

COMMUNICATING BIOLOGICAL SCIENCE

COURSE DETAILS

Course Description:

Time: Tuesday/Thursday 9:35 – 10:55 AM

Virtual Location: [SBR ZOOM room](#) (you can gain access in canvas)

This project-based course is designed to train students in best-practices for communicating biological science in both written and oral formats. Students will critically analyze and distil complex scientific articles. Students will learn how to write research articles, review articles, posters, grants, and news stories for the scientist and non-scientist while also learning to give research and chalk talks. Students will also be immersed in utilizing social media to convey science. At the end of the course, students will have the opportunity to produce a project of their choice, whether it be a grant, manuscript, review article, news story, or other biomedical science format.

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 (10:20-12:20 pm) & R (12:45-2:45 pm) [Office Hours Sign-up](#) | [Virtual Office](#)

Note from the professor:

From day one of my scientific journey, I realized how important communication skills are. Although you can make an entire career out of science communication, it is heavily integrated into every part of a scientific discipline. Most scientists stumble through the dark with learning the tools of the trade. This class was designed with that in mind. Being a good communicator leads to success in science. So, this is your start at perfecting it.

Learning Objectives:

1. Students will learn how to use “academic twitter” strategically to navigate their career and stay up to date on topics in their field
2. Students will gain experience reading and distilling recent research advances through navigating www.The-Scientist.com.
3. Students will gain experience conveying complex scientific topics in oral, written, and visual formats to multiple audiences.
4. Students will learn how to critically analyze the scientific literature.

Learning Outcomes:

1. Students will become comfortable with using Twitter to advance their careers.
2. Students will gain experience in identifying the big picture of research studies and conveying it to multiple audiences.
3. Students will move toward being goal-oriented when writing or discussing complex scientific concepts.
4. Students will learn how to see the bigger picture of research studies and fit it into the larger context of a field.

5. Students will learn how to use a critical eye to understand the intricate steps within a research article that lay the foundation of proving key points from a research study.
6. Students will become better communicators to help them advance their scientific career.

COURSE MATERIALS

Recommended Text: The Scientist's Guide to Writing: How to Write More Easily and Effectively throughout Your Scientific Career.

URL: <https://www.amazon.com/Scientists-Guide-Writing-Effectively-throughout-ebook/dp/B01C4V8RFW>

Description: This book should come in handy for your entire research career. Cheapest version is \$12.99 for kindles. Paperback is \$18.60.

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.

Zoom: We'll use Zoom to meet. You can access it directly through 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

Generally, Tuesdays will be for lecture days/discussion while Thursdays will be for workshops or presentations.

COURSE ASSIGNMENTS, ACTIVITIES, & DETAILS

Weekly Twitter Thread:

Goal: The only way to improve in communication is to read a lot and write a lot. The goal here is to help students become comfortable using twitter since so many scientists actively use the social media platform. Additionally, you'll gain experience reading several news stories over the course of the semester and discussing them on twitter. Reading news stories instead of primary literature for this activity will help you see the bigger picture for a field instead of getting lost in the weeds. Using Twitter will create a low barrier of entry opportunity to develop a voice with commentary on different fields.

Assignment (due by Sunday night each week): You'll be required to read at least one news article from www.The-Scientist.com and write a twitter thread about it. Try to turn it into a conversation by tagging your peers or others and be sure to use the hashtag #RutgersSciCom in at least one of the thread's tweets so I can easily find it and navigate between your unrelated tweets. Be sure the thread includes the following: 1) a link to the story, 2) what the story is about, and 3) why the story is important to science. It's suggested to choose a general topic of interest that's aligned with your CNS article and read a lot about that.

Rubric: You'll get full points if you have posted at least 14 posts across each of the 14 weeks of the semester that include all the details in the assignment details.

Objective: You want to start a conversation on twitter about the article. Don't just explain it. Try to give commentary to drive discussion.

Choosing a CNS article:

Goal: The highest impact journals are Cell, Nature, and Science (otherwise known as CNS). We want to choose a single research article and focus on reading/communicating it in different formats. This will give you a chance to truly know the paper front to back instead of burning and churning through literature. Each time you produce a new product from the paper, you'll notice details you didn't see upon first reading. This "deep reading" will help you understand the work much more. So, choose wisely. Choose a paper that truly interests you since you'll use it all semester.

Assignment: Browse for a research article published within the past two years from the primary journals of [Cell](#), [Nature](#), or [Science](#). If you find an article that's older than the past two years or in a different journal, I'm okay with you using it, but it first needs to be approved by me.

Rubric: You'll get full credit if you choose a paper based on the provided instruction. You'll get 80% of the points if you don't follow guidance items discussed in class.

Journal Club Presentation:

Goal: This is a standard presentation format you'll give in lab meetings, job talks, class, etc. The goal of this exercise is to truly understand and convey the science in your selected CNS article. Traditionally, these are 50-minute long presentations, but we are going to opt for the abbreviated 20-minute long talk that's common in conferences. We'll select times and order of talks as we approach Week 7.

Assignment: You will give a 20-minute talk about the CNS article you have chosen that walks the audience through the paper. You will be timed and will lose points for going over.

Structure of Journal Club Presentation/Rubric (~2 min for every slide):

Objective: Inform the audience. They're here to learn about your paper. They need to go away understanding the important details of HOW they authors reached their conclusions, not just the conclusions.

Introduction/Background (~5 min) (20%): 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? (~1 min) (10%): Now, discuss how this paper fits into the context of the week's lecture material.

Results (~10 min) (30%): 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. If there are no figures because it's a review or theoretical paper, you should present their logical flow. Consider the data as a story. Tell us the story.

Conclusions (~2 min) (10%): 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 (~2 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. Also, you should prepare your own intellectual questions to ask the audience to generate conversation.

Format (5%): Did the presenter follow the correct format and rules? i.e., not go over time?

Slide Design (5%): Were the slides easy to understand and appropriate for this audience?

Sufficient logic of HOW conclusions were made (10%): It's important that the audience understands not just what the conclusions are, but how the researchers came to them. I suggest going figure by figure, laying out the logic they use to build their argument. Be careful though. Explaining a technique takes a lot of time. Be sure to be selective of which sub panels within figures are most important to pay attention to.

Sufficient logic of WHAT the conclusions are (5%): The audience needs to have their hands held as you walk them through this story. Be sure you key into the logic behind each step of the story.

TED Talk:

Goal: This will help you focus on identifying the true hook of the article. While you will seldomly present to the public in this format as scientist, it's a good style of presenting that'll help you distill out the important aspects of the paper.

Assignment: You will give a 10-minute talk about the CNS article you have chosen that will identify the hook for the audience.

Structure of Journal Club Presentation/Rubric (~2 min for every slide):

Objective: wow the audience. You want the audience to not just understand what you're talking about but to also be INTERESTED in it. This is an important aspect of successfully publishing or getting a grant. Don't be a salesman, but SELL the paper. Dive in and find the hook that makes this study IMPACTFUL.

Introduction/Background (~5 min) (30%): 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:

- 5) The field the authors are exploring.
- 6) What is not known about the field.
- 7) The question they are trying to answer with their research, review, or theoretical paper.
- 8) How they propose to answer or approach the question.

Where does it fit? (~1 min) (10%): Now, discuss how this paper fits into the context of the week's lecture material.

Results (~10 min) (5%): 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. If there are no figures because it's a review or theoretical paper, 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 they proposed in the intro.

Questions/Discussion (~2 min) (0%): 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.

Format (5%): Did the presenter follow the correct format and rules? i.e., not go over time?

Slide Design (15%): Were the slides easy to understand and appropriate for this audience?

Sufficient logic of HOW conclusions were made (5%): It's important that the audience understands not just what the conclusions are, but how the researchers came to them. I suggest going figure by figure, laying out the logic they use to build their argument. Be careful though. Explaining a technique takes a lot of time. Be sure to be selective of which sub panels within figures are most important to pay attention to.

Sufficient logic of WHAT the conclusions are (10%): The audience needs to have their hands held as you walk them through this story. Be sure you key into the logic behind each step of the story.

Poster Presentation:

Goal: The poster is an incredibly common method to present research results. This format is ever evolving in a virtual and [in-person](#) spaces. We'll explore effective strategies for presenting the data in this format as a poster pitch, a short 5-10 minute walk through of the poster.

Assignment: You will turn the CNS article you have chosen into a poster and present it to peers. You can use either the #BetterPoster format or a traditional format. We'll run a mock conference where each of you will be assigned 2 posters to judge with the associated rubric from the ABRCMS conference (top secret rubric ☺).

Better Poster [Video 1](#) and [Video 2](#).

Objective: Your goal with a poster is to convey the research quickly and visually. You want the audience to understand the project sufficiently (not always down to the smallest detail) enough to provide you feedback on your research. It's not to impress them with how smart you are. It's to get their feedback on your work.

Rubric: I want your judges to actually be harsh on you, so I'm going to make their judging worth only 30% of your grade for this (this will allow judges to feel like they're actually allowed to ding you for things). That 30% will be the average of your two judges. The rest of the grade will simply be from scientific accuracy (10%), design (20%), lack of typos (5%), clarity (20%), comprehensiveness (10%), and next steps/conclusions (remember, posters are to share research directions and get feedback so there's always a next step - 5%) assessed by me.

Graphical Abstract:

Goal: The graphical abstract helps scientists convey the central message of their research article in a concise and effective manner. This will help you distill out the central message of the article.

Assignment: You will create a graphical abstract about the CNS article you have chosen using Biorender.com, Piktochart, or any other tools you wish.

Objective: You want to create a synopsis of the article that is easy to understand and get the take away just by quickly looking at the graphical representation of the article.

Rubric: You should follow the [Cell Press instructions](#) for creating a graphical abstract. Your grade will creativity (20%), uniqueness (can't just copy their abstract if they made one - 10%), Cell Press technical requirements (30%), clarity (20%), comprehensiveness (20%).

Expert News Story:

Goal: The expert news story is essentially what The-Scientist writes. It walks a reader through the research article as if it were a story. This helps the student deep read the content and extract out the segways between data to lay the foundation of a logical scientific story.

Assignment: You will write a 1500-word news story about the CNS article you chose with the expert as the audience in mind. The public will see this story because we will publish it in the soon-to-launch Journal of Biological Sciences Biology Blog, so write well. You must include a descriptive title.

Objective: You can anticipate other experts in the field reading this article. However, you may have a psychologist reading the article that includes molecular biology techniques. Thus, you have to be clever with how you write the article so that another expert in your field, but perhaps not familiar with the techniques in the paper can understand the step-wise progression of logic. Basically, you're writing an article to help other scientists or physicians to understand the research study quickly.

A VERY good way to understand the level of detail for this is to take a look at my own writings in PainResearchForum.com (targeting experts in pain) and how they compare to their companion pieces in RELIEF (targeting pain patients). Check out my website's science communication section.

Rubric: 80% of your grade will reflect whether you wrote the synopsis of the paper sufficiently and 20% of your grade will be provided by 2 of your peers in class who will judge whether you have used sufficient logic for them to understand the article. You'll receive edits from your peers and from me. Consider this document a final paper when you submit it, but I will be lenient with the grading because I will view this as your draft before it goes into the editorial process.

Layperson News Story:

Goal: Writing for a different audience is incredibly hard. This will force you to think more about the audience to improve how you write with purpose.

Assignment: You will write a 500-word news story about the CNS article you choose with the audience of a non-scientist in mind. The public will see this story because we will publish it in the soon-to-launch Journal of Biological Sciences Biology Blog, so write well. You must include a descriptive title.

Objective: Consider this as writing to the patient population your paper focuses on. Think about their level of understanding and how you can craft your article in such a way that it helps them understand the bigger picture as well as the general details of how the study was conducted. Basically, you're writing an article to help someone who has only high school experience in science understand a study that applies to them.

Rubric: 80% of your grade will reflect whether you wrote the synopsis of the paper sufficiently and 20% of your grade will be provided by 2 of your peers in class who will judge whether you have used sufficient logic for them to understand and enjoy the paper. You'll receive edits from your peers and from me. Consider this document a final paper when you submit it, but I will be lenient with the grading because I will view this as your draft before it goes into the editorial process.

Final Edits:

Goal: Writing is an iterative process. You only get better by going through several editions of it. This final assignment will help you improve your writing by responding to direct feedback on your assignments.

Assignment: You will respond to and make the edits for your expert and layperson news stories while keeping track changes on so I can see your updates.

Objective: I'm your editor and you need to make proper changes before this paper goes out. Make sure you keep track changes on so I can see your edits.

Rubric: You'll be graded on the effectiveness of your writing style and how well the final version of this has been written. I will grade harshly, so make sure you've put the time and effort in for a stellar final product.

Participation:

The only way this class can run effectively is if participation is taken into account. If you are showing up regularly, not missing your presentations, and being vocal in class, you'll get all full points. If not, I'll deduct points.

CALCULATION OF FINAL GRADES

Rubrics will be released in advance of each assignment for grading purposes, but will reflect the concept that each assignment is an iterative step toward improvements. As such, the grading will focus on helping the student improve, following the pure definitions of Excellent (A), Good (B), Satisfactory (C), and Bad (D).

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|---------------------------|-------------|
| Weekly Twitter Thread | 10 pts |
| Choosing a CNS article: | 10 pts |
| Journal Club Presentation | 10 pts |
| TED Talk | 10 pts |
| Poster Presentation | 10 pts |
| Graphical Abstract | 10 pts |
| Expert News Story | 10 pts |
| Layperson News Story | 10 pts |
| Final Edits | 10 pts |
| Participation | 10 pts |
| Total | 100 pts |

CLASSROOM POLICIES

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%).

Microphone and Video Policy: When we can put a name to a face, it can be helpful 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: Since this course will be virtual and some students may be affected by internet connectivity or COVID-related issues at different times, we will not require attendance. However, attendance and participation is highly recommended for this class to run effectively.

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 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, but I will try my best to respond within 24-48 hours. 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're ignoring you.