Communicating Science, STO 601, 2 credits

Meeting times: Wednesdays, 1-3 PM

Meeting place: Murie 103

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

Instructor:

Dr. Laura Carsten Conner
907-474-6950
ldconner@alaska.edu
WRRB 108 E
University of Alaska Fairbanks

Office hours: Friday 10-12 or by appt.

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

**Required Textbooks**


BOTH BOOKS ARE AVAILABLE FOR FREE DOWNLOAD AT NATIONAL ACADEMIES PRESS

**Recommended Textbooks**


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

http://www.ouhk.edu.hk/cridal/misc/jegede.htm

**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 Learning Sessions**

The final four weeks of the class will be dedicated to application of the skills learned over the course of the class. Students will have the opportunity to facilitate learning sessions for a live K-12 audience during the last four weeks of the class in local K-12 schools. Students will use pre-prepared lesson plans during the first three weeks, and will use a lesson plan that they develop over the course of the semester during the last week. Students will facilitate lessons in pairs or groups, depending on class size. Teachers will provide feedback about lessons delivered in K-12 classrooms.

**Talk for general public**

You will provide 1 ten-minute 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 style appropriate for a public
audience that may not be familiar with your research. The presentation should include hands-on “props” or other appropriate engagement strategies. A rubric will be distributed in class that describes how presentations will be graded.

**Participation**
The participation portion of the grade is based on active participation in discussion and lessons, as well as completing peer reviews of presentations. Rubrics will be provided.

**Point breakdown**

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
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<tbody>
<tr>
<td>4 facilitated learning sessions in the K-12 classroom</td>
<td>200</td>
</tr>
<tr>
<td>Written lesson plan developed during semester</td>
<td>100</td>
</tr>
<tr>
<td>Talk for general public</td>
<td>100</td>
</tr>
<tr>
<td>Participation</td>
<td>100</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>500</strong></td>
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</tbody>
</table>

Grades will be calculated as a percentage of the 500 points possible in the course. Rubrics will be distributed that describe specific scoring procedures for each assignment.

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

**Attendance Policy**
I 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 learning activities cannot be rescheduled. All scheduled presentations must be given on the day that they are scheduled. Failure to lead 1 scheduled K-12 school session will result in a one letter grade deduction. Failure to lead 2 or more scheduled K-12 school sessions 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 session, please speak with the instructor 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

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

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Readings and Assignments</th>
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</thead>
<tbody>
<tr>
<td>15-Jan.</td>
<td>Communicating Science: why and how</td>
<td>Fenichel and Schweingruber Chapter 1, 2</td>
</tr>
<tr>
<td>22-Jan.</td>
<td><strong>No class</strong></td>
<td></td>
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<tr>
<td>29-Jan.</td>
<td>Audience and Developing a Theme</td>
<td>Michaels et al. Chap. 4</td>
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<tr>
<td>5-Feb.</td>
<td>Science Translation/Learning Theory</td>
<td>Michaels et al. Chapter 1 and 2</td>
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<tr>
<td>12-Feb.</td>
<td>After school program—lead stations</td>
<td></td>
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<tr>
<td>19-Feb.</td>
<td><strong>Draft talks in class</strong></td>
<td></td>
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<tr>
<td>26-Feb.</td>
<td>Teaching Approaches/Engagement</td>
<td>Fenichel and Schweingruber Chapter 3, 4, 5</td>
</tr>
<tr>
<td>4-March</td>
<td><strong>SPRING BREAK—no class</strong></td>
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<tr>
<td>11-March</td>
<td>Inquiry</td>
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<tr>
<td>18-March</td>
<td>Ways of Knowing</td>
<td>Michaels Chap. 3</td>
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<tr>
<td>25-March</td>
<td><strong>Classroom observations</strong></td>
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<tr>
<td>1-April</td>
<td>Prior Knowledge and Formative Assessment</td>
<td>Michaels Chap. 5, Fenichel and Schweingruber Chap. 6</td>
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<tr>
<td>8-April</td>
<td>K-12 presentations/Questioning</td>
<td><strong>Due: Draft written lesson plan</strong></td>
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<tr>
<td>15-April</td>
<td>K-12 presentations</td>
<td></td>
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<tr>
<td>22-April</td>
<td>K-12 presentations</td>
<td><strong>Due: Final written lesson plan</strong></td>
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<tr>
<td>29-April</td>
<td>K-12 presentations/Final talks in class</td>
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