

# Education 185L/Cal Teach 3 –STEM Teaching and Learning Laboratory

Winter 2010

Room: Thimann 391

Class Sessions: Tuesdays, 6:00 - 7:50 pm

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Office Hours: 5:00 - 6:00pm Tuesdays

## **Purpose of Course**

The Cal Teach 3 course will supplement ED 185, in which you study learning theory in mathematics or science. In this lab, the roles that teaching and learning play in the development of mathematical and scientific understanding will be examined through discussion and hands-on activities. We will also touch upon how teaching and learning is affected by culture and language. In addition to participation in this laboratory course, you will also concurrently participate in a school internship.

## **Course Objectives**

1. Engage students as learners in an experiential laboratory course characteristic of current reform efforts in STEM instruction;
2. Discuss factors that can affect student learning;
3. Develop reflection and writing skills through discussion and practice.

## **Grading and Assignments**

Grades will be based upon preparation for and participation in class discussions and activities (20%), participation in the internship classroom (20%), writing assignments (50%) and class presentation (10%). I will evaluate the amount and quality of class participation. Input from the internship coordinator and host teacher will be used to determine the internship portion of the grade. *Written assignments must be typed and are due by the beginning of class on the day they are due. PAPERS WILL NOT BE ACCEPTED AFTER THE DUE DATE.* The instructor reserves the right to lower a student's overall course grade by one letter grade for every unexcused absence from class.

Written assignments include:

- Two 500 word essays reflecting upon your internship classroom experiences (5% each).
- Two short papers, 3-5 pages in length (5% each), due in weeks 3 and 6 (more detail below).
- One longer project of 12-18 pages, due in week 10 (elaborated below). Draft components of the final project will be due in weeks 2, 4, 7, and 8 (5% for each of the four preliminary assignments). The final paper is due the last day of class (10%).

All forms of academic misconduct, including plagiarism, as described in section 102 of the UCSC Code of Student Conduct, can result in a failing grade and/or expulsion from the class and/or university.

### *500 Word Essays about Internship Experiences*

1. Due Week 5: Progress report on internship classroom experiences. Please describe what you have learned and what you have done in your internship classroom to date.
2. Due Week 9: Final report on internship classroom experiences. Please reflect upon what you have learned and experienced during the quarter in your classroom internship.

### Short paper topics

1. Due Week 3: If/When you apply to a teacher credential program, you will be required at many institutions to write a personal statement that will be used in conjunction with other application materials to make judgments regarding your admission. This paper is meant to begin preparing you for credential program applications. Please write 3-5 pages describing how your background has influenced your decision to teach and/or attend graduate school. Please also describe any educational, familial, cultural, economic, or social experiences that have influenced your college and career decisions. How might you contribute to diversity within your field or serve underrepresented students with your degree?
2. Due Week 6: Describe a lesson you have observed in your placement classroom. Identify and discuss the learning theory that underlies the teacher's instructional approach to the lesson. You must reference at least 3 published works (e.g. readings from your Cal Teach or Education courses) and include a bibliography in APA or MLA format. This paper should be 3-5 pages long.

### Project

In CaT2, you developed a lesson intended to teach one or more legislatively mandated content standards. This project is intended to provide a context for you to link lesson content with pedagogical design that maximizes student learning. You will plan a short instructional **unit** (3-5 lessons) on a topic of choice. This unit may grow from a Cal Teach internship classroom or it can be a unit you would like to teach one day for middle or high school math or science students. You will describe what the students will learn, how they will be taught, and provide justification of the educational theory behind your choice of teaching methods. You must reference at least 4 scholarly articles/chapters and include a bibliography in APA or MLA format. In order to provide a framework in which to develop both your thinking and your writing, sub-assignments will be due throughout the quarter (weeks 2, 4, 7, and 8). The final project will be due the last day of class.

1. Due Week 2 - Introduction: Submit 1-2 pages describing the unit you will teach, brief descriptions of the topics you will teach, and overall learning goals for students.
2. Due Week 4 – Unit Activities: Provide 3-5 lesson plans (1-2 pages each) in the order you would teach them using the template on the next page (the template will also be emailed to you). Explain why you chose to teach the topics in that particular sequence.
3. Due Week 7 - Assessment: Submit 1-2 pages describing how you will assess your students, using both formative and summative evaluation techniques. You should also describe how will you evaluate the effectiveness of your teaching methods.
4. Due Week 8 – Learning Theory: Submit 3-4 pages describing the learning theory utilized in your teaching strategy. Why did you choose the teaching methods you did? Cite at least 4 scholarly references in this section from your Cal Teach and/or Education courses.
5. Due Week 10 - Total Revised Project: Please combine all draft components of the project, add transitions between sections, and make any corrections noted on the initial four components. In addition to submitting the final project, you will be required to resubmit the graded components due in weeks 2, 4, 7 and 8.

## Class Schedule

Date	In-Class Activities	Due in Next Class
Wk 1 1/5	<ul style="list-style-type: none"> <li>➤ Distribute syllabus</li> <li>➤ Discuss expectations.</li> <li>➤ Overview of course topics.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Reading 1 (Brooks &amp; Brooks)</li> <li>➤ Project Part 1: <i>Description of unit topic and learning goals</i> (1-2 pages).</li> </ul>
Wk 2 1/12	<ul style="list-style-type: none"> <li>➤ Behaviorist vs Active Learning</li> <li>➤ Literature activity</li> </ul>	<ul style="list-style-type: none"> <li>➤ Reading 2 <u>OR</u> 3 (Cai, et al <u>OR</u> Julyan &amp; Duckworth)</li> <li>➤ Short Paper 1 (3-5 pages): <i>Personal Statement</i></li> </ul>
Wk 3 1/19	<ul style="list-style-type: none"> <li>➤ Discuss Readings 2 and 3</li> <li>➤ Constructivism</li> <li>➤ Math/Science constructivist activities</li> <li>➤ Activity development</li> </ul>	<ul style="list-style-type: none"> <li>➤ Project Part 2: <i>Unit activities, materials needed and sequence of steps</i> (4-10 pages).</li> </ul>
Wk 4 1/26	<ul style="list-style-type: none"> <li>➤ Social Construction of Knowledge and Problem/Project-Based Learning</li> </ul>	<ul style="list-style-type: none"> <li>➤ Reading 4 (Clough)</li> <li>➤ 500 word essay: <i>Mid-term report about classroom internship</i> (500 words)</li> </ul>
Wk 5 2/2	<ul style="list-style-type: none"> <li>➤ Inquiry-Based Learning</li> <li>➤ Discuss inquiry in the classroom</li> </ul>	<ul style="list-style-type: none"> <li>➤ Reading 5 (Caram and Davis)</li> <li>➤ Short Paper #2: <i>Learning Theory Behind a Lesson You Have Observed in One of Your Internship Classrooms.</i></li> </ul>
Wk 6 2/9	<ul style="list-style-type: none"> <li>➤ Teaching Math and Science for Understanding</li> <li>➤ Cognitive demand</li> <li>➤ Circles and Floats? activities</li> </ul>	<ul style="list-style-type: none"> <li>➤ Project Part 3: <i>Student Assessment and Evaluation of Your Teaching Methods and Lesson Plan</i> (2-3 pages). Because there will be no class on Tuesday evening, please email your paper to <a href="mailto:apstucky@ucsc.edu">apstucky@ucsc.edu</a> by 6pm on 2/16.</li> </ul>
Wk 7 SAT. 2/20	<ul style="list-style-type: none"> <li>➤ Class will meet Saturday for a Technology in Education training provided for students in the MAT program. <i>(There will be no class on Tu 2/16)</i></li> </ul>	<ul style="list-style-type: none"> <li>➤ Reading 6 (AccELerate!)</li> <li>➤ Project Part 4: <i>Describe the Learning Theory used in your lesson plans. Justify why you chose to use each method of teaching. Cite at least 4 scholarly references in your work</i> (3-5 pages).</li> </ul>
Wk 8 2/23	<ul style="list-style-type: none"> <li>➤ Affect of Language and Culture on Classroom Learning</li> <li>➤ Demands in the classroom</li> <li>➤ Explanation activity</li> </ul>	<ul style="list-style-type: none"> <li>➤ Project Presentations: Group 1</li> <li>➤ 500 word essay: <i>Internship experience summary</i> (500 words).</li> </ul>
Wk 9 3/2	<ul style="list-style-type: none"> <li>➤ Presentations</li> </ul>	<ul style="list-style-type: none"> <li>➤ Project Presentations: Group 2</li> <li>➤ Final Project (12-18 pages). Please submit all graded sub-assignments with your final draft.</li> </ul>
Wk 10 3/9	<ul style="list-style-type: none"> <li>➤ Presentations; Course wrap-up</li> </ul>	

## GUIDELINES FOR THE STUDENT PROJECT PRESENTATIONS

Your project presentation should last 10-15 minutes and is worth 10% of your final course grade.

Below are items that should be addressed and discussed in your presentation.

1. *What is the topic you are teaching?*
2. *What activities will you use to teach the topic?*
3. *How will you assess your student learning?*
4. *What educational research and learning theories is your project based upon?*

Feel free to discuss additional elements that you find important to teaching and your project, including but not limited to:

1. *How does your lesson facilitate active learning?*
2. *How is your lesson connected to previous and future subject matter? (the basis of constructivism)*
3. *How does your lesson account for different learning styles?*

	Does Not Meet	Approaches	Meets
Instructional Plan	No clear learning goals. No plan for instruction beyond basic lecture notes. (0 points)	Learning goals described, but not clearly tied to instructional strategy. A plan for instruction described, but not carefully thought out. (1-2 points)	Learning goals clearly described, and tied to instruction. A plan for instruction is thoroughly described, including use of varying techniques to meet the needs of different learning styles. (3-4 points)
Assessment	Only the most basic methods of assessing student learning described. Learning goals not clearly assessed. (0 points)		Multiple methods used for assessing student learning. Assessments used are appropriate to learning goals. (1-2 points)
Educational Theory	No educational theory used to describe teaching strategies. (0 points)	Teaching strategy superficially tied to educational theory (1-2 points)	Teaching strategy is clearly tied to educational research and learning theory. Various methods to teaching are utilized. (3-4 points)

## Class Readings

1. Brooks, J. & Brooks, M. (2001). *In Search of Understanding: The Case for Constructivist Classrooms*, pp 3-14. New Jersey: Prentice Hall.
2. Cai, J., Moyer, J.C. & Laughlin, C. (1998). Algorithms for solving non-routine mathematical problems. In L. J. Morrow & M.J. Kenney (Eds.), *The Teaching and Learning of Algorithms in School Mathematics*, pp 218-229.
3. Julyan, C. & Duckworth, E. (1996). A constructivist perspective on teaching and learning science. In C.T. Fosnot., (Ed.), *Constructivism*. New York: Teachers College Press.
4. Clough, M.P. (2002). Using the laboratory to enhance student learning. In R. Bybee (Ed.), *Learning Science and the Science of Learning*, pp 85-94. Arlington, VA: National Science Teachers Association.
5. Caram, C.A. and Davis, P.B. (2005). Inviting student engagement with questioning. *Kappa Delta Pi Record*, Fall 2005, pp 18-23.
6. AccELLerate! (Fall 2009). Vol 2: Issue 1. Pp 11-16, 20-24.

➔ Optional readings about various course topics and a copy of this syllabus are available on my website: [http://calteach.ucsc.edu/aboutus/Amy\\_Stucky.html](http://calteach.ucsc.edu/aboutus/Amy_Stucky.html)

## Course Grading Scale

<b>100-98%</b>	<b>A+</b>	<b>79-77%</b>	<b>C+</b>
<b>97-94%</b>	<b>A</b>	<b>76-74%</b>	<b>C</b>
<b>93-90%</b>	<b>A-</b>	<b>73-70%</b>	<b>C-</b>
<b>89-87%</b>	<b>B+</b>	<b>60-69%</b>	<b>D</b>
<b>86-84%</b>	<b>B</b>	<b>&lt;= 59%</b>	<b>F</b>
<b>83-80%</b>	<b>B-</b>		