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Course Syllabus: Citizen Science and Scientist Citizens

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COURSE SYLLABUS

Citizen Science and Scientist Citizens

Course Description

The boundaries between science and society are becoming increasingly porous in today's rapidly evolving world. Citizen science, a collaborative approach that involves nonprofessional individuals in scientific research, is gaining prominence as a powerful tool for addressing complex and pressing challenges. At the same time, scientists are increasingly expected to engage with their communities and consider their work's broader ethical, social, and political implications. This interdisciplinary course explores the intersection of citizen science and the ethical obligations of scientists as responsible and engaged citizens.

Primary Texts

- Hannibal, M. E. 2016. *Citizen Scientist: Searching for Heroes and Hope in an Age of Extinction*. New York: The Experiment.
- Sarewitz, D. 2010. *Frontiers of Illusion: Science, Technology, and the Politics of Progress*. Philadelphia, PA: Temple University Press.

Course Objectives

- To introduce students to the principles, history, and practices of citizen science.
- To examine the roles and responsibilities of scientists as good citizens in a democratic society.
- To foster a deeper understanding of the ethical, social, and political dimensions of scientific research.
- To equip students with the skills necessary to engage with the broader public in scientific endeavors.
- To encourage critical thinking and ethical reflection on the ethical and societal implications of scientific research.

Course Topics

INTRODUCTION TO CITIZEN SCIENCE

- Defining citizen science.
- Historical context and evolution of citizen science.

SCIENCE AND SOCIETY

- The social contract between science and society.
- Public perception of science and trust in scientists.
- Communicating scientific findings to nonexperts.

SCIENTIFIC ETHICS AND RESPONSIBILITIES

- Ethical principles in scientific research.
- Responsible conduct of research and its implications.
- Privacy and data security in citizen science.
- Equity, diversity, and inclusion in science initiatives.

POLICY AND GOVERNANCE

- Regulations and guidelines for scientists.
- Who controls science policy making?
- The role of government and nongovernment organizations in supporting citizen science.

ENVIRONMENTAL AND SOCIAL JUSTICE IN CITIZEN SCIENCE

- The impact of citizen science on environmental and social justice issues.
- Case studies of citizen science projects addressing community concerns.

THE FUTURE OF CITIZEN SCIENCE

- Emerging trends in citizen science.
- Potential future challenges and opportunities.

Schedule and Readings

Day 1: What exactly is Citizen Science? Why does it matter?
• Hannibal, 1–11. • Video: Cooper, Caren. "Citizen Science: Everybody Counts." TEDxGreensboro. 2018. https://www.youtube.com/watch?v=G7cQHSqfSzI. • Bonney, R., T. B. Phillips, H. L. Ballard, and J. W. Enck. 2016. "Can Citizen Science Enhance Public Understanding of Science? *Public Understanding of Science*." Volume 25 (1): 2–16. • Eitzel, M., J. Cappadonna, C. Santos-Lang, R. Duerr, S. E.West, A. Virapongse, A. Sforzi et al. 2017. "Citizen Science Terminology Matters: Exploring Key Terms." *Citizen Science: Theory and Practice*. Volume 2 (1); 1–20. • Haklay, M. M., D. Dörler, F. Heigl, M. Manzoni, S. Hecker, and K. Vohland. 2021. "What is Citizen Science? The Challenges of Definition." *The Science of Citizen Science*. New York: Springer Publishing.
Day 2: Citizen Science Participation
• Hannibal, 11–26. • Galaxy Zoo website: Galaxy Zoo Classifications. Accessed April 9, 2024.
Day 3: What is the historical context of citizen science? What does it mean to be a scientist?
• Hannibal, 27–42. • Miller-Rushing, A. J., R. B. Primack, R. Bonney, and E. Albee. 2020. *The History of Citizen Science in Ecology and Conservation*, 17–24. Oakland, CA: University of California Press. • Strasser, B., J. Baudry, D. Mahr, G. Sanchez, and E. Tancoigne. 2019. "'Citizen Science?' Rethinking Science and Public Participation." *Science and Technology Studies* 32 (2): 52–76.
Day 4: Citizen Science Participation
• Hannibal, 42–57. • Ebird: Cornell's eBird Project. Cornell Lab of Ornithology. Accessed April 9, 2024.

Day 5: What role do scientists play in society? In government? Who has a seat at the table?
• Hannibal, 57–72. • Gibbons, M. 1999. “Science’s New Social Contract with Society.” *Nature* 402, (Suppl 6761): C81–C4. • Bahlai, C., L. Bartlett, K. Burgio, A. Fournier, C. Keiser, T. Poisot et al. 2019. “Open Science Isn’t Always Open to All Scientists” *American Scientist* 107, No. 2 (March-April): 78. • Murphy, M. C., A. F. Mejia, J. Mejia, X. Yan, S. Cheryan, N. Dasgupta et al. 2020. “Open Science, Communal Culture, and Women’s Participation In the Movement to Improve Science.” P*NAS. National Academy of Sciences* 117 (39): 24154–64. • Lupia, A. 2020. “Practical and Ethical Reasons for Pursuing a More Open Science.” *Political Science & Politics* 54 (2): 1–4.
Day 6: Citizen Science Participation
• Hannibal, 72–87. • NSF Noir Lab: Globe at Night. Accessed April 9, 2024.
Day 7: What are the ethical principles of scientific research? What does responsible conduct include?
• Hannibal, 87–102. • Resnick, David B. 2020. National Institute of Environmental Health Science. “What Is Ethics in Research and Why Is It Important?” https://www.niehs.nih.gov/research/resources/bioethics/whatis. • Morley, J., L. Floridi, L. Kinsey et al. 2020. “From What to How: An Initial Review of Publicly Available AI Ethics Tools, Methods, and Research to Translate Principles into Practices.” *Sci Eng Ethics* 26 (4): 2141–68.
Day 8: Citizen Science Participation
• Hannibal, 102–17. • Experiential Learning Blog: iNaturalist. “Twenty Citizen Science Projects for Students of All Ages.” March 10, 2023.

Day 9: What are some public perceptions of scientists worldwide? What does this mean for the endeavor of science?

- Hannibal, 117–32.
- Kristen, M. C., Julie A. Malecki, , Nasia Safdar Keating, . 2021. "Crisis Communication and Public Perception of COVID-19 Risk in the Era of Social Media." *Clinical Infectious Diseases* 72 (4): 697–702.
- Kassens-Noor, Eva, Mark Wilson, Meng Cai, Noah Durst, and Travis Decaminada. 2021. "Autonomous vs. Self-Driving Vehicles: The Power of Language to Shape Public Perceptions." *Journal of Urban Technology* 28 (3–4): 5–24.
- Southwell, Brian G. and Karen White. 2022. "Public Perceptions of Science and Technology." *Science and Technology Indicators*. https://ncses.nsf.gov/pubs/nsb20227/public-perceptions-of-science-and-technology.

Day 10: Citizen Science Participation

- Hannibal, 132–47.
- Project Noah. 2024. "Wildlife Photography Meets Citizen Science."

Day 11: Why do we need science communication? How do scientists communicate their findings to non-experts?

- Hannibal, 147–62.
- Crameri, F., G. E. Shephard, and P. J. Heron. 2020. "The Misuse of Color in Science Communication." *Nat Commun* 11 (1): 5444.
- Matta, G. "Science Communication As a Preventative Tool in the COVID19 Pandemic." *Humanities and Social Science Communications* 7 (159).
- Shorthand: "Twelve Examples of Stunning Science Communication." https://shorthand.com/the-craft/12-examples-of-stunning-science-comms/index.html. Accessed April 9, 2024.

Day 12: Policy Memo Workshop

- Come prepared with an idea.
- Hannibal, 162–77.

Day 13: What is the Narrative Policy Framework? Why is it useful for policy makers? Is it useful for scientists?

- Hannibal, 177–92.
- Jones, M. D., A. Smith-Walter, M. K. McBeth, and E. A. Shanahan. 2023. "The Narrative Policy Framework Theories of the Policy Process" in *Theories Of The Policy Process*, 161–95. New York: Routledge.

Day 14: Citizen Science Participation
• Hannibal, 192–207. • Zooniverse. Iguanas from Above. Accessed April 9, 2024.
Day 15: How does citizen science impact social justice? How could it do more in the future?
• Hannibal, 207–22. • Lewenstein, B. V. 2022. "Is Citizen Science a Remedy for Inequality?" *The Annals of the American Academy of Political and Social Science* 700 (1): 183–94. • Lorenz, L., and R. Lepenies. 2023. "Contributions of Citizen Science to the Sustainable Development Goals: Is Transformative "Global" Citizen Science Possible?" *Citizen Science: Theory and Practice* 8 (1): 42.
Day 16: Citizen Science Participation
• Hannibal, 222–37. • Zooniverse. Cosmic Muon Images. Accessed April 9, 2024.
Day 17: How does citizen science impact environmental justice? How could it do more in the future?
• Hannibal, 237–52. • Blake, C., A., Rhanor, and C. Pajic. 2020. "The Demographics of Citizen Science Participation and Its Implications for Data Quality and Environmental Justice." *Citizen Science: Theory and Practice* 5 (1). • Haklay, M., and L. Francis. 2017. "Participatory GIS and Community-Based Citizen Science for Environmental Justice Action." *The Routledge Handbook of Environmental Justice*, 297–308. New York: Routledge.
Day 18: Science Storytelling Presentations
For assignment instructions see below.
Day 19: What are some privacy and data security issues related to citizen science and science in general?
• Hannibal, 252–82. • Eticas Foundation. "Impact on Privacy and Data Protection of Citizen Science Projects." https://eticasfoundation.org/governance/impact-on-privacy-and-data-protection-of-citizen-science-projects/. Accessed April 9, 2024. • Bowser, A., A. Wiggins, L Shanley, J, Preece, and S. Henderson. 2014. "Sharing Data While Protecting Privacy in Citizen Science." *Interactions* 21 (1): 70–73.

Day 20: Citizen Science Participation
• Hannibal, 282–97. • Project Squirrel. 2018. "Become a Citizen Scientist."
Day 21: What are the common regulations and guidelines for different types of science? Who creates these? Who enforces them?
• Hannibal, 297–312. • In-class assignment (see below).
Day 25: What are some emerging trends and future challenges for citizen science?
• Hannibal, 312–31. • Fritz, S., L. See, and F. Gre. 2022. "The Grand Challenges Facing Environmental Citizen Science." *Frontiers in Environmental Science* 10.
Day 27: Citizen Science Project Presentations
For assignment instructions see below.