EDUC267F:

Development of Scientific Reasoning and Knowledge II

Stanford University, Winter 2019

Wednesday 2:30-5:15, January 9 – February 13, CERAS 204

Instructors

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Course Description:

Development of Scientific Reasoning and Knowledge II is the second of two courses you will take to investigate aspects of science in the elementary classroom. We endeavor to work with you to continue to develop your competence and confidence to teach science. We will be emphasizing: 1. The use of phenomena as a method of exploring the world around us, and 2. How to interpret and apply the Next Generation Science Standards in lesson and unit planning. We are excited to work with you to continue our exploration and ability to question what is happening around us.

Winter Quarter Goals

1. Analysis of existing curriculum in order to best use and make connections with curriculum you will use in your jobs next year.

2. Practice the skills and strategies that we learned last quarter (productive talk moves, literacy strategies, see it-do it-write it, applying practices and CCCs, using models, asking questions) and include them in your plans.

3. Understand student's ideas about science topics (pre-assessments) to inform teaching and instruction.

4. Develop a lesson plan using a known curriculum, imbedded in a phenomenon, based on the needs of students (including special needs, linguistic and cultural needs.)

Grading Policy:

Our intention is that all teacher candidates will become more comfortable teaching science and in their own science understandings. Assignments which do not meet criteria will be returned for revision. Please communicate questions or concerns with Polly and Greses directly.

Assignments:

Class participation/attendance/readings/discussion questions

Please attend all classes. Please do all readings. Thank you!

ASSIGNMENT 1: Analysis of Curriculum Due Week 3
This assignment will be completed with a partner who is teaching the same or a similar grade level as you. You will turn in one assignment together. The goal of this assignment is for you to explore some of the main curriculums available in schools right now and to share them with your classmates.

ASSIGNMENT 2: Video of your Students (~5-10 min) Due Week 4
The goal of this assignment is for you to practice talking about science with your students as a formative assessment strategy. This can be in the form of a science talk, students looking at data or a reading, students completing some sort of science activity or even interviewing a small group of students on the playground. We mostly just want to see and discuss some of what you might hear when listening to students talk about science.

ASSIGNMENT 3: Lesson Plan based on Curriculum Due Week 6
Using any curriculum studied in our class or that is used in your school, take an existing lesson from that curriculum and modify it into a lesson plan that takes your students into account. Link your lesson plan to the NGSS and if possible consider how you might also make it interdisciplinary. See provided template, or use your own format.

HONOR CODE:
Students are expected to adhere to Stanford's honor code. According to the Office of Judicial Affairs (OJA) website, "For purposes of the Stanford University Honor Code, plagiarism is defined as the use, without giving reasonable and appropriate credit to or acknowledging the author or source, of another person's original work, whether such work is made up of code, formulas, ideas, language, research, strategies, writing or other form(s)." For further information, please consult the OJA website:
http://www.stanford.edu/dept/vpsa/judicialaffairs/students/plagiarism.sources.html

STUDENTS WITH DOCUMENTED DISABILITIES:
Students who may need an academic accommodation based on the impact of a disability must initiate the request with the Office of Accessible Education (OAE). Professional staff will evaluate the request with required documentation, recommend reasonable accommodations, and prepare an Accommodation Letter for faculty dated in the current quarter in which the request is made. Students should contact the OAE as soon as possible since timely notice is needed to coordinate accommodations. The OAE is located at 563 Salvatierra Walk (phone: 723-1066, URL: http://studentaffairs.stanford.edu/oae).

SUGGESTED TEXT: (But mostly because we think it is a great reference for later)
Questions, Claims and Evidence: The Important Place of Argument in Children's Science Writing. Edited by: Brian Hand, Lynn Hockenberry, Kim Wise and Lori Norton-Meier. NSTA press book, 2008. All readings will be provided on the Canvas course site.

Sessions:

	Questions/Goals for Today	Tasks/Class Activities	Readings/Questions	Assignments
1 Jan 9 CERAS 204 2:30-5:15	**Questions/ Goals:** Where are we now? What is phenomenon based teaching and how can we go about it? **Equity Focus:** How does using a phenomenon-based approach help to support all learners?	Science Current events/finding phenomenon How do we see? Activity Unpacking sample curriculum. Review of next week's readings.	None for today	Form curriculum groups. • FOSS • Engineering is Elementary • CEEI • Amplify (grade 3) • Mystery Science • NGSS Storylines
2 Jan 16 CERAS 204 2:30-5:15	**Questions/ Goals:** How language and science learning can occur simultaneously? **Equity Focus:** Supporting culturally and linguistically diverse students in the science classroom	Reading discussion Group work on assignments. Review of next week's readings.	Why is Science a good context for language development? Additional readings: Lee, Quinn and Valdez. (2013) Science and language for English language learners in relation to NGSS Brown & Spang. (2008) Double Talk: Synthesizing everyday and science language in the classroom.	Continue to work on curriculum analysis. Collect video if it works for your schedule.
3 Jan 23 CERAS 204 2:30-5:15	**Questions/ Goals:** Understand the current definitions of K-12 engineering education (EE). Identify	Share Curriculum with each other. Towards a common definition of EE. Unpacking the practices associated with engineering.	National Resource Council, (2010) Standards for K-12 Engineering Education, National Academies Press pp 5-14 Appendix 1 –	**Assignment 1:** Curriculum Analysis due today (written part to canvas + slides to present today) Collect video if it

	connections between engineering and other content areas. What is an engineer? What do engineers do? **Equity Focus:** Understand how language works as a gatekeeper	Practice: The Engineering Design Process Review of next week's readings.	Engineering Design in the NGSS Optional readings on Canvas Resources: NGSS in Engineering Design by grade level KOI materials: Problem Solving with Shapes	works for your schedule.
4 Jan 30 CERAS 204 2:30-5:15	**Questions/ Goals:** How can we use the outdoor world to think about more questions and what we see? Nature journaling **Equity Focus:** What are the challenges involved in taking students on field trips/outside?	Rocks and Ecology Nature Journaling The talk science primer and application to the curriculum you might use in your placement/future teaching Review of next week's readings.	Talk Science Primer. The Inquiry Project. https://inquiryproject.terc.edu/shared/pd/TalkScience_Primer.pdf	**Assignment 2:** Video due today Upload to canvas, we will discuss in class. Share videos in class
5 Feb 6 CERAS 204 2:30-5:15	**Questions/ Goals:** How can models help us to explain phenomenon and how can we employ them effectively in our classrooms? **Equity Focus:** Prior knowledge and	Moon phases and seasons Using modeling in the classroom, challenges and benefits Review of next week's readings.	Baxter, John. (1989) Children's understanding of familiar astronomical events. International Journal of Science Education 11:5, 502-513. Passmore, Cynthia, Christina Schwarz and Jocelyn Mankowski. 2017. Developing and	

	how that can effect how a student reacts to new content		Using Models. From Helping Students make sense of the world using Next Generation Content Standards. pp 109-134	
6 Feb 13 CERAS 204 2:30-5:15	**Questions/Goals:** Teaching content that might be controversial? **Equity focus:** Science and social justice	Wrapping it all up! Sharing lesson plans and next steps.	Busch, K.C., & Osborne, J. (2014) Effective strategies for talking about climate change in the classroom. School of Science Review, 96(354) 25-32. Additional reading: Busch, K.C. (2016) Polar Bears or People? Exploring ways in which teachers frame climate change in the classroom. International Journal of Science Education, Part B, 6(2) 137-165.	**Assignment 3:** Lesson Plan due today (or later if you need more time)