



Cornell University

## **Comm 6660/STS 6661**

### **Public Engagement in Science**

#### **Spring 2020**

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This syllabus (including any updates) appears on the Cornell Canvas site

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#### **Instructor**

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#### Office hours

Tuesday, 1:00-3:00 pm in Morrill 303A  
and happily by appointment at other times

#### **Time and location**

Wednesday, 10:10-12:05, 138 Warren Hall

#### **Course description**

For decades, discussion of “science literacy” was at the center of discussions about public communication of science and technology. But since the emergence of a “public engagement” model in the 2000s, the term “science literacy” has fallen out of (scholarly) favor, being seen as connected to a disparaged “deficit” approach.\* But a 2016 National Academies of Science, Engineering, and Medicine report has renewed discussion about science literacy.

This semester, we will begin with an overview of current discussions about public communication of science and technology, including comments on public engagement, deficit, and other models. We will then pick up the 2016 NASEM report on science literacy. After a general review, we will focus on the idea of “community science literacy,” which argues that science literacy should be seen as a *collective* attribute, not an *individual* one. We’ll be trying to understand how this new idea connects with other ideas long evident in the literature, such as social learning, community capacity, and so on. Our goal will be to understand current scholarly discussions and...if we’re feeling bold...to contribute to those discussions.

Everyone will be expected to do the reading and come to class prepared to explore the readings. To “explore the readings” means you’ve read the texts, you’ve thought about them, and you’re ready to see where the arguments lead. It also means you’ve identified inconsistencies or problems with the logic and are ready to tear the texts apart. You will usually find material that is intellectually challenging: it may require multiple readings to make sense, or it may challenge

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\* Don’t worry if you don’t know what these models are – we’ll discuss in class!

beliefs you already have (even though you may not have known that you have them). You will be expected to justify your reactions with specific references to the texts or, when relevant, to other texts. As the class meets in physical space only once a week, cyberspace discussions via Canvas will play a key role in the course.

Each student will be responsible for helping lead one of the in-class discussions. You will come to class with a specific set of questions raised by the texts. Those questions may emerge from the content of the reading, or they may question the logic or approach taken by the author(s). Discussion leaders should circulate the questions on the Canvas discussion module by 6:00 pm on Mondays before class on Wednesday.

*Bonus activity:* A workshop on community science literacy will be held in May 2020, shortly after the semester ends. Final papers prepared for this course may be used as background material for the workshop, leading to a bibliographic citation for you!

### **Learning objectives**

After completing this course, students will be able to:

- Understand key issues in current scholarly debates about public engagement in science
- Connect themes in the public engagement literature with themes from other areas of scholarship
- Identify holes in current scholarship on community science literacy
- Plan, write, and present literature reviews on issues in public engagement in science

### **Texts**

Most readings will be accessible online, either directly or through the Cornell Library. Some readings will be posted on Canvas.

### **Assignments**

*Reading response:* Each week, you should submit a reading response of roughly 500 words. Responses should not be simple summaries of the readings, but *responses* – your statement of the key point of the reading and your sense of what works and what doesn't work in the author(s)'s argument. Provide detail. When there are multiple readings, you may either make an overall response or choose one or two articles to look at. You must post your response on the Blackboard discussion board by Tuesday, 6:00 pm, of each week – and you should plan on reading your colleagues' responses before class on Thursday.

*Final paper:* You will write a 10-20 page final paper exploring the scholarly literature around one aspect (of your choice) of science literacy.

### **Grades**

Grades will be based on class participation (30%, including written comments on readings and contributions to class discussions both physically and virtually) and on the final paper (70%).

### **Academic integrity**

Academic integrity is crucial to your personal scholarly identity. Your rights and responsibilities in this area are outlined in the Cornell University Code of Academic Integrity:

<https://theuniversityfaculty.cornell.edu/academic-integrity/>.

Violations of the code of conduct include but are not limited to:

- Submitting work in this class that has also been submitted for a grade in another course without prior permission of both instructors.
- Using, obtaining, or providing unauthorized assistance on examinations, papers, or any other academic work.
- Misrepresenting another person's work as your own. You are responsible for obeying the Code of Academic Integrity. Ignorance of the code is not an excuse.

The most common problem for many students is plagiarism, which will not be tolerated and will be sanctioned by failure of the course. Students from cultures outside the United States should be especially aware that American standards of acknowledgement and use of material prepared by others (especially one's professors) can be much different than those in other cultures. More information about plagiarism is available at <http://plagiarism.arts.cornell.edu/tutorial/index.cfm>.

By taking this course, you acknowledge that all required papers may be subject to submission for textual similarity review to Turnitin.com for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the [Usage Policy posted on the Turnitin.com site](#).

If you have any questions about how to interpret the Code in the context of assignments or activities in this class (especially any that involve collaboration with your colleagues), please feel free to contact the instructor or the University Ombudsman.

### **Students with special circumstances**

Cornell University (as an institution) and I (as a human being and instructor of this course) are committed to full inclusion in education for all persons. Services and reasonable accommodations are available to students with temporary and permanent disabilities, to students with DACA or undocumented status, to students facing mental health issues, to students with other personal situations (such as family emergencies or religious observances), and to students with other kinds of learning needs. Please feel free to let me know if there are circumstances affecting your ability to participate in class. Some resources that might be of use include:

- Office of Student Disability Services, <https://sds.cornell.edu/>
- Cornell Health (Mental Health Care), <https://health.cornell.edu/services/counseling-psychiatry>
- Undocumented/DACA Student Support, <https://scl.cornell.edu/identity-resources/undocumented-daca-support>
- Learning Strategies Center, <http://lsc.cornell.edu/>
- Office of Spirituality and Meaning Making/Cornell United Religious Work, <https://scl.cornell.edu/identity-resources/office-spirituality-and-meaning-making>

I would be glad to help you identify other resources if needed.

Tentative course schedule

**Week 1, 22 January: Introduction**

<http://informalscience.org/news-views/public-engagement>

[short, read in advance if possible]

**Week 2, 29 January: Public engagement in science**

Brossard, Dominique, & Lewenstein, Bruce V. (2010). A Critical Appraisal of Models of Public Understanding of Science: Using Practice to Inform Theory. In LeeAnn Kahlor & Patricia Stout (Eds.), *Communicating Science: New Agendas in Communication* (pp. 11-39). New York: Routledge. [on Canvas]

National Academies of Science, Engineering, and Medicine. (2017). Public Engagement. In *Human Genome Editing: Science, Ethics, and Governance* (pp. 125-137). Washington, DC: National Academies Press. [\[link\]](#)

Storksdieck, Martin, Stylinski, Cathlyn, & Bailey, Deborah. (2016). *Typology for Public Engagement with Science: A Conceptual Framework*. Washington, DC: AAAS Office of Public Engagement. [\[link\]](#)

*Supplementary reading*

Bauer, Martin W., (ed.). (2014). Public Engagement [special issue]. *Public Understanding of Science*, 23(1), 3-76. [\[link\]](#)

Rowe, Gene, & Frewer, Lynne J. (2005). A typology of public engagement mechanisms. *Science, Technology & Human Values*, 30(2), 251-290. [\[link\]](#)

House of Commons Science & Technology Committee. (2017). *Science communication and engagement*. [\[link\]](#)

Salmon, Rhian A., Priestley, Rebecca K., & Goven, Joanna. (2017). The reflexive scientist: an approach to transforming public engagement. *Journal of Environmental Studies and Sciences*, 7(1), 53-68. [\[link\]](#)

**Week 3, 5 February: Current research issues**

Science of science communication

Kahan, Dan, Scheufele, Dietram A., & Jamieson, Kathleen Hall. (2017). Introduction: Why Science Communication? In Kathleen Hall Jamieson, Dan Kahan, & Dietram A. Scheufele (Eds.), *Handbook of Science of Science Communication* (pp. 1-11). New York: Oxford. [\[Cornell Library link\]](#)

Akin, Heather, & Scheufele, Dietram A. (2017). Overview of the Science of Science Communication. In Kathleen Hall Jamieson, Dan Kahan, & Dietram A. Scheufele (Eds.), *Handbook of Science of Science Communication* (pp. 25-33). New York: Oxford. [\[Cornell Library link\]](#)

Citizen science

Pandya, Rajul, & Dibner, Kenne Ann (Eds.). (2018). Mapping the Landscape. In *Learning through Citizen Science: Enhancing Opportunities by Design* (pp. 27-51). Washington, DC: National Academies Press. [\[link\]](#)

*Supplementary reading*

National Academies of Science. (2016). *Communicating Science Effectively: A Research Agenda*. Washington, DC: The National Academies Press., chapters 3-5 [\[link\]](#)

**Week 4, 12 February: Science literacy**

Snow, Catherine E., Dibner, Kenne A., & Committee on Science Literacy and Public Perception of Science (Eds.). (2016). *Science Literacy: Concepts, Contexts, and Consequences*. Washington, DC: National Academies Press. [\[link\]](#)

*Supplementary reading*

Miller, Jon D. (1983). Scientific Literacy: A Conceptual and Empirical Review. *Daedalus*, 112(2), 29-48.

National Science Board. (2018). Science and Technology: Public Attitudes and Public Understanding. In *Science & Engineering Indicators--2018* (Chapter 7). Washington, D.C.: U.S. Government Printing Office. [\[link\]](#)

If available, 2020 *Science & Engineering Indicators* chapter on public attitudes (see [this article](#) for Jan 2020 update on how *S&EI* is being published)

**Week 5, 19 February: Community science literacy (CS): Cases and case studies**

- [Rural Activation and Innovation Network](#)
- [Thriving Earth Exchange](#)
- Borun, M., Chambers, M., & Cleghorn, A. (1996). Families are Learning in Science Museums. *Curator*, 39(2), 124-138.
- Falk, J. H., Staus, N., Dierking, L. D., Penuel, W., Wyld, J., & Bailey, D. (2016). Understanding youth STEM interest pathways within a single community: The Synergies project. *International Journal of Science Education, Part B*, 6(4), 369-384.
- Kastens, Kim, & Manduca, Cathryn. (2017). Leveraging the Power of a Community of Practice to Improve Teaching and Learning about the Earth. *Change: The Magazine of Higher Learning*, 49(6), 14-22. doi:10.1080/00091383.2017.1398997
- Ottinger, Gwen. (2017). Crowdsourcing Undone Science. *Engaging Science, Technology, & Society*, 3, 560-574. [\[link\]](#).
- Kinchy, Abby. (2017). Citizen Science and Democracy: Participatory Water Monitoring in the Marcellus Shale Fracking Boom. *Science as Culture*, 26(1), 88-110. doi:10.1080/09505431.2016.1223113
- Others as identified...

[Note: 4-day winter break occurs between weeks 5 and 6]

**Week 6, 26 February: Community science literacy (CSL): Relevant literatures, 1**

[Note: The organization and readings in the next few weeks have been prepared with substantial input from Prof. [Noah Weeth Feinstein](#) (Univ. Wisconsin—Madison), Prof. [Martin Storksdieck](#) (Oregon State Univ.), Prof. [Cathy Manduca](#) (Carleton College), and Dr. [Raj Pandya](#) (American Geophysical Union). But hold them harmless for errors, misjudgments, poor choices – those are all mine!]

**Structure and network properties of CSL.** The 2016 NASEM report says, “More research is needed to understand the relationship between network structure and community-level science literacy” (Snow et al., 2016, pp. 77-78). Considerations of network structures are absent from traditional individual-level conceptualizations of science literacy. What are the critical components of a community network for CSL?

- Community Capitals Framework and Science Capital
  - Flora, Cornelia Butler. (2016). *Rural communities: Legacy and change* (Fifth ed.). Boulder, CO: Westview Press.
  - Green, G. P., & Haines, A. (2002). *Asset building and community development*. Thousand Oaks, CA: Sage.
  - Archer, L., Dawson, E., DeWitt, J., Seakins, A. and Wong, B. (2015). Science capital: a conceptual, methodological, and empirical argument for extending Bourdieusian notions of capital beyond the arts. *Journal of Research in Science Teaching*, 52(7), 922–948.
- Social Infrastructure
  - Klinenberg, E. (2018). *Palaces for the people: How social infrastructure can help fight inequality, polarization, and the decline of civic life*. New York: Crown Publishing.
- Network Analysis
  - Frey, B. B., Lohmeier, J. H., Lee, S. W., & Tollefson, N. (2006). Measuring Collaboration Among Grant Partners. *American Journal of Evaluation*, 27(3), 383-392. doi:10.1177/1098214006290356
  - Hogue, T., & Simon-Brown, V. (1993). *Community-based collaboration: Community wellness multiplied*. Retrieved from <http://www.uvm.edu/crs/ncco/collab/wellness.html>
  - Borden, L. M., & Perkins, D. F. (1999). Assessing your collaboration: A self evaluation tool. *Journal of Extension*, 37(2). Retrieved from <https://www.joe.org/joe/1999april/tt1.php>

**Week 7, 4 March: Community science literacy (CSL): Relevant literatures, 2**

**Non-network properties of CSL.** Although structural and network analyses offer a range of promising conceptual and methodological tools, they do not capture the full range of community-level qualities that might contribute to CSL. What community characteristics are relevant that do not neatly depend upon network and community structure:



- Functional Science Literacy:
  - Ryder, J. (2001). Identifying science understanding for functional scientific literacy. *Studies in Science Education*, 36, 1–44.
- Transactive Memory and Collective Mind:
  - Wegner D.M. (1987) Transactive Memory: A Contemporary Analysis of the Group Mind. In: Mullen B., Goethals G.R. (eds) *Theories of Group Behavior. Springer Series in Social Psychology*. Springer, New York, NY. doi: 10.1007/978-1-4612-4634-3\_9
  - Weick, K., & Roberts, K. H. (1993). Collective mind in organizations: Heedful interrelating on flight decks. *Administrative Science Quarterly*, 38, 357-381.
- Communities of Practice:
  - Wenger, E. (2010). Communities of Practice and Social Learning Systems: The Career of a Concept. In Blackmore, C. (Ed.) *Social Learning Systems and Communities of Practice* (pp. 179-98). The Open University. doi: 10.1007/978-1-84996-133-2
- Culturally Appropriate Pedagogy (e.g. Hewitt, 2017)
  - Hewitt, Cynthia. (2017). Pan-African Approaches to Teaching Geoscience -- Workshop Summary. Retrieved from <https://serc.carleton.edu/integrate/workshops/african-education/summary.html>
- Institutional/organizational/structural elements of resilient communities.
  - TBD

### **Week 8, 11 March: Community science literacy (CSL): Relevant literatures, 3**

**Praxis (knowledge/action) frameworks for CSL.** Much of the most compelling work on community action deliberately blurs the boundaries between learning and acting on what is learned. Some prominent praxis-oriented frameworks:

- Collective Learning
  - Borun, M., Chambers, M. B., Dritsas, J., & Johnson, J. I. (1997). Enhancing Family Learning Through Exhibits. *Curator: The Museum Journal*, 40(4), 279-295. doi:10.1111/j.2151-6952.1997.tb01313.x
  - Crowley, K., & Jacobs, M. (2002). Islands of expertise and the development of family scientific literacy. In G. Leinhardt, K. Crowley, & K. Knutson (Eds.), *Learning conversations in museums* (pp. 333-356). Mahwah, NJ: Lawrence Erlbaum Associates.

- New Social Movement Theory
  - Buechler, S. M. (1995). New Social Movement Theories. *The Sociological Quarterly*, 36(3), 441-464.
  - Jasper, J. M. (2010). Social Movement Theory Today: Toward a Theory of Action? *Sociology Compass*, 4(11), 965-976. doi:doi:10.1111/j.1751-9020.2010.00329.x
  - Johnston, E. L. H., & Gusfield, J. (Eds.). (1994). *New Social Movements*. Philadelphia: Temple University Press.
- Community-based Participatory Research
  - Ballard, H. L., & Belsky, J. M. (2010) Participatory action research and environmental learning: implications for resilient forests and communities, *Environmental Education Research*, 16(5-6), 611-627, doi: 10.1080/13504622.2010.505440
  - Whyte, W. F., Greenwood, D. J., & Lazes, P. (1989). Participatory action research: Through practice to science in social research. *American Behavioral Scientist*, 32(5), 513-551, doi: 10.1177/0002764289032005003
  - Wilson, Elena. (2018). Community-Based Participatory Action Research. In Pranee Liamputtong (Ed.), *Handbook of Research Methods in Health Social Sciences* (pp. 1-15). Singapore: Springer Singapore.
- Collective Impact
  - Kania, John, & Kramer, Mark. (2011). Collective Impact. *Stanford Social Innovation Review*, 9(1), 36-41.

## **Week 9, 18 March: Community science literacy (CSL): Relevant literatures, 4**

**Institutional/material conditions for CSL.** As highlighted by the NASEM report, communities exist in broader resource, institutional, and societal contexts that shape their ability to learn, know, and act. What concepts and frameworks might shed light on how broader context shapes the development and deployment of CSL?

- Resource Mobilization Theory
  - McCarthy, J. D., & Zald, M. N. (1977). Resource Mobilization and Social Movements: A Partial Theory. *American Journal of Sociology*, 82(6), 1212-1241. doi:10.1086/226464
- System Perspectives on Health Literacy
  - Pleasant, A., Rudd, R. E., O'Leary, C., Paasche-Orlow, M. K., Allen, M. P., Alvarado-Little, W., ... & Rosen, S. (2016). *Considerations for a new definition of health literacy*. Washington, DC: National Academy of Medicine.



- Place-based Learning
  - Semken, S., Ward, E., Moosavi, S. and Chinn, P. (2017). Place-Based Education in Geoscience: Theory, Research, Practice, and Assessment *J. Geosci. Educ.* 65, 542–562.
- STEM Ecosystems
  - Traill, Saskia, & Traphagen, Kathleen. (2015). *Assessing the Impacts of STEM Learning Ecosystems: Logic Model Template and Recommendations for Next Steps (a report commissioned by the Noyce Foundation)*. Retrieved from [http://stemecosystems.org/wp-content/uploads/2015/11/Assessing\\_Impact\\_Logic\\_Model\\_Template\\_STEM\\_Ecosystems\\_Final.pdf](http://stemecosystems.org/wp-content/uploads/2015/11/Assessing_Impact_Logic_Model_Template_STEM_Ecosystems_Final.pdf)

**Week 10, 25 March: Regroup: What have we figured out? What's the picture?**

New literatures to explore? Identify today, then be prepared to discuss after Spring Break

**1 April: SPRING BREAK**

**Week 11, 8 April: Topics, 1**

**Week 12, 15 April, Topics, 2**

**Week 13, 22 April, Topics, 3**

**Week 14, 29 April, What did we discover this semester?**

**Final paper due date TBD**