

Research & Community: Biomedical Science in the Urban Curriculum
Academically Based Community Service
NGG 5900

Spring 2024

Dr. Lori Flanagan-Cato

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Tues, Thurs 10:15-11:45	Thurs 11:45-12:30	flanagan@psych.upenn.edu
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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

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|----------------------------------|---------------|
| 1) Classroom engagement | (25 points) |
| 2) Lesson creation | (15 points) |
| 3) Journal article presentations | (15 points) |
| 4) Policy Proposal | (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 develop lesson plans for specific experiment-based activities, with the class collectively executing a coherent program of lab education. Once per week, the class will work with students from 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:

Date	Schedule	Assignment Due
Thur, Jan 18	Class Introduction	
Tue, Jan 23	Robeson Meet & Greet	
Thur, Jan 25	Tour Robeson Graduate Discussion: Motivating science learning	Reading #1
Tue, Jan 30	Lab 1: The Cell	
Thur, Feb 1	Guest Speaker: Zac Steele (Netter Center) Graduate Discussion: SES and brain	Reading #2
Tue, Feb 6	Lab 2: Macromolecules	
Thur, Feb 8	Guest Speaker: Theresa Simmonds (Netter) Graduate Discussion: Mackey research	Reading #3
Tue, Feb 13	Lab 3	
Thur, Feb 15	Guest Speaker: Allyson Mackey, PhD Graduate Discussion: Community inclusion	Reading #4
Tue, Feb 20	Lab 4	
Thur, Feb 22	Graduate Discussion: Policy Proposals	
Tue, Feb 28	Lab 5	Policy draft #1
Thur, Mar 1	Graduate Discussion: Inequality and responsibility	Reading #5
Tues Mar 5	Penn Spring Break	
Thur, March 7	Penn Spring Break	
Tue, March 12	Lab 6	
Thur, March 14	Graduate Discussion: Penn & Philadelphia	Pucket
Tue, March 19	Lab 7	
Thur, March 21	Grad Discuss: Community in biomedical research	Reading #6
Tue, March 26	Workshopping	Policy draft #2
Thur, March 28	Grad Discussion: Community/biomedical research	Reading #7
Tue, April 2	Lab 8	
Thur, April 4	Graduate Discussion: Policy updates	New lab activity
Tue, April 9	Lab 9	
Thur, April 11	Graduate Discussion: Science cafe	Reading #8
Tue, April 16	Lab 10	
Thur, April 18	Grad Discussion: Policy Proposal Presentations	Final policy proposal
Tue, April 23	Undergraduate presentations	
Thur, April 25	Graduate Discussion: Final reflections	Research Reflection
Tue, April 30	Closing activity (party)	
Thur, April 27	Science Lab Tours for Robeson Students (Grad students only)	

Required Readings

Due Date	Topic	Reading
Jan 25 (#1)	Motivating Service Learning	Polirstok S. Strategies to Improve Academic Achievement in Secondary School Students: Perspectives on Grit and Mindset. <i>SAGE Open</i> . October 2017. doi:10.1177/2158244017745111
Feb 1 (#2)	Reading from Martha Farah Lab	Farah, Martha J. "Socioeconomic Status and the Brain: Prospects for Neuroscience-Informed Policy." <i>Nature reviews</i> . 19.7 (2018): 428–438.
Feb 8 (#3)	Reading from Allyson Mackey Lab	Tooley, U.A., Bassett, D.S. & Mackey, A.P. Environmental influences on the pace of brain development. <i>Nat Rev Neurosci</i> 22 , 372–384 (2021).
Feb 15 (#4)	Historical role of science in underrepresented communities	Jessica Jaiswal & Perry N. Halkitis (2019) Towards a More Inclusive and Dynamic Understanding of Medical Mistrust Informed by Science, Behavioral Medicine, 45:2, 79-85, DOI: 10.1080/08964289.2019.1619511
Feb 29 (#5)	Historical role of science in underrepresented communities	Graves Jr, J. L., Kearney, M., Barabino, G., & Malcom, S. (2022). Inequality in science and the case for a new agenda. <i>Proceedings of the National Academy of Sciences</i> , 119(10), e2117831119.
March 14	Penn & Philadelphia	Website
March 21 (#6)	Incorporating community in biomedical research	Holzer, J. K., Ellis, L., & Merritt, M. W. (2014). Why we need community engagement in medical research. <i>Journal of Investigative Medicine</i> , 62(6), 851-855.
March 28 (#7)	Incorporating community in biomedical research	Skinner JS, Williams NA, Richmond A, Brown J, Strelnick AH, Calhoun K, De Loney EH, Allen S, Pirie A, Wilkins CH. Community Experiences and Perceptions of Clinical and Translational Research and Researchers. <i>Prog Community Health Partnersh</i> . 2018;12(3):263-271. doi: 10.1353/cpr.2018.0050. PMID: 30581169; PMCID: PMC6428218.
April 11 (#8)	Incorporating community in biomedical research	Ridders, Wavne. "Using Garden Cafés to Engage Community Stakeholders in Health Research." <i>PLoS one</i> . 13.8 (2018): n. pag. Web.

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
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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.

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).
- **Structure.** 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.
- **Language.** 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.