ENVR 890-006: Special Topics in Environmental Sciences and Engineering

COMMUNICATING SCIENCE TO DIVERSE AUDIENCES

SPRING 2014, MONDAYS, 3:00-5:00P

MCGAVERN-GREENBERG 2305

INSTRUCTORS: Kathleen Gray, [kgray@unc.edu](mailto:kgray@unc.edu), 919-966-9799  
 Sarah Yelton, [sarah.yelton@unc.edu](mailto:sarah.yelton@unc.edu), 919-966-0895

OFFICE: UNC Environmental Resource Program

CVS Plaza, 137 E. Franklin Street, Suite 602

OFFICE HOURS: By appointment

## Overview

*In this course, students will develop skills in communicating science and translating research findings for non-academic audiences. This course will engage students with a variety of hands-on activities, presentations, and guest speakers designed to encourage exploration of effective ways to communicate about scientific research.*

###### Learning objectives

As a result of participation in this course, you will be able to:

1. Describe and recognize elements of effective science communication;
2. Explain which elements are most useful with varied audiences and using varied communications channels; and
3. Apply these elements as you communicate about your research projects.

###### Assignments and Grades

Graded assignments are varied in content and scale. Because this class relies heavily on interaction and discussion, you are expected to attend class and actively participate, and 30 percent of the course grade is based on your participation. The formula for calculating grades is below.

* Class participation (active participation in discussion, attendance), 30%
* Assignments (quality, timely submission), 40%
  + Your comments on weekly readings are due by **8:00p EST on Sunday night**, unless otherwise noted.
* Peer review of others’ assignments, 10%
  + Your comments on your peers’ review of readings are due by **10:00p EST on Sunday night**, unless otherwise noted.
* Final project, 20%

Grading uses a 10-point scale, where 90 and above is an A, 80-89 is a B, etc. (A- is 90-92, and B+ is 87-89, etc.) Missed deadlines incur a 10-point drop for each day delayed.

In response to reading assignments, **original posts to the discussion board** will be evaluated based on the following criteria: 1) critical assessment of the reading(s), noting particular strengths or weaknesses of the article or questions you have about study design, where applicable, and 2) identified connections between the reading(s) and your research or current science communication activities. Clarity, coherence, use of professional writing (i.e., no texting symbols or language), proper grammar, and timeliness will also be considered. Posts should be 300-500 words in length.

**Responses to peers** will be evaluated based on the extent to which you extend the conversation started by your peer or augment ideas s/he introduces. As with original posts, clarity, coherence, use of professional writing, proper grammar, and timeliness will also be considered. Peer responses can be brief (i.e., 1-2 paragraphs or ~200 words).

**Final Project:** Students will create a final project that communicates their research to a pre-defined target audience (one that we have covered this semester; student’s choice). This project could take the form of a website, video, blog, magazine article, etc. Final project rubric will be provided in class.

###### Learning Environment and Policies

**We strive to create a supportive learning environment.** We recognize that we are all learners, with each person bringing unique and valuable expertise to the class. In order to facilitate learning from one another, your active participation is required. **You will be videotaped and will have your** **writing and presentations openly critiqued**. Please provide constructive feedback to your peers to facilitate each other’s growth and development.

Active discussion will be a significant component of each class. In this context, questions can be as illuminating as answers. Never hesitate to ask a question, as every question asked is likely on the mind of others too. Your questions will be regarded as substantive contributions to our discussions.

Through readings and presentations, we will explore a variety of scientific topics that are currently covered in the media, such as climate change, evolution and genetics/genomics. We will also ask you to focus your assignments on one of your current research projects or science communication projects/initiatives, thereby increasing the personal relevance of the learning.

**Late Assignments:** Assignments are due at the time indicated on the weekly schedule. Late assignments will be docked a letter grade for every day they are overdue. If you know *at least two days prior* to a due date that you will have trouble completing an assignment on time, please contact the instructor to discuss your options.

**Absences**: You may have one unexcused absence; anything further will result in the reduction of one letter grade per unexcused absence. Examples of valid excuses for missing class include a professional presentation (documented with an agenda) or an illness with a doctor’s note.

## Weekly Schedule

### Jan 13 – Week 1

**How to talk about research (in an understandable way) to non-academic audiences**Kathleen Gray, Sarah Yelton

*This session will focus on the importance of effective science communication with lay audiences. Students will critique examples of science communication (written and video) and will craft an “elevator speech” to clearly and concisely convey their research or related scientific concepts.*

**Assignments:**

* Post profile paragraph, including photo and website, Twitter handle, or blog, as applicable. What kind of science communication do you most hope to do in your professional life?
* Also post the elevator speech that you developed in class today.
* **Due Jan 19, 10pm**

**Readings:** **Due** **Jan 19**, 8pm, your response; 10pm, comments to peers.

Handbook of Public Communication of Science and Technology, Chapter 5: **Theories of Public Communication of Science**. <http://www.bpatc.org.bd/elibrary/files/12713227600415386179.pdf>

**Stand up for science.** Baron, N. <http://www.nature.com/nature/journal/v468/n7327/pdf/4681032a.pdf>

### Jan 20 – Week 2

**MLK Holiday – NO CLASS**

**Readings: Due Jan 26**, 8pm, your response; 10pm, comments to peers.

**Science and Storytelling: The Use of Stories in Science Education**<http://blogs.plos.org/scied/2013/06/24/science-and-storytelling-the-use-of-stories-in-science-education/>

**The Construction and Analysis of a Science Story: A Proposed Methodology** <http://download.springer.com/static/pdf/166/art%253A10.1007%252Fs11191-008-9141-y.pdf?auth66=1389367993_07c1d82a999ebd61cfdb1863b52e59ab&ext=.pdf>

**Note: Optional reading:** an in-class activity on Jan 27 will reference Chapter 1 in the Randy Olson text, [*Connection: Hollywood Storytelling Meets Critical Thinking*](http://www.amazon.com/Connection-Hollywood-Storytelling-Critical-Thinking/dp/0615872387)*.*

### Jan 27 – Week 3

**Science as Story***Claire Fieseler, Scientists with Stories* <http://www.scientistswithstories.com/about/>  
*Brian Sturm, Associate Professor, School of Information and Library Science* *and professional storyteller*

**Assignments:**

* Apply the Connections exercise from class to your research or a current science communication project.
* Create 5 slides to describe your research. These slides must address overarching goal, methods, results, relevance to public **Due Feb 2, 10pm**

**Reading:** **Due** **Feb 2**, 8pm; comments on peer posts, 10pm.

Escape from the Ivory Tower, Chapter 8: **How to Deliver a Clear Message.** <http://www.scribd.com/doc/139349871/escape-from-the-ivory-tower-chapter-8-delivering-a-clear-message>

### Feb 3 – Week 4

**Developing presentation skills***Sharon McMillen Cannon, Ph.D., Associate Professor of Management and Corporate Communication, Kenan-Flagler Business School*

*This session will cover how to structure a presentation in a way that engages and informs an audience. This will also cover how to tailor presentations to a particular audience and adapt to challenges.*

**Assignment**: Revise your slides based on what you learned in class, incorporating some sort of visualization. Post on Sakai. Comment on two other students’ presentations, using rubric provided. **Due Feb 9, 10pm**

**Readings:** **Due** **Feb 9**, 8pm; comments on peer posts, 10pm.

**Expert and public perception of risk from biotechnology**. Savadori, L. et al. <http://search.ebscohost.com/login.aspx?direct=true&db=eih&AN=15022549&site=ehost-live&scope=site>

Handbook of Public Communication of Science and Technology, Chapter 14: **Risk, science and public communication: Third-order thinking about scientific culture**. <http://www.bpatc.org.bd/elibrary/files/12713227600415386179.pdf>

### Wed, Feb 5, 6:00pm

***Optional Special Event: Carolina Science café*Toxic metals in your children's food, cause for alarm?**Dr. Rebecca Fry

*Dr. Rebecca Fry is an Associate Professor at UNC-Chapel Hill in the Gillings School of Global Public Health. She researches toxic metals in the environment, making sure that we understand the effects of exposure on our most vulnerable populations including pregnant women and infants. Please join us on Wednesday, February 5, 6pm, at Back Bar in downtown Chapel Hill as she talks about her research on toxic metals such as arsenic in food and water, and implications for health effects.*  [*Learn more about Dr. Fry's research here.*](https://www2.sph.unc.edu/srp/researcher_spotlight_-_dr._rebecca_fry_22174_5880.html)

### Feb 10 – Week 5 (JOINT with Duke – Virtual)

**Communicating risk and scientific uncertainty**   
Yolanda Sanchez (by Skype)

*This session will describe what risk communication is, how it is used, why it’s important, and it’s relevance to environmental and public health researchers.*

**Readings:** **Due** **Feb 16**, 8pm; comments on peer posts, 10pm.

**An Introduction to Social Media for Scientists.** Bik, H. and Goldstein, M. <http://www.plosbiology.org/article/info%3Adoi%2F10.1371%2Fjournal.pbio.1001535>

Handbook of Public Communication of Science and Technology, Chapter 13: **Internet: Turning science communication inside out?** <http://www.bpatc.org.bd/elibrary/files/12713227600415386179.pdf>

### Feb 17 – Week 6

**Using social media to communicate research**   
Sarah Yelton, Dana Haine

*This session will cover the vast and rapidly-expanding world of social media, particularly the use of blogging and tweeting scientific research for lay audiences. Students will explore creative approaches to how social media can be used and why it’s important.*

**Assignment**: Write a blog post about an aspect of your research that connects to a current news topic. **Due Feb 23, 8pm.** Comment on one blog posting and create two follow-up tweets based on your peer’s contributions. **Due Feb 23, 10pm**

**Reading: Due** **Feb 23**, 8pm; comments on peer posts, 10pm.

Handbook of Public Communication of Science and Technology, Chapter 10: **Public relations in science**: Managing the trust portfolio, Rick E. Borchelt.

### Feb 24 – Week 7 (JOINT with Duke – Virtual)

**Communicating policy implications of research**   
Steve Wall, Project Director, UNC Institute for the Environment

*This session will explore how research findings can lead to changes in policy.*

**Assignment**: Instructors will identify a current environmental decision where an agency is seeking public comment. Students will draft a response to the call for comments that incorporates their scientific knowledge (to be shared only with the class) **(Due Mar 2, 8pm)** and comment on one other post (**Due Mar 2, 10pm)**

**Reading: Due** **Mar 2**, 8pm; comments on peer posts, 10pm.

Six Americas: Fracking in the American Mind. <http://environment.yale.edu/climate-communication/files/Fracking_In_the_American_Mind_2012_copy.pdf>

### Mar 3 – Week 8 (JOINT with Duke – in Durham)

**How to talk to the media about research**   
Adam Hinterthur & Dave Spratt, Institutes for Journalism and Natural Resources, & fellows

*This session will describe how to communicate research findings with the media, including how to explain complex processes, scientific uncertainty, and convey the significance/relevance of research findings.*

**Assignments**: Write a press release describing your research. Find an op-ed related to the scientific field or discipline in which you work written by a scientist. Post a link to the op-ed and comment on how effectively the author communicated scientific concepts. Also comment on one other student’s op-ed postings. In prep for Mar 24 class, post a (state/federal) agency that might use the results of your research or with whom you might interact. **Due Mar 16, 8pm**

**Reading:** **Due Mar 16**, 8pm; comments on peer posts, 10pm

Handbook of Public Communication of Science and Technology, Chapter 9: **Scientists as public experts.** <http://www.bpatc.org.bd/elibrary/files/12713227600415386179.pdf>

### MAR 10 – Week 9

**Spring Break – NO CLASS**

### MAR 17 – Week 10 (JOINT with Duke – Virtual)

**Exploring the expert witness process**   
Ted Slotkin, Duke University

*This session will describe what it means to be an expert witness and how this role might be relevant to scientific researchers. Students will learn how to prepare for and what to expect if asked to provide expert testimony.*

**Reading:** **Due Mar 23**, 8pm; comments on peer posts, 10pm

Handbook of Public Communication of Science and Technology, Chapter 12: **Public participation and dialogue**. Edna F. Einsiedel.

### Mar 24 – Week 11

**Communicating research to agency partners**Bill Crowell, Director, Clean Water Management Trust Fund and Albemarle-Pamlico National Estuary Program

*Establishing ongoing communication with government agencies involved in protection of health and the environment is critical to ensuring that policymakers and regulators have access to current research that is applicable to their work. It also reinforces the real-world implications of your research and helps you understand how it might be applied. This session will focus on engaging in bi-directional interactions with various government agencies and understanding how to communicate science in a political and social context.*

**Assignment**: Identify a specific office within a state or federal environmental or health agency and create a one-page description of your research for that office. Include photos and use concise text. Include relevance to the agency in your description. **Due: Mar 30, 8pm**

### Mar 31 – Week 12

**Communicating research to investors**   
*This session will explore how research can lead to innovations and commercialization and will specifically focus on how to present research innovations to potential investors. Students will learn more about the commercialization process, resources on campus to support innovation, and brainstorm ways this might apply to their own work.*

**Assignment**: Students will create a 2-3 minute video pitch to a hypothetical investor, seeking funding for their research project. **Due: Apr 6, 8pm**

**Reading:** **Due April 6**, 8pm; comments on peer posts, 10pm

Page, M., Wilhelm, M.S. & Regens, N. (2011). Preparing Graduate Students for Teaching: Expected and unexpected outcomes from participation in a GK-12 classroom fellowship. *Journal of College Science Teaching*, vol. 40, issue 5, p.32-37.

Roles for Scientists and Engineers in the Schools. Sharing Science with Children: A Survival Guide for Scientists and Engineers. Developed by the North Carolina Museum of Life and Science. <http://www.nationalacademies.org/rise/roles1a.htm>

### Apr 7 – Week 13 (Joint with Duke – in chapel hill)

**Sharing science with teachers and school aged children**  
Sarah Yelton, Dana Haine

*This session will explore what’s appropriate for different age groups, how to develop interactive and meaningful lessons for children, and how to coordinate with a teacher/instructor to make sure the material meets their needs. Students will have the opportunity to try several hands-on activities for youth audiences that are based on emerging research at UNC.*

**Assignment**: Create a hands-on activity, appropriate for middle or high school students, introducing a key science concept relevant to your research or the broader discipline within which you work. Note: All activities must be able to be safely conducted outside of a laboratory environment. **Due: April 13, 8pm.**

Revise written elevator speech (will be videotaped on Apr 14 class)

**Reading:** **Due April 13**, 8pm; comments on peer posts, 10pm

Bultitude, K. & Sardo, A.M. (2012). Leisure and Pleasure: Science events in unusual locations. *International Journal of Science Education*, vol. 34, issue 18.

### Sat, Apr 12 10:00aM – 3:00PM

**Special Event (OPTIONAL): UNC Science Expo***Can assist for one hour at ERP/SRP booths for* ***extra credit******with prior approval.*** *More details provided in class.*

### Apr 14 – Week 14

**Nonformal science communication**Jonathan Frederick, Morehead Planetarium and Science Center (invited)

**Assignment**: Comment on peer videos, providing constructive feedback. **Due: 10pm, Apr 20**

**Final Project:** Students will create a final project that communicates their research to a pre-defined target audience (one that we have covered this semester; student’s choice). This project could take the form of a website, video, blog, magazine article, etc. **Due: 8pm, Apr 20**

### Apr 21 – Week 15

**Culminating activity: individual project presentations, peer review**