



PPBR RESEARCH LAB SYLLABUS

COURSE DETAILS

Course Description:

Time: PPBR lecture meets Mondays from 12:30-1:50 pm. We will hold in-person lab meetings on Wednesdays from 12:30-1:50 pm.

Physical Location: CNS-222

Virtual Location: [Virtual Office](#)

Science is inherently hard. This entire class focuses on accomplishing a research project, but the learning experience is NOT just about discovering a new piece of knowledge. It's about learning all those small steps to get there. For example, if you need to use a primary antibody, what concentration do you use? Where would you get that information? What do you dilute it into? If you are running a 3-day experiment, how do you plan the incubation steps? If your fruit flies are all dead for no apparent reason, how do you figure out what's wrong and what do you do to keep the project alive? THESE are the skills you'll need in graduate school, medical school, and on the job market. So, let's focus on the end goal (a completed project), but let's not forget to dive into the process. Please keep in mind the following:

1. You are independent researchers. Dr. Fried is your CSO (Chief Scientific Officer). I'm not here to tell you exactly what to do. Instead, I'm someone you can consult with. I'll help guide you, but you're steering the ship.
2. Working as a team to complete a research project is hard. Doing it virtually is even HARDER. The most common complaint amongst students is the **lack of communication** or **waiting until the last minute** to complete an assignment. We encourage all teams to have open communication with one another and STAY SOCIAL AND HONEST. We will use SLACK as a way for immediate communication. Be prompt and be a good labmate.
3. Every member in your group has different goals with PPBR. You'll find some are PASSIONATE about this work while others are here to do the minimum that gets them an "A". There's nothing wrong with that, but recognizing who you are and being vocal about that can help your group "match their expectations".

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](#)

Learning Objectives:

1. Students will design, conduct, and carry out independent research projects.
2. Students will work together as a team to carry out these projects.
3. Students will learn how to distill scientific papers relevant to their project.
4. Students will learn how to conduct the experiments necessary to complete their research project.
5. Students will learn how to interpret and distill down their findings to the scientific community.

Learning Outcomes:

1. Students will develop independence.
2. Students will develop project-management skills.
3. Students will learn how to drive their own intellectual curiosity.
4. Students will become content experts in their particular field.

COURSE MATERIALS

Peer-reviewed articles: Most peer-reviewed articles that you need can be found at pubmed, but if you are not on campus, you'll often hit a paywall. To get these articles, you just need to go to the [Paul Robeson's Library](#) website and search either "pubmed" or the title of your article. Once you go through this portal, it'll ask you to sign in with your netID. Once signed in, you'll have access to all articles for free.

Online Project Management Tools for Research: There's a bunch of tools research labs across the US use all the time. There's always a learning curve that can be frustrating to get used to, but these tools help you stay organized and will give you valuable experience for future jobs.

Slack: We'll use Slack to keep in contact in this virtual world. Slack is a great tool used by companies across the world to turn emails into conversations. Definitely immerse yourself into it because it's a tool future employers will want to know if you can use. I suggest downloading the desktop app instead of using the web portal ([windows](#) & [mac](#)). The desktop app is MUCH easier to use and more intuitive.

Trello: We'll keep track of tasks for project management with [Trello](#). Here's a [good pitch](#) for using it to manage a research project.

Benchling: This is a [free online lab book](#) used by labs across the country. It's good to get used to using it so we'll use it to keep track of our lab meetings and you can use it as you see fit!

Zotero: This [reference management software](#) is nothing short of life changing. It'll help you keep track of any and all interesting research papers you find that'll help you work on your project. I suggest creating a shared library for you all to add papers to as you find them. Trust me, it'll save you SO MUCH time when you're writing your progress reports.

Data Analysis tools: For most stuff you'll do, you can simply use Excel or Google Sheets. But if you have more than two groups you're comparing, you'll need to use R-Studio. See below.

Excel: You get it [here](#) for free from Rutgers

R & R-Studio: R is a free open-source programming language and R-Studio is a GUI with a free version that helps you use R. You can download both for free [here](#). Download the open-source (free) version of R-Studio Desktop.

CLASS STRUCTURE

Lecture Period: Monday from 12:30-1:50 pm, you'll meet with Dr. Kwangwon Lee. There are no lecture meetings on Thursdays.

Weekly Lab Meetings: Each group will schedule a 1-hour lab meeting with me where we'll discuss their project. The meeting will consist of a 15-minute journal club where you'll present a paper relevant to your project to me and 45 minutes to discuss your research project's progress. The goal of the meeting is to help you get to the next step of your project. Feel free to record these meetings for your future reference.

Research Hours: When you work on your project is up to you and your group. Use your 'personnel' wisely. You all don't have to meet at the same time to accomplish goals. Some weeks will be easier than others, but use the rule of thumb that

one lab credit consists of 3 hrs of bench work and 2-3 hrs of off-the-bench work. So, you're looking at 5-6 hrs/week outside of lecture time/assignments for each researcher to accomplish your work.

Monday Check-ins: Project management is hard. I suggest that each of your groups plan to meet with each other briefly on Mondays via zoom. This is not a requirement, but it'll start the week off on the right foot. During this meeting, you can all update each other regarding who's doing what for the week.

COURSE ASSIGNMENTS, ACTIVITIES, & DETAILS

The lab portion of this class is graded not on whether you accomplish your research project, but instead on whether you are prepared each week and are on top of your project. Below are the specific assignments you'll be graded on.

Weekly Reflection: Each week, you will be required to submit a *very brief* weekly reflection about your efforts toward the project. This will also give you the opportunity to bring up any challenges regarding group dynamics so we can deal with them sooner than later. This is due every Monday at midnight. You get full credit for submitting it.

Weekly Performance Evaluation: Each week, I will provide an evaluation of your performance on the research project following the lab meeting. The goal for this evaluation is to provide an incentive to grow while not penalizing you with a grade. If you earn less than a 90%, I'll give you a written reasoning for it so you can improve.

If you go above and beyond, you'll get 100% (rare to earn this)

If you do well, you'll get 95% (common to earn this)

If you could do better, you'll get 90% (incentivizes while not dinging your grade)

If you do poorly and need to improve, you'll get an 80-85% & an explanation for improvement.

Weekly Lab Meeting: We will hold a weekly lab meeting to discuss the progress of your projects, troubleshooting, ordering, etc. We will mirror lab meetings you'd find in grad school. The goal of the meeting is to identify next steps on the project and figure out how to proceed. Each lab member will be given a set of tasks they must complete over the following week. These tasks may be knowledge-based or action-based. It's natural to not have completed tasks due to unforeseen circumstances so we will work together to troubleshoot and overcome challenges together. The goal is to work together on different items to move the ship forward.

Attendance: All members of the group should be present and on time. Please alert your group of any absences via slack. If you can't make it due to COVID or other conflicting matters, please alert us in Slack so we can open zoom on a laptop for you. Attendance will be taken in canvas and the grade will reflect the percentage of lab meetings attended. You will receive a 20% penalty if you are late to the meeting.

Journal Club Walkthrough: Each student in the group will be responsible for presenting two 15-minute informal "walk-throughs" of a paper relevant to their project. Students will be assigned their dates to lead the walk-through at the beginning of the semester. The presenter should simply walk us through the paper without using slides. They should discuss the following during their walk through and also put their notes on these items into the Benchling "Journal Club Notes" section:

- 1) Big picture of the paper
- 2) How the paper fits into the research project
- 3) A brief description of a) HOW (technical) and b) WHAT was discovered in each figure.

The grade for this is 100% if covering all components above, 90% if covering most components, 80% if covering only some components, and 0% if not doing it.

Journal Club Questions: Journal Clubs are only helpful if it drives a discussion. Each student can earn a total of 100 'insight points' throughout the semester. Your grade in this category is the total number of points earned. Reading the paper ahead of time and thinking about how it contributes to your project will help you earn these points faster. Insight point values are below:

Question that demonstrates understanding of methods in the paper	10 insight points
Question that demonstrates understanding of experimental design in the paper	20 insight points
Question that demonstrates understanding of bigger picture of the paper	25 insight points
Question that demonstrates understanding of how paper relates to group project	35 insight points

Praise/Improvement Feedback: Each week, I will identify one thing you deserve praise on and one thing you could improve.

Performance Feedback: Each week, I will provide a very brief performance

Scientific Literacy Tests:

Technique Test (must be completed by end of October): Each of you will be using a different set of techniques to conduct your research. Each technique has very detailed nuances to it. You must be able to explain this technique verbally or as a “chalk talk” (i.e., you can draw as you speak but can’t come with slides). You can explain this technique to me in any of the lab meetings. You should take no more than 5 minutes to explain it. You can do this as many times as you wish to improve your grade. Rubric is below:

- If you explain it poorly, you’ll receive a 75%.
- If you explain it sufficiently, you’ll receive an 85%.
- If you explain it VERY well, you’ll receive a 95%.
- If you explain it perfectly, you’ll receive a 100%.

Chalk Talk (must be completed by Biology Day): Every study has a “story” that contains a central logic to it. A chalk talk encourages you to casually convey the central aspects of the logic behind your study in a verbal format. While you can’t use slides, you can certainly draw to help explain the study. Your chalk talk should be no longer than 5 minutes. You can give your chalk talk in any of the lab meetings. Rubric is below:

- If you explain it poorly, you’ll receive a 75%.
- If you explain it sufficiently, you’ll receive an 85%.
- If you explain it VERY well, you’ll receive a 95%.
- If you explain it perfectly, you’ll receive a 100%.

Conducting Research:

Splitting Effort: We are still going through a pandemic, so we have to be flexible with our timing and methods of completing work. If someone gets sick or becomes positive, they won’t be allowed on campus, so your group may have to pivot regularly. I suggest thinking about the amount of time it takes to complete certain tasks and if someone can’t make it to lab, they should instead work on a component of the project remotely that equals a similar amount of time. For example, if a member is stuck at home, they can work on the powerpoint presentation or data analysis while the others collect data in the lab. To make things even, make sure the “at-home” work takes the same amount of time as the “in-person” work. Please be as understanding as possible and work with each other to finish your project.

Approval to use CNS-222: Once students have completed the following tasks, they will be given the privilege of using CNS222 in pairs without the supervision of Dr. Fried. (**Note: Students MUST ALWAYS BE IN PAIRS WHEN IN CNS222**)

1. Complete Lab Tour
2. Complete RTK training
3. Complete the Independent Undergraduate Research Contract.

CALCULATION OF FINAL GRADE

Weekly Performance Evaluation	15 pt
Weekly Reflection	15 pt

Journal Club Walkthroughs	10 pt
Journal Club Questions	10 pt
Lab Meeting Attendance	20 pt
Technique Test:	15 pt
Chalk Talk:	15 pt
Total:	100 pt

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.

Lab Equipment Ordering: We are not allowed to reimburse you for expenses incurred as part of this course. Please contact me early with anything you need. There are always shipment delays.

Attendance/Tardiness: This 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. Let everyone know in Slack if you have an unexpected absence. The earlier you tell us, the better.

Faculty communication policy: The best way to contact me is to “at me” on your Slack channel or send a DM. But if you send an email, send it to neuro.fried@rutgers.edu which is an alias that categorizes your email as important for class. I get a lot of emails every day so it will take time for me to respond to your inquiries. 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.

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, book a time slot with me online ([Office Hours Sign-up](#) | [Virtual Office](#)). Feel free to sign up for multiple 20-minute time slots. These office hours are time for me to chat with you about anything under the sun. Use them liberally. They’re your time!!!

Shared Equipment Policy: We share equipment with other research/teaching labs. This is ESPECIALLY true for equipment in common spaces. EVERY TIME you use a piece of equipment, you MUST fill out the log form. If there is no log form at the location, create a log sheet by taping a piece of paper close to the equipment with headers for name, date, time used. This actually protects YOU in the event of damage to equipment.

Clean Lab Policy: A clean lab is a happy lab. DO NOT LEAVE dishes unclean, or benches dirty. Before you leave each day, you MUST wipe everything down, return equipment to its proper location, and make sure everything is tidy. This is ESPECIALLY important for COVID safety measures.

Lab Book policy: Your group must work diligently to record all work you perform. Keeping track of work is important and you should always be able to quickly track down details we may ask of you. I suggest using Benchling to keep these records, but its up to your lab on how you want to stay organized.

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](#).

Independent Undergraduate Researcher Contract

By signing this document, you are recognizing the following:

Research Project Ownership Statement: This is YOUR research project. You are not *just* PPBR students. You are INDEPENDENT UNDERGRADUATE RESEARCHERS in PPBR. However, neither Dr. Fried or Dr. Lee have expertise in every single field. This means that YOU will become the expert on your project. YOU MUST TAKE OWNERSHIP OF IT. We are here to help guide you to complete your project, but you should not expect us to drive the project. Embrace your role as an independent undergraduate researcher. The onus is on YOU to bring this project to completion. We are merely your guides.

We will not come up with your experimental design: Students should feel free to ask us for feedback on proposed experimental design, or for suggestions when struggling to come up with a way to investigate a particular question, but students should not expect us to come up with an experimental design for them. How to develop an experiment to investigate a question is a vital part of the course.

We will not perform your experiments: We will demonstrate how to conduct a technique, but it is up to your team to complete the experiment.

We are here to help, but are not accessible 24/7: While we will help in every way possible, recognize that we have our own research and teaching responsibilities. Thus, do not expect us to respond to emails immediately or be available to schedule experiments any time during the week.

Mentorship and Guidance: We're here to mentor and guide students through the process of preparing for and carrying out a research study to investigate a question. This includes helping students learn to develop a good question, directing students to appropriate resources for research into research topic, and providing feedback regarding student ideas, procedures, and experimental design.

Safety and proper equipment usage training: We're here to help confirm each group is properly trained in lab safety and proper usage of any equipment necessary to carry out their proposed study. YOU MAY NOT USE ANY EQUIPMENT UNLESS YOU HAVE RECEIVED PRIOR TRAINING AND APPROVAL. If you would like to receive additional training, please reach out.

Obtaining and Allocating resources: As long as students properly communicate what equipment, materials, and resources they require for their project, we'll ensure that everything needed to complete the project is provided (within reason). We will not reimburse students for their own expenses. Please contact us to purchase items.

CLEAN Lab Policy: It is ESSENTIAL that you clean up your lab space before and after every use of the area. Do not borrow items from other lab spaces without prior approval. We must work together to keep a clean and well oiled lab working.

Access to CNS-222: You will have access to CNS-222 during normal working hours. Weekend access is limited.

Working in pairs: DO NOT WORK ALONE IN THE LAB! You MUST always be in CNS222 in pairs.

I, Dr. Nathan Fried, approve _____ to become an independent undergraduate researcher. With this responsibility, the student agrees to treat the lab space with respect in a safe way and to only enter the lab if they have another student with them. The student MUST follow all rules demonstrated in the syllabus.

Student Name: _____

Student Signature: _____

Instructor Signature: _____

Date: _____