

California State University San Marcos
College of Education
EDST 612: Methods for Science Teaching II: Physical Sciences
Thursdays 5.30 - 8.15 p.m. at Alvin Dunn Elementary School
Room 48
Spring 2006

General Information:

Instructor:

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College of Education Mission Statement

The mission of the College of Education Community is to collaboratively transform public education by preparing thoughtful educators and advancing professional practices. We are committed to diversity, educational equity, and social justice, exemplified through reflective teaching, life-long learning, innovative research, and ongoing service. Our practices demonstrate a commitment to student-centered education, diversity, collaboration, professionalism, and shared governance.

Course Description:

The description and the course objectives/ schedule may be subject to adjustment, additions or subtraction based on student and teacher input before, during and after completion of this course. In this course, we will investigate several models of teaching and applying them to the science classroom. This course will also focus on expanding the students' breadth of science through discussions, experiments, and teachings in the physical sciences. It is the goal of the instructor to make connectivity between the major areas of science. By the end of the class, students should have a stronger knowledge base in the physical sciences content and be able to implement several designed lessons in their respective classrooms.

The purpose of the course should serve multiple purposes all related to the understanding and the challenges of teaching science in today's schools. The first purpose is to familiarize the student with the central concepts in physical sciences and strategies for effectively teaching these concepts to different types of learners.

A second purpose is to use this focus, to personalize the inquiry by a proposing and implementing a more formal inquiry/investigation on the learning needs of one child specific to a selected physical science concept and to plan for an instructional intervention necessary to meet the student's learning needs. Many of the course activities will also

serve as models for the National Board requirements and also examples of applications of National Technology Standards for Teachers.

National Board for Professional Teaching Standards (NBPTS)

All courses within the CSUSM masters program are intended to provide a comprehensive professional development experience. Teachers pursuing National Board Certification will find the COE assessment process, including requirements for portfolio completion, particularly helpful. Regardless of whether or not National Board Certification is sought and achieved, by the time teachers complete the program they will have made and documented significant accomplishments, which will be reflected in their practice.

The National Board for Professional Teaching Standards' (NBPTS) five core propositions that are reflected in the COE masters program course syllabi. The concepts in the five propositions are the heart of the National Board's perspective on what teachers should know and be able to do. They help frame the core experiences and activities that enable teachers to demonstrate a high level of knowledge, skills, dispositions, and commitments described by these propositions. They provide the foundation for all standards and assessment. These propositions are: 1) Teachers are committed to students and their learning; 2) Teachers know the subjects they teach and how to teach those subjects to students; 3) Teachers are responsible for managing and monitoring student learning; 4) Teachers think systematically about their practice and learn from experience; and 5) Teachers are members of learning communities.

CSUSM masters students will be supported in meeting the National Board's high and rigorous standards through the completion of assignments for program courses. Through their portfolios that provide evidence of teaching practice, through student work samples, through videotapes of classroom interaction, and through written commentaries that document and reflect their actions. These sources of evidence serve as a lens to what teachers do and how they think about their practice.

The EDST 612 course activities focus on content knowledge as well as age-appropriate and content-appropriate strategies that teachers may use for teaching physical science subject matter. Students will demonstrate their knowledge by responding to topics, assignments and readings that address critical issues of change and through the development of professional growth planning and reflective thinking. Course objectives that align with (NBPTS) indicate that all students will show evidence of the following:

- A commitment to students and their learning.
- Knowledge of the subjects they teach and how to teach them.
- The demonstration of management and monitoring of student learning.
- Thinking systematically about their practice and learning from experience.
- Involvement as members of learning communities.

Required Texts:

1. Koballa, R. T., & Tippins, J. D. (2000). *Cases in middle and secondary science education: The promise and dilemmas*, (2nd Ed.) Upper Saddle River, NJ: Pearson Merrill Prentice Hall.

Other Readings

2. National Science Education Standards. Available:
<http://www.nap.edu/catalog/4962.html>
3. California State Science Education Standards. Available online at
<http://www.cde.ca.gov/be/st/ss/scmain.asp>

Authorization to Teach English Learners

This credential program has been specifically designed to prepare teachers for the diversity of languages often encountered in California public school classrooms. The authorization to teach English learners is met through the infusion of content and experiences within the credential program, as well as additional coursework. Students successfully completing this program receive a credential with authorization to teach English learners.

(Approved by CCTC in SB 2042 Program Standards, August 02)

College of Education Attendance Policy

Due to the dynamic and interactive nature of courses in the College of Education, all students are expected to attend all classes and participate actively. At a minimum, students 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 student have extenuating circumstances, s/he should contact the instructor as soon as possible. *(Adopted by the COE Governance Community, December, 1997).*

Students with Disabilities Requiring Reasonable Accommodations

Students must be approved for services by providing appropriate and recent documentation to the Office of Disable Student Services (DSS). This office is located in Craven Hall 5205, 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.

Course Objectives:

Upon completion of this course the student will be able to:

1. Demonstrate knowledge and understanding of the major concepts in physical sciences,
2. Analyze and mediate the learning needs of students relative to key concepts in physical sciences.
3. Develop and teach physical science lessons using inquiry, constructivist problem solving model of teaching through a hands-on, interactive model.

4. Think critically about issues affecting teachers and the teaching of physical science through the analysis of teaching cases.

Grading Procedures and Assignments

Grading is calculated based the following percentage points:

94 - 100 = A	80 - 83 = B-	70 - 73 = C-
90 - 93 = A-	77 - 79 = C+	60 - 69 = D
87 - 89 = B+	74 - 76 = C	below 60 = F
84 - 86 = B		

Web Site Resources:

CSUSM Library: <http://library.csusm.edu/>

WebCT: <http://courses.csusm.edu>

National Science Teachers Association (NSTA): www.nsta.org

Eisenhower National Clearing House: www.enc.org

National Board for Professional Teaching Standards: <http://www.nbpts.org/>

California Science Education Standards: <http://www.cde.ca.gov/re/pn/fd/documents/sci-stnd.pdf>

Graduate level expectations of assignments:

- Expectations are that all assignments will be professionally done (i.e. typed and at the highest quality level representative of graduate work)
- Citations should always be used when utilizing information from another source as well as quotations if direct quotes are used
- Punctuality and attendance and participation are essential and missed assignments and classes will be excused only for highly unusual circumstances. Any assignments that could be made up from missed days (not all could since they are group and interactive) will only count a maximum of 1/2 since discussion/reflection of these assignments in class is an essential part of the process. **Two missed classes will lower student grade by one and three may result in a dropped from the class.**

Synopsis of each assignment:

- 1. Discussion Questions:** *(Based on Readings from the course text: Cases in Middle and Secondary Science Education) – 15%*

Each student will be required to submit a discussion question through WebCT for the class based on the readings from assigned chapters from the book *Cases in Middle and Secondary Science Education*. Late submissions will not be accepted since the questions

will be used to direct the class discussions and activities. If you submit a question beyond the expected time, it will not count towards your grade for this assignment.

The question should be submitted to the WebCT class postings under the heading identified for discussion questions by NOON on the day of the class when such readings are assigned. The specific chapters assigned for each day are shown in the class schedule in the appendices to this syllabus. The discussion question should be an open-ended question that provides opportunity for discussion and calls for diverse responses. In addition it should reflect that you read the assigned readings. The dates when the questions are due are reflected in the course schedule. Late submissions will not be accepted since the questions will be used to direct the class discussions and activities. If you submit a question beyond the expected time, it will not count towards your grade for this assignment.

2. Reflective Reading logs for other readings assigned in class (5%):

Beyond the readings from the course text, other readings pertinent to specific days' agenda will be provided through WebCT. For these readings each student will prepare a reading log. These will not be collected but in order for one to participate in discussions, expectations are that they would be available). This is on the honor system but if it is evident that a student has not done the reading and the log he or she will be deducted appropriate points. The following format is a possible suggestion of how this might be done:

- Short summary of the main ideas
- List some questions you would like to discuss with your group
- Make some connections with something that has happened in your teaching and/or learning experience.
- Find at least four interesting concepts or passages that are new or have special meaning to you and or recommendations (especially for the CASES).
- Create a visual of what your favorite part of the reading, what you learned and share it

3. Model Lesson Presentations (25%)

The spirit of this assignment is for the class to observe a variety of examples of teaching physical sciences using the inquiry approach and have an opportunity to critique it. Each student will have an opportunity to choose one concept in the physical sciences and prepare and teach the concept modeling a specific teaching approach. You will teach this to your classmates. Each lesson will be allocated 30 minutes of class time to teach and 10 minutes for discuss and feedback from your classmates. Do not ask your classmates to act as kids in your class but teach the way you would teach it exactly in your class. Treat your classmates as teachers who can learn from your lesson the same way student may learn.

The lessons should include hands-on activities lessons, and should emphasize particular physical science concepts. The learning cycle is strongly recommended as a guide to

lesson development and implementation. The Exploration phase of the Learning Cycle must require hands-on science activities using manipulatives that may be either physical or electronic. Hands-on activities are NOT reading or completing worksheets (though they may require students to read something or complete lab observation sheets). You should take the activities off paper and require students to use the science process skills with science manipulatives.

A handout lesson plan should be available at the conclusion of the presentation that includes as a minimum: standards addressed objectives, materials and resources, procedures, assessments and explanation. Presentations will be evaluated by the instructor and peers using the following rubric:

- 1) Appropriateness of materials (0-5)
- 2) Questioning Techniques (0-5) Non-judgmental, Science process skills, Constructivist, Closure
- 3) Involvement/Engagement of audience (0-5)
- 4) Teacher Content Knowledge (0-5)
- 5) Overall comments and scoring

4. Interviewing/Teaching Tasks – 50%

One of the most fundamental principles of teaching is to understand the capabilities and prior knowledge of the target learner: “Where are your learners and how far you can expect to go with them?” In this three-part assignment, you will first plan to conduct an interview with a school student to gather an understanding of the student’s prior knowledge of a given fundamental concept in physical science. Once you have designed your interview, you will then conduct your interview. You will use your interview to identify your student’s conceptions of the concept. You will then design a brief 5-E format lesson to remediate some aspect of your student’s alternate or incomplete conceptions. Finally, after receiving feedback on your lesson plan, you will present your lesson to the student and analyze its effectiveness. By taking part in this process, you will be gaining important practical experience in developing questioning and teaching strategies, skills that are the hallmark of exemplary teaching! Details of the assignment will be provided in class.

Summary List and Value of each Assignment:

- 1) Reflections/comments on designated reading assignment (self assessment) 5%
- 2) Attendance and Participation in discussion/evaluations = 5%
- 3) Model Lesson presentations 25%
- 4) Discussion Questions – 15%
- 5) Student Interviewing assignment – 50%

EDST 612: Tentative Course Schedule

Week	Date	Topic	Readings & Assignments Due
1	1/19	Introductions; Discussion on The Nature of Science and school Science; State and national Standards	
2	1/26	Creating an Inquiry based science classrooms <i>Balancing Acts Activity</i>	Read the Learning Cycle handout on WebCT Reflection Due in Class
3	2/02	Knowledge Construction Processes in physical sciences <i>Pendulums Activity</i>	Chapter 5 Learning Cycle handout Question due
4	2/09	Process Skills & Processes Based Science Learning	Chapter 7 Question Due Interview Task Part I presentations
5	2/16	Cooperative Learning in Physical Sciences <i>Guest Speaker</i> <i>Physical Science Concept Activity by Student</i>	Chapter 6 Question Due Task I Due on WebCT Assignments
6	2/23	<i>Physical Science Concept Activity by Student</i> Problem based learning in Science	Chapter 3 Question Due
7	3/02	Meaningful Learning /Conceptual Change <i>Electricity & Circuits Activity by Instructor</i>	Chapter 4 plus Handout Question Due
8	3/09	Cross Curricula Learning /multidisciplinary	Interviewing Task Part II Presentations. WebCT Class/Synchronized discussions Chapter 2: Question Due
9	3/16	Assessment: Knowing your students and their abilities <i>Physical Science Concept Activity by Student</i>	Chapter 10: Question Due
10	3/23	<i>Physical Science Concept Activity by Student</i> Technology based learning	Chapter 9: Question Due Task II Due on WebCT
11	3/30	SPRING BREAK	☺ Enjoy the week off!

12	4/6	Task III Individual work with students	No class meeting
13	4/13	Adapting Science Curriculum <i>Physical Science Concept Activity by Student</i>	Chapter 11: Question Due
14	4/20	Curriculum Design models <i>Physical Science Concept Activity by Student</i> <i>Guest Speaker</i>	Handouts from Guest Speaker Reflection Due in class
15	4/27	Contemporary Issues in Sc.Ed. <i>Simple machine Activity/Pulleys</i>	Chapter 8: Question Due
16	5/04	Interviewing Task Presentations/ Closing	Task III Due on WebCT