Bi/Ch/Geol/Phys 407/507 SEM: TEACHING SCIENCE

WINTER 2016 –189 PLC

Thursday 12-1:50pm, 2 credits

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Course Description:

In this course we will read, discuss, and apply a variety of techniques from science education literature. Students will be active participants in the exploration of scientific teaching. Using concepts and information introduced in class, students will develop the curriculum for an activity to be used in an undergraduate science course.

Course Objectives:

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:

- Identify and implement the elements of backward design creating goals, objectives, assessment, activities for a teaching tidbit
- Define evidence-based students-centered scientific teaching and describe how it can be implemented in a science classroom
- Plan and facilitate a teachable tidbit including aligning goals, learning objectives, and assessments.
- Identify the diversity of student backgrounds in university courses and describe how to create an inclusive classroom environment

RATIONALE:

Many students will be employed in positions that require them to teach. However, few graduate and undergraduate students have an opportunity to learn instructional methods during their college careers. To help students become more employable, and to help them become successful in their first positions, they need skills and experience in teaching. Following this class, it is hoped that students will implement the instructional activities developed during the course.

PREREQUISITES:

None. This course is designed especially for graduate and undergraduate students who wish to have teaching as part of their future career, but is open to other interested in learning about scientific teaching.

COURSE MATERIALS:

All of the course assignments and readings are available at our course Canvas site.

REQUIREMENTS:

ATTENDANCE AND 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 us know as soon as reasonably possible (preferably before class)***. You are responsible for any missed work and information.

PARTICIPATION—is more than sitting as a warm body in the class. You should come to class prepared to participate in self reflection, group work, and class discussions. Participation includes respect for your fellow classmates and instructors by coming to class on time, turning off cell phones, and paying attention during class.

READING—Students should have a copy of *Scientific Teaching [*Handelsman, J., Miller, S., & Pfund, C. (2007). *Scientific teaching.* Macmillan.]. Additional reading assignments will be posted online in Canvas before each class session and class activities will be based on the readings. We expect you to demonstrate comprehension of these reading materials during classtime.

PRESENTATIONS—are designed to provide you with opportunities to practice creating an activity or assessment for an undergraduate science courses. We will build pieces of this activity throughout the term, and you will present the activity to your classmates during the final week of the term.

REQUIREMENTS AND GRADING:

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

"PRACTICE MAKES PERFECT"

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.

DIVERSITY

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.

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*.

STUDENTS WITH DISABILITIES

The University of Oregon is working to create inclusive learning environments. If there are aspects of the instruction or design of this course that result in barriers to your participation, please notify me as soon as possible. You are also welcome to contact the Accessible Education Center (AEC) in 164 Oregon Hall at 346-1155 or uoaec@uoregon.edu.

If you are not a student with a documented disability through AEC, but you would like for us to know about class issues that will impact your ability to learn, we encourage you to come visit with us during office hours so that we can strategize how you can get the most out of this course.

COURSE OUTLINE: (ALWAYS A TENTATIVE SCHEDULE)

Week	Topic	Homework
1	Who are we? Backward Design	**Read:** Lang, JM. 2008. On Course. Harvard University Press, Cambridge. *The First Day of Class.*
2	What are goals and learning objectives?	**Read:** Handelsman, J. S.Miller, and C. Pfund. 2007. Scientific Teaching. Chapter 5 "A Framework for Constructing a Teachable Unit" **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.
3	How are goals, objectives, and assessments aligned?	**Read:** Rovick, AA*, et al.* 1999. How accurate are our assumptions about our students' background knowledge? Am. J. Physiol. 276 (Adv. Physiol. Educ): S93-101.
4	How do we know if/what students are learning?	**Read:** Handelsman, *et al.* 2007. Chapter 3 "Assessment" **Read:** Gormally, C., Brickman, P., and Lutz, M. 2012. Developing a Test of Scientific Literacy Skills (TOSLS): Measuring Undergraduates' Evaluation of Scientific Information and Arguments. CBE Life Sciences Education, 11(4), 364–377.
5	How is class time spent?	**Midterm feedback** **Read:** Handelsman, *et al.* 2007. Chapter 2 "Active Learning." Pages 39-44. (Optional pages 23-38). **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. CBE Life Science Education 9: 473–481. **Read:** Silverthorn, D.U. 2006. Teaching and learning in the interactive classroom. Advances in Physiology Education, 30(4): 135–140.
6	How is class time spent?	**Read:** Allen, D. and K. Tanner. 2005. Infusing active learning into the large-enrollment biology class: seven strategies, from the simplex to complex. Cell Biology Education 4: 262-268 **Read:** McClanahan, E. B.; McClanahan, L. L. 2002. Active learning in a non-majors biology class. College Teaching Summer: 92-96.
7	How do we create an inclusive classroom environment?	**Implicit Assumptions Test** **Read:** Handelsman, *et al.* 2007. Chapter 4 "Diversity". **Read:** Smith, JL, KL Lewis, L Hawthrone, 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. Pers Soc Psychol Bull 39:131-143. **Assignment:** Meet with Mark and Elly outside of class about your presentation.
8	Presentations of teachable tidbits	
9	Presentations of teachable tidbits	
10	Presentations of teachable tidbits Wrap-up	**Read:** hooks, b. 1994. Teaching to Transgress. Chapter 1: Engaged Pedagogy and Chapter 14: Ecstasy—Teaching and Learning Without Limits. **Assignment:** Teaching Tidbit Reflection