



SCHOOL OF EDUCATION

*Engaging diverse communities through leading and learning for social justice.*

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<b>Course Number</b>	<b>EDST 450-01</b>
<b>Course Title</b>	<b>STEM Teaching and Learning, Theory and Practice</b>
<b>CRN Number</b>	<b>21741</b>
<b>Days</b>	<b>Tuesday</b>
<b>Time</b>	<b>4:00-5:30 PM</b>
<b>Course Location</b>	<b>ACD 204</b>
<b>Semester / Year</b>	<b>Spring 2017</b>
<b>Instructor</b>	<b>Debbie DeRoma</b>
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<b>Office</b>	<b>ACD 423A</b>
<b>Hours</b>	<b>Thursday 12:00 – 1:00 PM, or by appointment</b>

### SCHOOL OF EDUCATION MISSION & VISION STATEMENT

*(Adopted by SOE Governance Community, January 2013)*

#### *Vision*

To serve the educational needs of local, regional, and global communities, the School of Education advances innovative practice and leadership by generating, embracing, and promoting equitable and creative solutions.

#### *Mission*

The mission of the School of Education community is to collaboratively transform education. We:

- Create community through partnerships
- Promote and foster social justice and educational equity
- Advance innovative, student-centered practices
- Inspire reflective teaching and learning
- Conduct purposeful research
- Serve the School, College, University, and Community

### BASIC TENETS OF OUR CONCEPTUAL FRAMEWORK

- Student centered education
- Research and theory specific to the program field inform practice
- Connections and links between coursework and application
- Strong engagement between faculty and candidates
- Co-teaching clinical practice
- Culturally responsive pedagogy and socially just outcomes

## **COURSE DESCRIPTION**

### **Undergraduate Mathematics and Science Teaching and Learning, Theory and Practice**

Designed for students serving as Learning Assistants (LA), Tutors, Teaching Assistants (TA), or Supplemental Instructors (SI) in undergraduate STEM courses. Integrates educational theory, pedagogy, and practice as well as touching on theoretical issues such as conceptual development, conceptual change, collaborative learning, technology in education, and students' conceptions of various topics in mathematics and science. Focuses on practical issues encountered in facilitating learning, managing the classroom, formative and summative assessment, curricula, and differentiating instruction in a collaborative environment.

### **Course Prerequisites**

Accepted as a CSUSM LA, TA, Tutor, SI Leader, or Ambassador for Spring 2017.

### **Course Objectives**

The primary objectives of this course are as follows:

- To provide participants' with the knowledge, confidence, and skills necessary to be successful peer educators
- To expand participants' understanding of effective methods of college teaching and instructional strategies
- To develop participants' ability to apply educational theory and relevant research in a classroom environment
- To increase participants' awareness of careers in math and science teaching

### **Credit Hour Policy Statement**

Per the University Credit Hour Policy:

- Students are expected to spend a minimum of two hours outside of the classroom each week for each unit of credit engaged in learning.
- The combination of face-to-face time, out-of-class assignments, peer observations, and group projects totals at least the minimum of 45 hours per unit of credit.

## **REQUIRED TEXTS, MATERIALS AND ACCOUNTS**

There is no required text for this course. Weekly course readings will be available online through Cougar Courses (CC).

### **Course Material Available**

#### **Cougar Courses**

The course syllabus, LA contracts, weekly readings, handouts, videos, and directions and rubrics for major assignments can be found on the Cougar Courses site (<http://cc.csusm.edu/>). Be sure to set your preferred email in your profile settings so you receive important announcements and communications. It is your responsibility to check the course site regularly and bring any issues to the instructor's attention.

## COURSE LEARNING OUTCOMES

Upon successful completion of this course, students will (be able to):

- Identify univocal vs. dialogic discourse in a STEM classroom
  - Apply appropriate questioning strategies in their work as an LA, TA, Tutor, or SI
  - Describe the role of formative assessment and the importance of eliciting student thinking in the STEM classroom
  - Utilize student preconceptions to design learning/teaching scenarios
  - Manage group investigations related to a topic/concept in their fields of expertise
  - Evaluate student activity to recognize examples of “doing science” vs. “doing school”
- Identify the intellectual activity of STEM teaching, including the ongoing opportunities to do math or do science as a teacher

## GENERAL CONSIDERATIONS

### **School of Education Attendance Policy**

Due to the dynamic and interactive nature of courses in the School of Education, all candidates (course participants) are expected to attend all classes and participate actively. At a minimum, candidates (course participants) must attend more than 80% of class time, or s/he may not receive a passing grade for the course at the discretion of the instructor. Individual instructors may adopt more stringent attendance requirements. Should the candidate (course participants) have extenuating circumstances, s/he should contact the instructor as soon as possible. (*Adopted by the COE Governance Community, December, 1997*).

### **CSUSM Academic Honesty Policy**

Students will be expected to adhere to standards of academic honesty and integrity, as outlined in the Student Academic Honesty Policy. All assignments must be original work, clear and error-free. All ideas/material that are borrowed from other sources must have appropriate references to the original sources. Any quoted material should give credit to the source and be punctuated accordingly.

Academic Honesty and Integrity: Students are responsible for honest completion and representation of their work. Your course catalog details the ethical standards and penalties for infractions. There will be zero tolerance for infractions. If you believe there has been an infraction by someone in the class, please bring it to the instructor's attention. The instructor reserves the right to discipline any student for academic dishonesty, in accordance with the general rules and regulations of the university. Disciplinary action may include the lowering of grades and/or the assignment of a failing grade for an exam, assignment, or the class as a whole.

Incidents of Academic Dishonesty will be reported to the Dean of Students. Sanctions at the University level may include suspension or expulsion from the University.

Refer to the full Academic Honesty Policy at:

[http://www.csusm.edu/policies/active/documents/Academic\\_Honesty\\_Policy.html](http://www.csusm.edu/policies/active/documents/Academic_Honesty_Policy.html)

### **Plagiarism**

As an educator, it is expected that each candidate (course participant) will do his/her own work, and contribute equally to group projects and processes. Plagiarism or cheating is unacceptable under any circumstances. If you are in doubt about whether your work is paraphrased or plagiarized see the Plagiarism Prevention for Students website <http://library.csusm.edu/plagiarism/index.html>. If there are questions about academic honesty, please consult the University catalog.

### **Students with Disabilities Requiring Reasonable Accommodations**

Students with disabilities who require reasonable accommodations must be approved for services by providing appropriate and recent documentation to the Office of Disabled Student Services (DSS). This office is located in Craven Hall 4300, and can be contacted by phone at (760) 750-4905, or TTY (760) 750-4909. Students authorized by DSS to receive reasonable accommodations should meet with their instructor during office hours or, in order to ensure confidentiality, in a more private setting.

### **All University Writing Requirement**

The CSUSM writing requirement of 850 words is met through the completion of the peer observation write-up, poster assignment, and weekly teaching and reading reflections. All writing will be assessed for content, organization, grammar, spelling, and format.

### **Use of Technology**

Candidates (Course participants) are expected to demonstrate competency in the use of various forms of technology (i.e. word processing, electronic mail, Moodle, use of the Internet, and/or multimedia presentations). Specific requirements for course assignments with regard to technology are at the discretion of the instructor. Keep a digital copy of all assignments for use in your teaching portfolio. All assignments will be submitted online, and some will be submitted in hard copy as well. Details will be given in class.

### **Electronic Communication Protocol**

Electronic correspondence is a part of your professional interactions. If you need to contact the instructor, e-mail is often the easiest way to do so. It is my intention to respond to all received e-mails in a timely manner. Please be reminded that e-mail and on-line discussions are a very specific form of communication, with their own nuances and etiquette. For instance, electronic messages sent in all upper case (or lower case) letters, major typos, or slang, often communicate more than the sender originally intended. With that said, please be mindful of all e-mail and on-line discussion messages you send to your colleagues, to faculty members in the School of Education, or to persons within the greater educational community. All electronic messages should be crafted with professionalism and care.

Things to consider:

- Would I say in person what this electronic message specifically says?
- How could this message be misconstrued?
- Does this message represent my highest self?
- Am I sending this electronic message to avoid a face-to-face conversation?

In addition, if there is ever a concern with an electronic message sent to you, please talk with the author in person in order to correct any confusion.

## **COURSE REQUIREMENTS AND GRADED COURSE COMPONENTS**

### **Key Assignments**

This course is a seminar, and its success will depend on the active participation of all members in helping to shape the content and its relevance. Our primary activity will be in-depth discussions of course topics and readings. Requirements include the following:

1. *Class Discussion/Participation (20%)* – Class members are expected to attend every class session and contribute to class discussions. The purpose of these discussions is to help us as individuals, and as a group, develop meaningful interpretations of the ideas conveyed by the readings, and to make connections to the class members' teaching experiences. There will be weekly questions about the assigned article(s).
2. *Weekly Quick-Writes (15%)* – Each class member is expected to respond to a collection of questions based on the weekly article reading. Quick-writes will be completed at the start of each class meeting.
3. *Weekly Teaching Reflections (15%)* – Each LA is expected to spend approximately 4-7 hours per week working with STEM undergraduates in collaborative, learner-centered environments. Using this

experience as a guide, fill out weekly teaching reflection questions. Post responses to CC. These reflections may be shared with the CSM lead faculty; however, LA names – not departments/courses – will be removed. **\*\*NOTE\*\*** After several weeks, if you have only interacted with a handful of students (and/or mainly on an individual basis), contact your LA course instructor (me).

4. *Peer Observation (15%)* – Each LA will complete and submit a written summary of a field observation of another LA. During the LA Seminar, you also will have a consultation session with the LA you observed. (Likewise, you also will be observed and participate in a consultation session.)
5. *Poster Assignment (25%)* – Working individually or in pairs, students will develop and present a poster that describes how their views of teaching and learning have changed over the course of the semester. The poster will be shared with faculty and fellow students.
6. *Weekly Meetings with Lead Faculty in Mathematics and Science to Plan Instruction (10%)* – Each week, LAs are responsible for meeting with the CSM lead faculty to plan and reflect on instruction and to discuss student achievement. Students cannot pass the LA Seminar course if they fail to meet with the Lead Instructor each week. **\*\*NOTE\*\*** If you find that your Lead Instructor is not meeting with you, notify your LA course instructor immediately so that this can be corrected.

### **Grading Standards**

This course is graded as Credit / No Credit. The following activities contribute to the course grade:

<b>Activity</b>	<b>Points Possible</b>	<b>% Total Grade</b>
<b>Attendance &amp; Class Participation</b>	<b>60</b>	<b>20%</b>
<b>Weekly In-Class Quick Writes (3pts each X 15)</b>	<b>45</b>	<b>15%</b>
<b>Weekly Teaching Reflections (3pts each X 15)</b>	<b>45</b>	<b>15%</b>
<b>Observation Assignment</b>	<b>45</b>	<b>15%</b>
<b>Poster Assignment</b>	<b>75</b>	<b>25%</b>
<b>Weekly Meetings with Faculty</b>	<b>30</b>	<b>10%</b>
<b>Total</b>	<b>300</b>	<b>100%</b>

### **Final Exam Statement**

There is no final examination for this course. The poster presentation during Week 15 serves as the culminating project for the course.

### **Policy on Late/Missed Work**

Unless *prior arrangements* have been made with the instructor, work submitted past the due date will be reduced by one letter grade for each week it is late. Work received over two weeks late may receive no credit. One point will be deducted for all reflections submitted more than one week late. Two points will be deducted for all reflections submitted more than two weeks late.

**TENTATIVE\* SCHEDULE**

Date	Topic	Reading/Assignment Readings are to be completed BEFORE class. Teaching reflections due by midnight the following Sunday.
Week 1 1/24/17	Introduction to Being an LA <i>Discuss LA contracts</i>	Week 1 Teaching Reflection <b>LA Entrance Survey</b>
Week 2 1/31/17	Classroom Discourse: Dialogic versus Univocal	Knuth, E., & Peressini, D. (2001). Unpacking the nature of discourse in mathematics classrooms. <i>Mathematics Teaching in the Middle School</i> . 6(5). 320-325. Week 2 Teaching Reflection
Week 3 2/7/17	Questions and Questioning Strategies	Trowbridge, L. W., Bybee, R. W., & Powell, J. C. (2000). Questioning and discussion. In <i>Teaching secondary school science: Strategies for developing scientific literacy</i> (1st ed). Upper Saddle River, NJ: Merrill. Week 3 Teaching Reflection <b>LA Contract – signed by professor</b>
Week 4 2/14/17	Learning Theory I: Mental Models <i>Discuss protocol for LA observation</i>	Redish, E. (1994). Implications of cognitive studies for teaching physics. <i>American Journal of Physics</i> . 62(9). Week 4 Teaching Reflection
Week 5 2/21/17	Formative Assessment	Nicol, D.J. & MacFarlane-Dick, D., (2006). Formative assessment and self-regulated learning: A model and seven principles of good feedback practice. <i>Studies in Higher Education</i> . Week 5 Teaching Reflection
Week 6 2/28/17	Mindsets	Dweck, C. (2008). Mindsets and Math/Science Achievement. <i>Carnegie Corporation of New York-Institute for Advanced Study Commission on Mathematics and Science Education</i> . 31(2), 198-218. Week 6 Teaching Reflection
Week 7 3/7/17	Student Ideas in Content Areas	See miscellaneous articles posted on CC relevant to topic areas. Week 7 Teaching Reflection
Week 8 3/14/17	Cooperative Learning & Motivation	Frey, N., Fisher, D., Everlove, S. (2009). Defining Productive Group Work. In <i>Productive Group Work</i> . Alexandria, VA: ASCD. Frey, N., Fisher, D., Everlove, S. (2009). Promoting Face-to-Face interactions. In <i>Productive Group Work</i> . Alexandria, VA: ASCD. Week 8 Teaching Reflection <b>LA Observation write-up due</b>

**SPRING BREAK**

		<b>Reading/Assignment</b>
<b>Date</b>	<b>Topic</b>	<b>Readings are to be completed BEFORE class. Teaching reflections due by midnight the following Sunday.</b>
Week 9 3/28/17	Metacognition	Schoenfeld, A. (1987). What's all the fuss about metacognition? In A. Schoenfeld (Ed.) <i>Cognitive Science and Mathematics Education</i> (pp. 189-215). Hillsdale, NJ: Lawrence Erlbaum Associates. Week 9 Teaching Reflection
Week 10 4/4/17	Argumentation <i>Discuss Poster Assignment</i>	Osborne, J. (2011) The role of argument: Learning how to learn in school science. In Fraser, B.J. & Tobin, K. (Ed.) <i>Second International Handbook of Science Education</i> (pp. 933-948). Springer Science & Business Media, 2011. Week 10 Teaching Reflection
Week 11 4/11/17	LA Celebration & Recruitment Event	Week 11 Teaching Reflection
Week 12 4/18/17	Nature of Science/Nature of Mathematics	McComas, W. (1997) 15 Myths of Science. <i>Skeptic</i> 5(2) 88-96. Week 12 Teaching Reflection
Week 13 4/25/17	Qualities of Effective Teachers	Stronge, J. H. (2002). <i>Qualities of effective teachers</i> . Washington, DC: ASCD. Week 13 Teaching Reflection
Week 14 5/2/17	Influence of Technology	See miscellaneous videos posted on CC Week 14 Teaching Reflection
Week 15 5/9/17	Poster Presentations	Week 15 Teaching Reflection <b>LA Exit Survey</b> <b>Poster presentation due</b>

\*This schedule is an approximation. Given the nature of the seminar, we will likely alter the scheduled topics (and possibly dates) in order to accommodate student interest and learning opportunities. In particular, reading assignments are likely to adjust as the class unfolds. Please check the course website regularly for updates to this schedule.