BIOL 810: College Science Teaching
Fall 2020
Day and Time TBD

Instructor:
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SEMINAR DESCRIPTION
This interactive seminar will provide the knowledge and skills required to design and implement student centered, inquiry-based and active learning strategies in undergraduate science courses. Over the semester, you will explore many different evidence-based teaching methods and create lesson plans using them. You will also get to learn from the many great instructors at UNC by observing their class sessions and reflecting on their lessons plans and how they supported students in meeting learning objectives. Finally we will also learn about the variety of science teaching positions available as we have Skype interviews with science instructors from a diverse set of colleges and universities.

DRIVING QUESTIONS
- Why is student-centered teaching and active learning more valuable than lecture-focused instruction?
- How do I draft effective learning objectives?
- What is Backward Design and how does it support curriculum development?
- How can I assess students' achievement of learning objectives?
- What student-centered and active learning strategies can I use in my future classroom?
- How can I support students in understanding primary literature articles?
- What kinds of college science teaching jobs are available?

ATTENDANCE
Attendance will be expected for all students who audit or register for the course. Because sessions build on one another, please e-mail me if you miss a class to get class materials.

COURSE ASSIGNMENTS

Readings
We will explore several education research articles to learn more about educational research and the specific teaching strategies that have been identified as most effective. These will be posted on Sakai and will be accompanied by guided reading questions to help you develop an understanding of the teaching strategies.

Teaching Observations
All students will observe at least three active learning science classes over the course of the semester and write a reflection on the learning objectives, the active learning strategies they observe and how the strategies supported students' in obtaining the learning objectives.

Applying Innovative Teaching Strategies
We will explore several models of student-centered and active learning strategies so you will have a toolbox of teaching strategies. After we explore these strategies in class, you will design a lesson using the strategy topic of your choice. See Sakai for specific assignment expectations and due dates.
- Learning Cycle Model
- Problem Based Learning
- POGIL - Process Oriented Guided Inquiry Learning
- CREATE - Consider, Read, Elucidate hypotheses, Analyze data, and Think of the next Experiment
- Modeling-based Instruction
- Case study based instruction

	Class Driving Questions	**Class Activity**	**Assignment completed before class**
1	What should the overarching goals be for undergraduate science education?	Science Education Jigsaw	
2	What is high structure, active learning and why is it seen as best practice?	Frustrated Student Active Learning analysis	Read and answer reflection questions *Active learning narrows achievement gaps for underrepresented students in undergraduate science, technology, engineering, and math. Proc Natl Acad Sci U S A. 2020 Mar 24;117(12):6476-6483.*
3	What is Backward Design and how does it improve curriculum design?	Traditional vs. to Backward Design class analysis	Read and answer reflection questions Allen, D., & Tanner, K. D., *Putting the horse back in front of the cart: Using visions and decisions about high-quality learning experiences to drive course design.* CBE Life Sciences Education, 6 (2), 85-89. (2007).
4	What are best practice in making multiple choice exams?	Using Bloom's Taxonomy to code multiple choice exam questions	Backward Design class revision – You will choose from a selection of college science lectures/class sessions, apply Backward Design to the topic and propose revisions to the class that align with Backward Design
5	What are authentic forms of assessment?		Multiple Choice Assessment Questions
6	What is active learning and what role does assessment play in active learning?	Active Learning Observations	Explanatory model rubric Data analysis/experimental design rubric
7	What is active learning and what role does assessment play in active learning?	Active Learning Observations	Active Learning Observation Reflection #1
8	What is active learning and what role does assessment play in active learning?	Sharing Active learning Lessons Learned	Active Learning Observation Reflection #2
9	How can case studies provide anchor for exploring real world phenomena?	Case Study Analysis	Case Study Description Exploration
10	How can students learn through exploring models? What is POGIL?		*Process-oriented guided inquiry learning improves long-term retention of information.* (2013) Advances in Physiology Education 37: 233–241.
11	How can I engage undergraduate students in reading primary literature?		Hoskins, S.G. and Stevens, L.M. (2014) *The CREATE Strategy for Intensive Analysis of Primary Literature Can Be Used Effectively by Newly Trained Faculty to Produce Multiple Gains in Diverse Students.* CBE Life Sci Educ vol. 13 CREATE outline for a research paper of choice
12	What should be included in an effective teaching statement?		Teaching Statement main arguments/themes
13	What are different expectations of science instructors at different colleges and universities?	College Science Faculty Interviews	College faculty interview questions
14			Teaching Statement outline