility for students struggling with the COVID pandemic. Let's work together and make this semester intellectually fulfilling.

Course Student Learning Objectives:

1. Develop an expertise in the electrical properties of neurons.
2. Develop an expertise in the signaling properties of neurons.
3. Develop an expertise in the sensory components of the CNS and PNS.
4. Develop an ability to engage with recent neuroscience-related news.

COURSE MATERIALS

This course does not have a textbook. Instead, we will use online resources.

CrashCourse's Youtube videos

URL: <https://bit.ly/3juWca4> or google "Neuroscience Crash Course" to find the page.

Description: This is an open-source collection of YouTube videos that will provide core information on the material in this course.

MetaNeuron

URL: <http://www.metaneuron.org/>

Description: This is an online neuron simulator. You should download this program. We will use it in class.

University of Texas's online neuroscience textbook

URL: <https://nba.uth.tmc.edu/neuroscience/toc.htm>

Description: This is a complete open-source neuroscience textbook. It is more detail than you need, but it will be a valuable resource for studying. Notice all the interactive flash animations to help understand the material.

Optional Textbook

If you wish to purchase a textbook to follow along, I suggest "Neuroscience: Exploring the Brain, 4th edition" by Bear, Connors, and Paradiso. It is an EXCELLENT book to get started in this space. I included recommended reading in the schedule that matches to the 4th edition.

Laptop:

It's great if you can bring a laptop to the Wednesday sessions in case we need it, but it is not required.

CLASS STRUCTURE

This is a flipped classroom where you watch pre-recorded lectures and take a weekly quiz prior to the in-person meeting. Along the way, you'll take part of group projects and problem-based learning exercises to reinforce the concepts in the video lectures. All course material is broken into 15 modules. I suggest the following example timeline each week:

Before Monday Class: Watch the Module videos and take general notes.

Monday Class: Recitation time held virtually – come with your questions. Recordings available on canvas.

Before Wednesday Class: Take the Module Quiz.

Wednesday Class: Problem-Based Learning exercises held in-person.

COURSE ASSIGNMENTS, ACTIVITIES, & DETAILS

Individual Work

Module quizzes (due 8am on Wednesdays before class): There will be 8-question quizzes for Modules 1-13. They're pretty hard to answer without watching the videos, so don't start the quiz until you've watched them and feel comfortable with the material! While the quiz is open-note, you are not allowed to work in groups. These questions will appear one-by-one, be randomly selected from a pool of new questions, and will have a 30-minute time limit. These components of the quiz may be frustrating, but prevents students from working together or cheating while also facilitating the freedom to take the quiz asynchronously. You will have two tries to complete this quiz and your grade will be the average of both tries. This weekly quiz ensures you are prepared for in-class activities. I recommend watching the videos prior to Monday's virtual class so you can ask questions prior to taking the quiz.

Exams: At the end of the first three sections, you will be given a 60-75-question exam on the material from that section. While each subsequent section will focus primarily on that section’s material, you’ll still have to tap into your cumulative knowledge from the course to answer questions. These exams will basically be long-format quizzes. It’ll again be open-note and you will have an entire week to complete the exam asynchronously, but you are not allowed to work in groups. To prevent cheating, the exam questions will appear one-by-one, be randomly selected from a pool of new questions I’ve created, and you’ll will have a time limit of 2-3 hours depending on the length of the exam. Exams 1 & 2 will be open for one week while Exam 3 will be open for two weeks. This exam serves as a checkpoint before moving into the next section of the course.

Final Exam: The fourth and final exam will be untimed, and you are allowed to work in groups if you wish. It will cover the TBD paper/special lectures and will require you to answer specific questions about the research studies covered, experimental design, and interpretation of data.

Wednesday Activities: You have two options to get these points: 1) Complete the in-person PBL Activity or 2) Complete the Alternative Asynchronous Assignment. See below for details:

Option 1- Problem-Based Learning (PBL) Activity: During most in-person Wednesday class sessions, we’ll work together on case studies, discussions, analyses, etc. Most of these activities can be completed during class time, but some will require homework that should not take too much time to complete. These sessions seek to reinforce concepts by getting you experience working through problems related to the brain. Each week’s workshop will have one of three grades for those who participate: 100% for those who complete the activity perfectly, 90% for those who do well but could use a little improvement, and 80% for those who need extensive improvement. These grades are to encourage growth while not penalizing your grade severely.

Option 2- Wednesday Alternative Asynchronous Assignment: To provide flexibility to students who are not able to come to the in-person class time due to absences, you can instead complete the alternative assignment asynchronously. This involves reading the week’s “associated paper” (see schedule) and answering brief paper-summary questions due on Friday. The assignment is designed so that you spend an equal amount of time as those who are in-person.

Group Work:

Subject Matter Expert (SME) Groups: You must decide to join 1 of 13 groups (max 4 students per group). Each group will become the SMEs for one specific module. This will involve you working on recent discoveries in that module and being a great go-to for that module’s content. Sign up is first come first serve!

News & Views: To increase your exposure to scientific literature and recent science news, I have gathered a list of very recent neuro-related news stories from The-Scientist.com, the go-to daily science news resource scientists use. These news stories are short articles written by science journalists that distill down complex research articles that were recently published. Use the “news article” to help you understand the “associated research paper”. In the schedule, you can see the assigned news story and its associated paper for the module you’re the SME for. Rubrics and guides for the below items are on canvas:

Journal Club Presentation: Each group will be required to do a 10-minute virtual presentation based off their assigned “The Scientist Article” and “Associated Paper” (see schedule) followed by 5-minute discussions. SME Groups for Modules 1-5 will present on 9/27. SME Groups 6-9 will present on 10/25. SME Groups 10-13 will present on 11/22. Rubric and assignment guide can be found on Canvas.

Twitter Thread: Along with your presentation, you’ll also have to write a twitter thread ([instructions](#)) about the paper to walk readers through the research. You can follow me [@NeuronNate](#) and the [Rutgers Academic Twitter List](#) to get started with Twitter and you’ll submit a link to it through canvas. The purpose of this is to give you experience on twitter, arguably the most useful social media platform for

scientists. To see a former Neuro student using Twitter REALLY effective, follow [@SarahSynapses](#) who has amassed a pretty strong following. I will retweet your post once you submit it and it is due at the same time as your presentation. Rubric and assignment guide can be found on Canvas.

Science Outreach Video Lecture: Dr. Kwangwon Lee has started an [outreach resource](#) for local middle/high school students and we want to contribute as many videos on neuroscience as we can. Your group will be responsible for distilling down the content from your assigned module (Modules 1-13) into a recorded video that is 5-10 minutes long and geared toward grades 4-8. The goal is to provide a summary of this entire college course to these students. Turning my 1.5 hrs worth of video content into 10 minutes is not easy, but the purpose of this assignment is to force you to think critically about the content. Those who can explain these complex topics to a kid generally understand the content the best. This assignment is inspired by the “[One concept in 5 Levels](#)” video series.

Peer Review: It’s natural that not all group members will pull their own weight. This is where you can ding them on points. Your grade will be the average from all peer reviews, including a self-assessment review to prevent unfair assessment.

Extra Credit:

Most Twitter Interactions: The group with the most twitter interactions will receive an extra 2.5 pts to their final grade.

Science Outreach Video Selection: If your video is selected for Dr. Kwangwon Lee’s outreach resource, your group will receive 2.5 pts.

CALCULATION OF FINAL GRADES

Individual Work

Module Quizzes (13 quizzes)	20 %
Section Exams (3 exams)	40 %
Final Exam	10 %
Wednesday Activities (10 Activities)	10 %

Group Work

N&V Presentation	5 %
N&V Twitter Thread	5 %
Sci Outreach Video	5 %
Peer Review	5 %

Extra Credit

Most Twitter Interactions	+2.5 % pts
Science Outreach Selection	+2.5 % pts

Total 100 pts (105 pts w/ extra credit)

CLASSROOM POLICIES

COVID Safety Precautions: I have received the vaccine (Pfizer – two doses) and will be wearing a mask while indoors in both my professional and private life. All students are required to wear masks while in the classroom. Be sure to cover both your mouth and nose. Rutgers is continuing to update their recommendations ([updates](#) & [official protocols](#)).

COVID Compassion Culture: These past two years have not been easy. We want to treat each other with compassion because this semester will continue to throw us curve balls. Let's cultivate a space where we care about each other and try our best to be understanding, fair, and compassionate. Everyone is going through their own personal struggle. Some have greater risks due to living with unvaccinated children or family and others have their own risk tolerance levels. Let's cultivate a space where we can 1) respect each other's boundaries and 2) feel safe to verbalize our boundaries.

Late Assignments or Exams: If an assignment or exam is late, you receive a 10% deduction (i.e., the max grade you can get is a 90%). I will not accept an exam that is more than one day late, but I will accept all other assignments/quizzes up until finals week.

Attendance: Since portions of this course will be virtual and some students may be affected by internet connectivity or health-related issues at different times, I will not require attendance. I have instead designed the course to allow maximal flexibility. You never need to tell me if you can't make it to class.

Office hours policy: Please don't email me to tell me you're coming to office hours. I get 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 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 YOUR TIME to chat with me about anything under the sun. Use them liberally.

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 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.

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.

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](#).