

BI/CH/GEOL/
PHYS
407/507:
Seminar
Teaching
Science Course
Fall 2018

When & where we meet:
Time: W 9-10:50am
Location: PSC 040

Final: M 12/3 10:15-12:15

Course Description

In this course, we explore and apply principles of Scientific Teaching.

We will read, discuss, and apply a variety of techniques from science education literature. You will be active participants in the exploration of Scientific Teaching. Using concepts and information introduced in class, you will develop an activity for an undergraduate science course. In the future, many of you may have positions where you teach. However, few graduate



As part of the Science Literacy Program we will pay special attention to uncovering ways science is connected to larger societal issues and big ideas across and within the discipline. SLP courses include General Education courses for non-science majors and courses for science majors taught by teams of faculty, graduate fellows, and undergraduate scholars, who will include opportunities during classtime for you to engage with the class topics through a variety of activities. For more information about the program scilit.uoregon.edu

Your Teaching Team

Instructor Name: Elly Vandegrift
Please call me "Elly" in all communications
Office Location: 141 Willamette
Instructor Email: ellyvan@uoregon.edu
Instructor Phone Number: 541-346-8982

What are Office Hours?

*Office Hours: 141 Willamette
Wednesday 11am-12noon (or by
appointment)*

I am here to help guide your learning and help you succeed during the course. I am available during office hours to answer questions about this course or provide additional resources. I invite you to come visit us, so I can meet you and learn more about your interests in the course. Office Hours are a great way to make connections with faculty and graduate students which may be helpful when you need future letters of recommendation or academic advice.

Course Goals

In this course students will

1. Explore ways in which Scientific Teaching principles can be used to enhance a student classroom experience.
2. Understand how the three pillars of Scientific Teaching can be used in development of a classroom activity.
3. Enjoy exploring science teaching from behind the scenes.

Course Learning Outcomes

The objective of Seminar: Teaching Science is to provide students with an opportunity to practice evidenced-based student-centered scientific teaching pedagogy. By the end of the course students will be able to:

1. Identify and implement the elements of backward design creating goals, objectives, assessment, activities for a teachable tidbit.
2. Define evidence-based student-centered pedagogy and describe how it can be implemented in a science classroom.
3. Identify and apply inclusive teaching practices to create a classroom environment that supports learning for all students.
4. Plan and facilitate a teachable tidbit including aligning goals, learning objectives, assessments, and activities using inclusive teaching practices.

How will you be graded?

This is a two-credit, pass/no pass course. To pass the course, you must complete at least 70% of all material satisfactorily, submit your teaching tidbit components on time (including the final presentation), *meet* or *exceed* expectations on your presentation, and miss no more than two class meetings.

Your presentation will receive feedback that includes an overall assessment in one of the following categories: *exceeds expectations (EE)*, *meets expectations (ME)*, *approaches expectations (AE)*, or *does not meet expectations (DNME)*.

How you'll know you're learning.

We'll spend time in class discussing evidence-based teaching pedagogy and then you will have the opportunity to read more outside of class as you develop a course activity. The more effort you put towards your teaching practice during the term the easier it will be to incorporate innovative teaching on the job.

Formative Assessments

Attendance & Participation Your presence and participation are necessary to make this course successful for you and for the class community. Personal circumstances may prevent you from attending a class meeting, but keep in mind that each class meeting represents a big portion of the overall course. If you have difficulties getting to class, whatever the reason, *please let me know as soon as reasonably possible (preferably before class)*. I am happy to guide you to gaining any missed work and information.

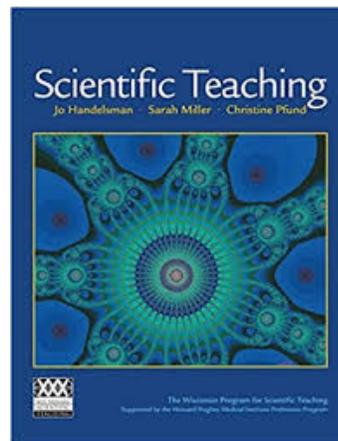
Class Participation is more than sitting as a warm body in class. Please come to class prepared to participate in self-reflection, group work, and class discussions. Participation includes respect for your learning community by being on time, turning off cell phones, and paying attention during class.

Readings you will read *Scientific Teaching* during the term. Additional reading assignments will be posted online in Canvas before each class session and class activities will be based on readings. Before class, you will write a short reflection to prepare for in-class activities and discussion.

Activities throughout the classtime you will engage in a variety of class activities which will double as formative assessments to evaluate your understanding and application of the material from the readings and discussions.

Summative Assessments

Teaching Tidbit Presentations are designed to provide you with opportunities to practice creating an activity and assessment for an undergraduate science course. We will build pieces of this summative assessment throughout the term, and you will present the activity to your classmates during the final week of the term.



What supplies will you need?

Handelsman, J., Miller, S., & Pfund, C. (2007). *Scientific teaching*. Macmillan
Canvas Access

A few things to help you succeed in this course

1. Attend class every week.
2. Complete the readings and daily reading reflections before class.
3. Participate and engage in every class activity.
4. When questions arise, send me an email or visit office hours.
5. As you develop your teachable tidbit, imagine that you are developing it for a real class audience and keep the learning of your students in mind through all the work you do.
6. Keep track of all your assignments with the course calendar and transfer everything to your personal calendar throughout the term so there are no surprises.

Inclusivity

Open inquiry, freedom of expression, and respect for difference are fundamental to a comprehensive and dynamic education. We are committed to upholding these ideals by encouraging the exploration, engagement, and expression of divergent perspectives and diverse identities.

Duty to Report

As an instructor, one of my responsibilities is to help create a safe learning environment for my students and for the campus as a whole. As a member of the university community, I have the responsibility to report any instances of sexual harassment, sexual violence and/or other forms of prohibited discrimination. If you would rather share information about sexual harassment, sexual violence or discrimination to a confidential employee who does not have this reporting responsibility, you can find a list of those individuals here <https://safe.uoregon.edu/services>

Academic Integrity

All students are expected to complete assignments in a manner consistent with academic integrity. Students must produce their own work and properly acknowledge and document all sources (ideas, quotations, paraphrases). Students can find more complete information about the University of Oregon's Policy on Academic Dishonesty in the University of Oregon *Student Handbook*.

Campus resources to support your learning

Tutoring and Academic Engagement Center
Drop-in math and writing support in addition to tutoring, study skills support, and Class Encore. Located in the 4th Floor Knight Library (541) 346-3226, engage@uoregon.edu

Counseling Center Call anytime to speak with a therapist who can provide support and connect you with resources. Located on the 2nd Floor of the Health Center (541)346-3227

Accessible Education Center Provides supports for support student instructional accommodations. If there are aspects of the instruction or design of this course that result in barriers to your participation, please contact me so together we can strategize how you can get the most out of this course. AEC located on the 1st Floor of Oregon Hall (541) 346-1155, uoaec@uoregon.edu

Center for Multicultural Academic Excellence (CMAE) mission is to promote student retention and persistence for historically underrepresented and underserved populations. We develop and implement programs and services that support retention, academic excellence, and success at the UO and beyond. We reaffirm our commitment to all students, including undocumented and tuition equity students. Located on the 1st Floor of Oregon Hall (541) 346-3479, cmace@uoregon.edu

Course Schedule

Week Date	Topic & Learning Objectives * Students will be able to...	Reading and Assignments Due (tentative)
1 9/26	<p>Who are we? What is Scientific Teaching? How do I begin the first day of class?</p> <p>*Meet classmates and build a learning community. *Reflect on teaching preconceptions. *Describe Scientific Teaching. *Reflect on the first day of class.</p>	<p>Read: Lang, JM. 2008. On Course. Harvard University Press, Cambridge. <i>The First Day of Class</i>.</p> <p>Read: Handelsman, J. S. Miller, and C. Pfund. 2007. Scientific Teaching. Chapter 1 "Scientific Teaching"</p> <p>Assignment: Complete daily reading questions on Canvas.</p>
2 10/3	<p>How do we create an inclusive classroom environment?</p> <p>*Discuss the complexities of teaching to diverse student populations. *Develop a plan to create an inclusive classroom environment that supports learning for all students.</p>	<p>Implicit Assumptions Test</p> <p>Read: Freeman, S., Haak, D., & Wenderoth, M. P. (2011). Increased course structure improves performance in introductory biology. <i>CBE—Life Sciences Education</i>, 10(2), 175-186.</p> <p>Read: Eddy, S. L., & Hogan, K. A. (2014). Getting under the hood: How and for whom does increasing course structure work? <i>CBE-Life Sciences Education</i>, 13(3), 453-468.</p> <p>Read: Smith, JL, KL Lewis, L Hawthorne, SD Hodges. 2013. When trying hard isn't natural: women's belonging with and motivation for male-dominated STEM fields as a function of effort expenditure concerns. <i>Pers Soc Psychol Bull</i> 39:131-143.</p> <p>Assignment: Complete daily reading questions on Canvas.</p> <p>Tidbit: Select your tidbit topic</p>
3 10/10	<p>What are goals and learning objectives?</p> <p>*Identify the difference between goals and objectives.</p>	<p>Read: Handelsman, J. S. Miller, and C. Pfund. 2007. Scientific Teaching. Chapter 5 "A Framework for Constructing a Teachable Unit"</p> <p>Read: Ambrose SA, Bridges MW, DiPietro M, Lovett MC, Norman MK. 2010. How Learning Works: 7 Research-Based Principles for Smart Learning. Appendix D-What are learning objectives and how can we use them? Jossey-Bass, San Francisco, CA.</p> <p>Assignment: Complete daily reading questions on Canvas.</p> <p>Tidbit: Write broad learning goals and specific/measurable student learning objectives.</p>

Week Date	Topic & Learning Objectives * Students will be able to...	Reading and Assignments Due
4 10/17	<p>How are goals, objectives, and assessments aligned?</p> <p>*Discuss assumptions that instructors have about students' abilities and how this informs classroom experiences.</p> <p>*Align goals, objectives, and assessments.</p> <p>*Identify lower order and higher order cognitive skills.</p>	<p>Read: Ebert-May, D., Batzli, J., & Lim, H. (2003). Disciplinary research strategies for assessment of learning. <i>AIBS Bulletin</i>, 53(12), 1221-1228.</p> <p>Assignment: Complete daily reading questions on Canvas.</p> <p>Tidbit: Write summative assessments aligned with your goals and objectives.</p>
5 10/24	<p>How do we know if/what students are learning?</p> <p>*Provide peer feedback on alignment of goals and objectives.</p> <p>*Evaluate pros and cons of assessments and ways to implement them in a class.</p>	<p>Midterm feedback</p> <p>Read: Handelsman, <i>et al.</i> 2007. Chapter 3 "Assessment"</p> <p>Read: Deslauriers, L., Schelew, E., & Wieman, C. (2011). Improved learning in a large-enrollment physics class. <i>science</i>, 332(6031), 862-864.</p> <p>Assignment: Complete daily reading questions on Canvas.</p> <p>Tidbit: Develop formative assessments (often doubling as classroom activities) that include inclusive teaching practices.</p>
6 10/31	<p>How is class time spent?</p> <p>*Discuss the benefits of an active learning classroom.</p> <p>*Evaluate methods for engaging students in class activities.</p> <p>*Identify how student work outside of the classroom relates to the in-class experience.</p>	<p>Read: Handelsman, <i>et al.</i> 2007. Chapter 2 "Active Learning." Pages 39-44. (Optional pages 23-38).</p> <p>Read: Moravec, M., A. Williams, N. Aguilar-Roca, and D.K. O'Dowd. 2010. Learn before Lecture: A Strategy That Improves Learning Outcomes in a Large Introductory Biology Class. <i>CBE Life Science Education</i> 9: 473-481.</p> <p>Assignment: Complete daily reading questions on Canvas.</p> <p>Tidbit: Meet with Elly about tidbit. Meet with a classmate about tidbit.</p>
7 11/7	<p>How is class time spent?</p> <p>*Discuss the benefits of an active learning classroom.</p> <p>*Evaluate methods for engaging students in class activities.</p> <p>*Identify how student work outside of the classroom relates to the in-class experience.</p>	<p>Read: Tanner, K. D. (2013). Structure matters: twenty-one teaching strategies to promote student engagement and cultivate classroom equity. <i>CBE—Life Sciences Education</i>, 12(3), 322-331.</p> <p>Read: McClanahan, E. B.; McClanahan, L. L. 2002. Active learning in a non-majors biology class. <i>College Teaching Summer</i>: 92-96.</p> <p>Assignment: Complete daily reading questions on Canvas.</p> <p>Tidbit: Meet with Elly about tidbit. Meet with a classmate about tidbit.</p>

Week Date	Topic & Learning Objectives * Students will be able to...	Reading and Assignments Due
8 11/14	<p>What does cognitive science tell us about learning?</p> <p>*Discuss elements of cognitive science that can support student learning such as testing effect, interleaving, and retrieval.</p>	<p>Read: TBA</p> <p>Assignment: Complete daily reading questions on Canvas.</p> <p>Tidbit: Finalize your tidbit preparation.</p>
9 11/21	<p>*Note, yes we do have class the day before Thanksgiving.</p> <p>Presentations of teachable tidbits</p> <p>*Lead a classroom activity has been developed with Scientific Teaching principles.</p> <p>*Provide feedback on classmates teaching activities.</p>	<p>Tidbit: Present tidbit. Participate as a student give peer feedback to classmates about their tidbits.</p>
10 11/28	<p>Presentations of teachable tidbits</p> <p>*Lead a classroom activity has been developed with Scientific Teaching principles.</p> <p>*Provide feedback on classmates teaching activities.</p>	<p>Tidbit: Present tidbit. Participate as a student give peer feedback to classmates about their tidbits.</p>
Finals 12/3	<p>Monday 10:15am-12:15pm</p> <p>Presentations of teachable tidbits</p> <p>Wrap-up and What's next?</p> <p>*Reflect on the implementation of Scientific Teaching in future teaching endeavors.</p>	<p>Read: hooks, b. 1994. Teaching to Transgress. Chapter 1: Engaged Pedagogy and Chapter 14: Ecstasy—Teaching and Learning Without Limits.</p> <p>Assignment: Teaching Tidbit Reflection</p> <p>Tidbit: Present tidbit. Participate as a student give peer feedback to classmates about their tidbits.</p>