Research & Community: Biomedical Science in the Urban Curriculum
Academically Based Community Service
NGG 5900
Spring 2026
Tuesday 1:45 - 4 pm
Thursday 1:45 - 3:15
Teaching Associate: Hannah Gura

Instructor:
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Overview: NGG 590 is an activity-based course with three major goals. First, the course is an opportunity for biomedical graduate students to develop their science communication skills and share their enthusiasm for neuroscience with high school students at a nearby public high school in West Philadelphia. In this regard, Penn students will prepare demonstrations and hands-on activities to engage local high school students, increase their knowledge in science, and ultimately promote their interest in science-related careers. Second, the course will consider the broader educational context, such as the conditions of the local high school and its overall progress in science education. Students will discuss the problems they encounter and learn how to develop effective proposals, taking into account the participants and the origins of current policies. Third, students will reflect and discuss the important connection between their biomedical research at Penn and the local Philadelphia community.

Grading: Students will be evaluated based on

1) Classroom engagement (25 points)
2) Lesson development (15 points)
3) Journal article presentation (15 points)
4) Policy Proposals (3x10 points)
5) Research Reflection (15 points)

Specific Learning Objectives: By the end of this course students should be able to

- Facilitate a biomedical lab program appropriate for high school students
- Engage with high school students in science activities
- Review literature on secondary science activities, the history of biomedical research in marginalized communities, and the role of science & scientists in the local community
- Write a concise proposal to address real-world challenges in science education

- Engage in discussion & written reflection regarding the connection between biomedical research at Penn and the Philadelphia community

Course structure: Students will work in teams to fine-tune previously developed lesson plans for specific experiment-based activities, with the class collectively executing a coherent program of lab education. Once per week, the class will travel to a nearby high school to implement these activities and learn first-hand the science education challenges in local schools. Additionally, students will engage in critical readings and small group discussions about the historical role of science in underrepresented communities, the connection between research & community at Penn, and opportunities to increase science-oriented engagement throughout their doctoral training

Clearance needed: The Commonwealth of Pennsylvania and the School District of Philadelphia require you to obtain clearance to teach in the classroom through a criminal history background check if you have not obtained this through previous classroom outreach activities. The instructions for obtaining a child abuse clearance form and criminal history check are on the course web site.

Canvas site: Select journal articles will be posted on Canvas and should be read prior to class. A template for the lesson plans is also available on Canvas. In addition, the Canvas site includes examples of policy memos.

General Schedule: Most weeks, we will have a teaching-learning session with local high school students on Tuesdays. For the first part of Thursday class time, we will have guest lecture, group discussion and/or small group work. For the second part of Thursdays, we will have grad-student-only journal club or project presentations.

Date	Tues	Thurs	Notes
Jan 15	First day of classes		
Jan 20	Reading #1		
Jan 27	Dr. Theresa Simmonds	Reading #2	
Feb 3	M&G	Zac Steele, Reading #3	
Feb 10	Lab 1 (DNA)	JC 1 by grad students	
Feb 17	Lab 2 (the neuron)	Reading #4	
Feb 24	Lab 3 (PNS)	Dr. Tim Foxx, Reading #5	Draft 1 of policy due
Mar 3	Lab 4 (reflexes)	JC 2 by grad students	
Mar 10	SPRING BREAK	SPRING BREAK	
MAR 17	Lab 5 (taste)	Reading #6	
Mar 24	Lab 6 (tour at Penn)	Lab 7 (decide on SF topic)	Draft 2 of Policy due
Mar 31	Reading #7	JC 3 by grad students	
Apr 7	Lab 8 (SF research)	Reading #8	Final Policy Due
Apr 14	Lab 9 (SF data)	Make science fair posters	

Apr 21	Survey. Lab 10 (SF assembly)	Science fair rehearsal	Reflection due
Apri 28	Last day: Science Fair		

Required Readings

Due Date	Reading
Jan 20 (#1)	Koepsell, D. (2010). On genies and bottles: Scientists' moral responsibility and dangerous technology R&D. *Science and engineering ethics*, *16*(1), 119-133.
Jan 29 (#2)	Lupia, A., Allison, D. B., Jamieson, K. H., Heimberg, J., Skipper, M., & Wolf, S. M. (2024). Trends in US public confidence in science and opportunities for progress. *Proceedings of the National Academy of Sciences*, *121*(11), e2319488121.
Feb 5 (#3)	https://collaborativehistory.gse.upenn.edu/?_gl=1*1qwula6*_gcl_au*MTU4Nzk2NzYwOS4xNzY4NDA4MTYz*_ga*MTA4ODM2NDY1Ni4xNzMxMzQyOTYw*_ga_10FWQ5NDJP*czE3Njg0MDgxNjIkbzkkZzAkdDE3Njg0MDgxNjIkajYwJGwwJGgw
Feb 19 (#4)	Ricard, J. A., Parker, T. C., Dhamala, E., Kwasa, J., Allsop, A., & Holmes, A. J. (2023). Confronting racially exclusionary practices in the acquisition and analyses of neuroimaging data. *Nature Neuroscience*, *26*(1), 4-11.
Feb 26 (#5)	Brown, K. E., Fohner, A. E., & Woodahl, E. L. (2023). Beyond the individual: community-centric approaches to increase diversity in biomedical research. *Clinical Pharmacology & Therapeutics*, *113*(3), 509-517.
Mar 19 (#6)	Wallrich, L. (2022). {{Re}} Groups of diverse problem-solvers outperform groups of highest-ability problem-solvers-most of the time. *ReScience C*, *8*(1).
March 31 (#7)	Graves Jr, J. L., Kearney, M., Barabino, G., & Malcom, S. (2022). Inequality in science and the case for a new agenda. *Proceedings of the National Academy of Sciences*, *119*(10), e2117831119.
April 11 (#8)	Emmons, K. M., Mendez, S., Lee, R. M., Erani, D., Mascioli, L., Abreu, M., ... & Bierer, B. E. (2023). Data sharing in the context of community-engaged research partnerships. *Social Science & Medicine*, *325*, 115895.

Additional Readings

While not required, these readings may be helpful during teaching preparation and for students who develop additional interests in these topics

Topic	Reading
Netter Center efforts	Harkavy, I., Hodges, R.A., Weeks, J (2021) Towards creating the truly engaged, responsive university: Penn's partnership with the West Philadelphia Community as an experiment in progress. Chapter 3 in The responsive university and the crisis in South Africa, Chris Brink (Ed.)
Netter Center efforts	Harkavy, I., Bergan, S., Gallagher, T., van't Land, H (2020) Universities must help shape the post-covid-19 world. University World News.
Netter Center efforts	Harkavy, I., Hartley, M., Hodges, R.A., Weeks, J. (2013). The promise of university-assisted community schools to transform American schooling: a report from the field, 1985-2012. *Peabody journal*, 88, 525-540. doi: 10.1080/0161956X.2013.834789
Netter Center efforts	Harkavy, I., Martin-Vega, L., Chubin, D., Hodges, R.A., Chae, J (2017). Assessing performance and developing an accountability system for broadening participation: the role of higher education. Report on an NSF-funded meeting.
Neuroscience service learning	Najmr, S., Chae, J., Greenberg, M.L., Borman, C., Harkavy, I., Maeyer, J.R. (2018). A service-learning chemistry course as a model to improve undergraduate scientific communication skills. Journal of chemical education, 95(4), 528-534. doi: 10.1021/acs.jchemed.7b00679
Example lab activities	Stephen Hauptman, Katherine Du Bois, and Bruce R. Johnson.The Homemade Alternative: Teaching Human Neurophysiology with Instrumentation Made (Almost) from Scratch. JUNE, 2012, 11(1):A161-A168.
Example lab activities	Bethany Schille, Wes Colgan III, Brandon Calderon, and Bruce R. Johnson. Muscle Spindles and Our Sense of Physical Self: Kinesthetic Illusions of Limb Position and Posture. JUNE, 2018, 16(3):A282-A288.
Example lab activities	Robert A. Wyttenbach. Exploring Sensory Neuroscience Through Experience and Experiment. JUNE 2012, 11(1):A126-A131

Digital resources	Terri L. Gilbert. The Allen Brain Atlas as a Resource for Teaching Undergraduate Neuroscience. JUNE 2018, 16(3):A261-A267.

Assignment to develop a Lesson:

Working in a small group, students will create a new neuroscience-based lab activity for a future semester. This will include a "Lesson Plan" with instructions for teachers, as well as "Workbook" pages formatted in Canva. Components of the lesson should include an essential question, limited science vocabulary terms, one or a few hands-on activities that can be completed in about 50 minutes, and "comprehension checks" in the form of fill-in-the-blanks, crossword puzzle, multiple choice questions, or something of your own creation. Feel free to float your ideas to current undergrads and high school students!

Assignments to develop a Policy Proposal:

In this course, you will write three policy proposals. Each assignment should be 2-3 pages (single-spaced) and written in policy memo form.

Assignment 1: Identify a problem. An issue's place on the decision-making agenda depends on the problem, current policies, and ongoing politics. Discuss a problem you perceive in science education and discuss the relevant policies and politics.

Assignment 2: Policy Implementation Analysis. When a policy has the attributes of stability, consistency, power, and authority, it is more likely to be effectively implemented. For this assignment, you will discuss the policy attributes that pertain to the problem you have identified in science education.

Assignment 3: Policy Proposal. For your final policy memo, you will select a science education policy issue. Your proposal should include the following:

- **Problem statement –** description and significance of the issue or problem you are examining
- **Evidence –** overview of the evidence on the issue you are examining and key factors contributing to the issue or problem
- **Recommendation –** your conclusions about the issue
- **Counterarguments & rebuttals –** counterarguments to your position and your rebuttal
- **Implementation implications –** considerations for your recommendations (e.g., political, economic, environmental).

Guidelines for Writing Effective Policy Memos:

- **Purpose**. A policy memo provides information, guidance or recommendations about an issue or problem to a decision-maker. It must be well-organized, clearly written, and succinct, with a logical connection between the background information, evidence and conclusions/recommendation. The reader should be able to identify the essential points in a quick scan of the memo (particularly the section headings and topic sentences).

- The format of a memo should enhance its readability. It is not written as one lengthy essay. Rather, it is divided into sections, with headings that identify the content or major point of each section. Each paragraph should begin with a significant point (the "topic sentence"), to be supported or expanded upon in the rest of the paragraph. Each major point should be the focus of a separate paragraph. Do not "bury" major themes in the middle of a paragraph.
- Policy memos require brevity and specificity. Each sentence must serve to advance your idea. Be concise and do not waste words. Use clear, direct language, free of bureaucratic jargon and clichés. Eliminate unnecessary words and avoid repetition. Write in the active voice, keep sentences relatively short, and minimize the use of adjectives and adverbs. Avoid vague language and sentences that have no substance or state the obvious. Also, refrain from dramatic embellishment, hyperbole, and emotional rhetoric (you are not writing a political speech or an op-ed article).

Guidelines for Research Reflection:

- **Purpose**. This assignment is designed to prompt critical thinking and reflection regarding the connection of your biomedical research at Penn and the local Philadelphia community.
- **Guiding Questions**. What is the overarching purpose of the biomedical research you are performing at Penn? How could connecting with the local Philadelphia community help you to better understand the purpose of your research? How might your research connect with someone's world and real-life experiences? How can you communicate to best connect someone's current knowledge with new knowledge you are sharing? How can you increase your science communication skills by interacting with the community? Finally, propose a mechanism (or mechanisms) to incorporate community engagement into your dissertation (or rotation) research. How could this change the course of your research? How could incorporating community engagement into BGS dissertations change the future of how research is conducted in PSOM? How would this benefit Philadelphia (be specific)?
- **Structure**. 2-3 pages, single spaced
- **Advice**. Keep in mind that our role is not to simply "help the community." Rather, you are encouraged to reflect on what you have learned this semester and propose practical value that your doctoral training at Penn can have in the Philadelphia community. This is not intended to be a hypothetical exercise. Please propose practical value that the biomedical doctoral training program at Penn can provide to the surrounding community, and how you can practically incorporate the community into your research. While not all proposals may eventually be executed, only creative and realistic proposals will earn a high grade.

A note on Academic Freedom

The principle of academic freedom was established to protect the integrity of research and teaching from interference by donors, politicians, and others who might seek to make universities serve personal and political interests. It is based on the idea that a university's purpose is to generate new knowledge that can serve the common good in a democratic society,

and that generating new knowledge requires free and open inquiry. To safeguard the university's public mission, academic freedom entails the following rights for all faculty members and students:

- The right to full freedom in research, teaching, extramural speech (public speech on issues of general concern) and intramural speech (speech about the university itself, including criticism of it).

- The right to freedom in learning, which includes freedom of association and expression and freedom of inquiry in the classroom.