

**Communicating Science, BIOL/ MSL 694, 2 credits**

**Meeting times:** Tuesdays, 6-8 PM

**Meeting place:** Irving 1 201

**Prerequisites:** Graduate standing in the sciences (advanced undergraduates may take the course with instructor permission)

**Instructors:**

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## **COURSE SYLLABUS**

### *Course description*

This highly interactive course allows students to gain hands-on experience with teaching and communicating science to public audiences. Over the course of the semester, students will lead programs in K-12 schools and/or museum settings, develop a presentation and present their own science to peers. Students will also explore pedagogical theory, and learn how to use active and inquiry-based teaching strategies.

### *Course purpose and objectives*

There is an increasing and well-documented need for scientists to effectively communicate their science to the public. This course aims to build communication and teaching skills among graduate students. In this way, individuals will be more effective science communicators throughout their careers. In addition to gaining skills specific to presenting to public audiences, graduate students will also observe instructors using inquiry-based and active learning techniques that have been shown to enhance learning in the university classroom.

The overall goals of this course are:

- to increase graduate student skill in communicating science to different audiences
- to introduce future scientists to the importance of K-12 education, public outreach, and the broader impact of their work

- to increase graduate student skill in addressing diversity issues
- to familiarize graduate students with teaching techniques for K12 and college audiences, especially inquiry-based approaches

### *Student learning objectives*

Upon completion of the course, students will be able to do the following:

- Develop and deliver science lessons to K-12 children
- Effectively present science concepts to audiences of all ages
- Know and use pedagogical theory to communicate science
- Successfully lead inquiry-based classroom experiences

### *Required Textbooks*

S. Michaels, A. W. Shouse, and H.A. Schweingruber. 2008 *Ready, Set, Science: putting research to work in K-8 classrooms*. National Academies Press.

R. Olson. 2009. *Don't be such a scientist*. Washington: Island Press.

### *Recommended Textbooks*

J. Branson et. al. 2000. *How People Learn: brain, mind, experience, and school*. National Academies Press.

### *Supplemental Readings*

AAAS website, "Communication 101."

[http://communicatingscience.aaas.org/comm101/define\\_audience.shtml](http://communicatingscience.aaas.org/comm101/define_audience.shtml)

Kawagley, Angayuqaq Oscar, and Roger and Delena Norris-Tull

1998 The Indigenous Worldview of Yupiaq Culture: Its Scientific: Nature and Relevance to the Practice and Teaching of Science. *Journal of Research in Science Teaching*, Vol. 35, #2.

<http://ankn.uaf.edu/Curriculum/Articles/KawagleyNorrisTull/YupiaqCulture.html>

Feynman, RP 1985. *Surely You're Joking, Mr. Feynman! Adventures of a curious character*. W.W. Norton Company, Inc. NY, NY.

Leiserowitz, A, Maibach, E, & Light, A. 2009. *Global Warming's Six Americas; an Audience Segmentation Analysis*. A Center for American Progress report.

<http://www.americanprogress.org/issues/2009/05/pdf/6americas.pdf>

Rutherford, F.J, and Ahlgren, A. 1991. *The Nature of Science*. In: *Science for All Americans*, AAAS, 272 pp. <http://www.project2061.org/publications/sfaa/online/sfaatoc.htm>

Other readings may be assigned throughout the semester, and will be posted on Blackboard at least 1 week prior to the due date.

### *Assignments and Grading*

In this class, we will use both formative and summative assessment techniques. We hope that you will model these techniques in your own teaching career. Formative assessment is the process of gaining feedback and making mid-course corrections, while summative evaluations typically measure the end outcome. For example, a summative assessment tool might be an exam or an end of course term paper, while formative assessments might take many forms, such as quick five-minute writes, clicker questions, or feedback on drafts of a paper. In this class, we will model many formative assessment techniques that enable instructors to assess how well the class is gaining concept mastery before high-stakes assignments are complete. Summative assessment measures are described below.

#### *K-12 Presentations*

The final four sessions of the class will be dedicated to application of the skills learned over the course of the class. Students will have the opportunity to present lessons to a live K-12 audience during the last four weeks of the class, either at the University of Alaska Museum of the North or in local K-12 schools. Students will use pre-prepared presentations during the first three weeks, and will use a presentation that they develop over the course of the semester during the last week. Students will deliver lessons in pairs or groups, depending on class size.

#### *Peer and teacher reviews*

Students will provide peer reviews of their partner's lessons during the school presentations described above. The review will be based on an instructor-developed rubric. Teachers will also provide feedback about lessons delivered in K-12 classrooms.

#### *Fireside chat*

You will provide 1 ten-minute PowerPoint presentation to the class about your own science, or a topic closely related to your area of expertise. The presentation should be given in a "fireside chat" style appropriate for a public audience that may not be familiar with your research. The presentation should include hands-on "props" or other engagement strategies. A rubric will be distributed in class that describes how presentations will be graded.

#### *Point breakdown*

<b>Assignment</b>	<b>Points</b>
4 lesson presentations in the K-12 classroom	200
Written lesson plan developed during semester	100
Peer reviews of teaching	50
Fireside chat	100
Participation	100
<b>TOTAL</b>	<b>550</b>

Grades will be calculated as a percentage of the 550 points possible in the course. Rubrics will be distributed that describe specific scoring procedures for each assignment.

90-100% =	A	60-69% =	D
80-89% =	B	Below 60 =	F
70-79% =	C		

### *Attendance Policy*

We expect you to attend class and participate. Science education research has demonstrated that students who take an active role in their learning learn more and retain that knowledge longer. In other words, participation will help you get the most out of the course. Your attendance will be part of your participation grade.

Due to the nature of the audience, missed presentations cannot be rescheduled. All scheduled presentations must be given on the day that they are scheduled. Failure to present 1 scheduled school presentation will result in a one letter grade deduction. Failure to present 2 or more scheduled school presentations will result in a failing grade for the class. However, if you have a documented illness or emergency that causes you to miss a school presentation, please speak with the instructors about making up points through alternate activities.

### *Plagiarism/Academic Honesty*

Disciplinary action may be initiated in cases of plagiarism, cheating, and/or academic dishonesty. Please refer to the student code of conduct:

[http://www.uaf.edu/catalog/current/academics/regs3.html#Student\\_Rights](http://www.uaf.edu/catalog/current/academics/regs3.html#Student_Rights)

### *Student Support*

Students with special needs or concerns can contact Student Support Services (474-6844). Please let us know at the beginning of the semester if you will require accommodations due to a documented disability, and we will work with you in conjunction with the Office of Disability Services (203 WHIT, 474-7043).

## Course schedule

<u>Date</u>	<u>Topic</u>	<u>Readings and Assignments</u>
22-Jan	Communicating Science: why and how	Feynman article
29-Jan	Audience and Developing a Theme	Michaels Chap. 4, Olson Chap. 1
5-Feb	Science Translation	Olson Chap. 2 and 3
12-Feb	Science for Kids	Olson Chap. 4 and 5
19-Feb	Teaching Approaches/Engagement	Michaels Chap. 1 and 2
26-Feb	Prior Knowledge and Formative Assessment	Michaels Chap. 3 <b>Due: Fireside Chat topic and theme</b>
5-Mar	Ways of Knowing	Kawagley; Rutherford
12-Mar	<b>Spring Break—no class</b>	
19-Mar	Questioning strategies, leading discussions Fireside Chats	Michaels Chap. 5
26-Mar	Fireside Chats	
2-Apr	Classroom Observations	<b>Due: Draft written lesson plan</b>
9-Apr	K-12 presentations	
16-Apr	K-12 presentations	
23-Apr	K-12 presentations	<b>Due: Final written lesson plan</b>
30-Apr	K-12 presentations	
9-May	Final Exam (Fireside chats)	