EDUC267D: ELECTIVE IN SCIENCE CURRICULUM & INSTRUCTION  
COURSE SYLLABUS  
Spring Quarter, 2016

CLASS MEETINGS:  
CERAS 308, March 29 – May 31, 2015  
Tuesdays 3:15PM – 6:05PM

INSTRUCTORS:  
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COURSE GOALS  
This course will focus on preparing pre-service teachers to plan learning segments (and curricular units) to be used for science teaching. We expect that teachers in this course will not necessarily be subject matter experts, but they will still be expected to use their knowledge of teaching to transfer to science content.

Specifically, in this course we will endeavor:

● To convey and practice the cognitive apprenticeship model as we understand it in the context of science teaching.
● To be able to read and interpret the NGSS in order to effectively plan effective learning experiences in science content.
● To prepare all pre-service teachers to design lesson plans, learning segments, and eventually, curricular units, that create deeply integrated learning segments that enable students to understand and apply their conceptual understanding based on their understanding of students’ skills, backgrounds and needs,
● To prepare all students to analyze and assess the impact of their planning strategies on student learning in an effort to revise and improve their instructional performance.

WEEKLY ESSENTIAL QUESTIONS

How is scientific thinking different?

Reading:

Ch. 2 Guiding Assumptions and Organization of the Framework

Additional Resource:
Ch 3 Dimension 1 Scientific and Engineering Practices (41-82)

2. Teaching Science – Why Do We Teach It? (April 5)
What are our many reasons for teaching science?

Reading:

3. Context and Science – What do students wonder about science from their everyday lives? (April 12)
What role does science play in your students’ lives?

Reading:

Additional Resource:

4. NGSS 3D learning (April 19)
Disciplinary Core Ideas, Cross Cutting Concepts, and Review of Scientific Practices

Ch. 4 Dimension 2: Crosscutting Concepts
The Role of Language in Science (April 26)

“Talking science,” scientific language, everyday English, using vernacular to convey complex scientific ideas, 20 second story, identifying support vocabulary and core vocab for the subject matter, conveying mathematical information in science to language (i.e. physics formulas)

Reading:

Additional Resources:


Revisiting Scientific Practices -- Design Thinking (May 3) PACT due May 2

What type of problems can we solve with science? How can we facilitate activities for answering a scientific question or proposing a solution to a problem? Answer a question, propose a solution, get the solution evaluated!

Inquiry Activities in the Science Classroom and Interpreting Data (May 10)

Guided inquiry labs, modeling in science, interpreting and analyzing data, integration of mathematical information with scientific concepts
Reading:

8. **Relevance of Science to Society, Informal Learning of Science (May 17)**  
*Science literacy, social justice, citizen science, socioscientific issues*

Reading:

Additional Resource:

9. **Features of scientific discourse and argumentation (May 24)**  
*Argumentation, discourse based learning, explaining reasoning, setting norms, evaluation of claims – new standards*

Reading:

Additional Resource:

10. **Showcase of Final Projects / Presentations – Small group enactments of a selected portion of your lesson plan. (May 31)**

**ASSIGNMENTS**

*For readings: For each class, prepare 2-3 questions, comments, connections to home subject, applications to teaching, etc. in advance of class discussions or small group talk. These will not be collected.*

Cross Content Observation: (Due May 17th) In conjunction with Seminar, complete a reciprocal observation of a STEP colleague in a science classroom. Reciprocal observation conference will be held Wednesday, May 18th during the end of seminar and supervisory. Observation instructions and pairings will be assigned in
Seminar. Please observe the use of talk in science class as well as implementation of scientific practices. (Do we need to rewrite this so it looks the same in all courses?)

Workshopping or Rehearsal to develop Final Assessment will happen during the course in class.

Creation of a Project Based Science Activity (Due May 31st) that integrates major ideas covered by Weeks 1-9 (integrates NGSS components from all 3 dimensions, has a rationale for the teacher and students, data interpretation and/or analysis, breakdown of academic language, and a focus on design thinking or argumentation). (We assume this assignment is about 3-5 pages, rubric will be provided.)

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).

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**FINAL ACTIVITY PLANNING RUBRIC**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Score of 1</th>
<th>Score of 2</th>
<th>Score of 3</th>
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<tbody>
<tr>
<td>Reference to the Standards</td>
<td>• There are no standards listed.</td>
<td>• There is a vague reference to the specific standards</td>
<td>• There is a clear reference number to the specific</td>
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<td>(3-D NGSS – DCI, CCC, and Scientific Practices)</td>
<td>• The standards listed may not coordinate with the actual activities.</td>
<td>standards • The activities actually match the standard.</td>
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<tr>
<td><strong>Listing of Learning Goals</strong></td>
<td>• There are no learning goals listed.</td>
<td>• There is a vague listing of the learning goals • The learning goals are not clearly connected to the content standards. • Some learning goals are not clearly assessed by the assessment activities.</td>
<td>• There is a detailed listing of the learning goals • The learning goals are clearly connected to the content standards • Each learning goal is clearly assessed by the assessment activities.</td>
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<tr>
<td><strong>Listing of Activities</strong></td>
<td>• There is no list of academic activities.</td>
<td>• There is a short list of some of the activities • The activities may be teacher-centered • The activities provide students with a single to access the understanding involved with instruction.</td>
<td>• There is a detailed listing of the activities • The activities are student centered • The activities provide students with multiple opportunities to access the understanding involved with instruction.</td>
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<td><strong>Analysis and / or Interpretation</strong></td>
<td>• There is no opportunity for students to analyze or interpret scientific information in the form of data or text.</td>
<td>• There are elements of analysis and / or interpretation that may not be clearly linked to the learning goals.</td>
<td>• There are elements of analysis and / or interpretation that are clearly linked to the learning goals that were stated.</td>
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<td></td>
<td>• There is no clear assessment plan</td>
<td>• There is a detailed listing of possible assessments</td>
<td>• There is a detailed listing of assessment including both ways</td>
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<tr>
<td>Description of Proposed Assessments</td>
<td>Description of Instructional Vocabulary</td>
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| including either the formative or summative assessment plan, but not both.  
  • The assessment strategy provides the instructor an opportunity to assess a few learning goals, but not all.  
  • Students’ conceptual understanding is assessed on the final assessment. |  
  • There is no list of the instructional vocabulary.  
  • The lesson plan provides a listing of either the content or support vocabulary that may be incomplete.  
  • The lesson plan describes how ELs and special needs students will be supported. |  
| of formative and summative assessment.  
  • The assessment strategy provides the instructor an opportunity to assess the listed learning goals.  
  • Students’ conceptual understanding is assessed prior to the final assessment. |  
  |
| **Design Thinking OR Argumentation Piece** | • There is no Instructional Agenda. | • The agenda provides a generic overview of each activity, but does not estimate the time or resources necessary to accomplish them all.  
• The instructional agenda is not designed to support design thinking or argumentation. | • The agenda provides a detailed overview of each activity, resources needed, and the time it will take to accomplish them all.  
• The activity allows students to engage in a design thinking activity or an argumentation-based discourse activity, and debriefs students. |