

**Advanced Methods in Science Teaching II: Physical Science Emphasis
EDST 612
Spring 2004**

General Information:

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Other times are also available by appointment so please feel free to call or e-mail me to set up a convenient time to meet.

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.

Required Materials:

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

Joyce, B., Weil, M., & Calhoun, E. (2000). *Models of Teaching-6th Edition*. Boston, MA: Allyn & Bacon.

Course Description:

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.

Course Assignments:

| Assignment | Points | Due Date |
|-------------------------------|--------|---|
| 1. Assignments and Homework | 10 | TBD throughout semester |
| 2. Mini Lessons | 10 | Electronic lesson plan due one week after specified model of teaching is presented |
| 3. Lesson Plan | 25 | <i>March 6:</i> Group identified topic <i>May 1:</i> Lesson plan with supporting documents due |
| 4. Current Issues Assignment | 25 | <i>April 24:</i> Paper due |
| 5. Electronic Portfolio | 25 | <i>May 15:</i> due during finals week |
| 6. Attendance & Participation | 5 | |

PROFESSIONALISM:

As a professional in the field of education, you need to take seriously your responsibility for learning and helping others learn in this class. As a professional, you should:

- attend all classes
- arrive on time and remain for the entire period
- be prepared for each class by having thoughtfully completed all readings and assignments
- keep me informed of any extenuating circumstances in your life that may hinder your ability to succeed in this course
- remain on task during class sessions
- respect others' opinions in the class
- be curious about ideas different than your own

I take very seriously the idea that our class is a community of learners. It is important that everyone feels both encouraged to participate and a responsibility to participate. All ideas are welcome including those that are different than my ideas and those of the majority of the class. Only through explorations of multiple perspectives will we be able to really address the complex issues of teaching and learning mathematics.

COE ATTENDANCE POLICY:

Due to the dynamic and interactive nature of course in the COE, 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. If you miss two class sessions or are late (or leave early) more than three sessions, you cannot receive a grade of "A". If you miss

three class sessions, your highest possible grade is a "C+". Should you have extenuating circumstances, contact the instructor as soon as possible. Please discuss with me any extenuating circumstances that will cause you to miss class prior to your absence. Attendance will be taken at each class session.

GRADING SCALE:

Grades will be based on the typical grading scale shown below. Additionally, plus and minus grades will be used.

| | |
|--------|-----------|
| A..... | 90 -100% |
| B..... | 80 - 89% |
| C..... | 70 - 79% |
| D..... | 60 - 69% |
| F..... | Below 60% |

PLAGIARISM AND CHEATING:

Please be sure to read and understand the university policy on plagiarism and cheating as it will be strictly enforced. Academic dishonesty will not be tolerated and will result in a failing grade for this course and will be reported to the University.

SPECIAL CONCERNS:

Every consideration is made to accommodate student learning in this course. If you have any special needs, please inform the instructor. Some students are terrorized by the thought of taking a "science" course. It is the instructor's goal to alleviate this fear and replace it with a positive learning experience!

COURSE ASSIGNMENTS:

With the exception of the laboratory notebook, all assignments should be double-spaced and saved on a zip disk. Each assignment is due on the date indicated on the syllabus, and grades on late assignments will be lowered unless *prior arrangements* have been made with the instructor. A more thorough description of the course assignments is provided near the end of this document.

- ALL ASSIGNMENTS MUST BE TURNED IN BY THURSDAY, MAY 15, 2003.

Discussion Questions, Participation and Attendance – 15 points

Each student will be required to submit a discussion question for the class based on the reading for the specific class. The question should be submitted to the instructor via email by noon on the day of the class. The discussion question should be an open-ended question that provides opportunity for discussion and calls for diverse responses. Examples of such questions will be available on WebCT

Active participation in this course is determined by both being present and contributing in a positive way that supports the learning of the class. In addition

to doing individual work, collaboratively working in groups, both large and small, is an integral part of teaching and learning. A small portion of your grade in this class is determined by how well you are able to work with the variety of individuals in your cohort to produce the best possible outcome. Additionally, you must be present to make your contribution. Your presence is determined not only by your body being in class, but also your mind. No outer-body experiences allowed! ☺

Model Lesson Presentations (25%)

Each student will have an opportunity to choose one of the models of teaching to be discussed in the course and prepare a lesson modeling the specific teaching approach.

Science Instruction Case Study (30%) (May work in pairs)

You will develop a case study of science instruction involving input from classroom observations, a K-12 teacher or teachers and K-12 students. The case should include 5 parts: your observations, teacher interview, student surveys, data analysis (comparison chart of comparison included here may be used), and case study paper. Carefully read A-F below.

Observations of Science Lessons

A. Ask a school teacher if you can observe 2-3 science lessons in his or her class. Your observation should focus on the key models of science teaching discussed in the course. The following questions may help direct your observations:

1. How would you define science instruction in this classroom?
2. What are the characteristics of science instruction?
3. What do the students do during science instruction?
4. What materials are used?
5. How often do the students engage in hands-on activities?
6. Do they each participate and have a role?
7. How is the classroom organized for science instruction?
8. What science materials are in the classroom?
9. What evidence is there of science?
10. Do you see writing infused within the science lessons? If so, what are some examples?
11. Are there children in the class who are learning English? What differences and similarities exist for children who are learning English?

Feel free to add more descriptive information in regard to science instruction.

B After you have answered the above questions find time to interview the teacher..

Ask the teacher to answer the Teacher Survey. Please inform the teacher that the school and district will not be identified, only the grade level. Please do not put the teacher's name on the survey.

Teacher Survey

1. How do children learn science?
2. How do you organize instruction so that children learn concepts related to the California science standards?
3. What are the different activities that you do during science instruction?
4. How do you group the students during science activities?
5. How often do you teach science?
6. How often do the children participate in hands-on science activities?
7. Do you integrate writing activities into science lessons? What are some examples?
8. What is the easiest thing about teaching science?
9. What is the most difficult thing about teaching science?
10. If you could design the ideal science program, what would be the characteristics of the program?
11. How do you organize instruction for science in two languages or in a language other than English? What challenges does this present for you?
12. How do you adapt instruction for students with special needs? Are there particular techniques or issues related to science teaching and students with special needs?

Feel free to include other questions during the interview. If possible, take a portable tape recorder to record the responses for later transcription, as it is easy to miss some things when you are taking notes. Be sure to ask the teacher if she or he minds if you use the tape recorder, and do not use it if the teacher is hesitant.

- C. Ask the teacher if you can hand out the Student Survey to the students in the class. Do **not** have the students put their names on the surveys. Feel free to include other questions on the survey, but do not make it too long for the students to answer. This survey will work with third graders and up; you can try it with second graders but I would suggest reading the questions aloud one at a time for them. If you are working with K, 1 or 2 use the following alternative strategy: Choose approximately 6 students (if you are in a bilingual class choose 3 who have English as their native language and 3 with Spanish or whatever other language is spoken in the class). Interview each student using the survey questions. Record the answers, if possible, and transcribe the taped interviews. Be flexible and adapt the survey to the level of the students.

Student Survey

Please answer the following questions.

Grade level: _____ Are you a Boy Girl ?

What language(s) do you speak? English Spanish Other

1. What happens during science in your class? How does your teacher teach you science?
2. How often do you do hands-on science activities in class?
3. What sorts of science activities do you do in class?
4. Do you work in groups to do science activities? If so, what do you do in the groups? Does each person have a job to do?
5. Do you have science materials to use during science activities? What sorts of materials do you use?
6. What are some of the science topics you have studied this year in science class?
7. Do you like science time? What do you like best about it?
8. Are you a good student in science? What helps you learn best?

D. Examine the three sets of data (your observations, those of the teacher and students) for matches and mismatches. Create a grid to organize the data:

Possible Comparison Chart

| | My Observations | Teacher Interview | Student Surveys |
|---|------------------------|--------------------------|------------------------|
| How is science taught/what happens during science time? | | | |
| How does the teacher teach science/what does the teacher do? | | | |
| Do the students participate in hands-on science activities? | | | |
| Adaptations and Accommodations | | | |

E. Using the data you have collected and the match/mismatch chart, type a 2-3 page CASE STUDY PAPER of the science instruction.

- F. Turn in a copy of the following. Staple all together in the following order with the Case Study paper on top.
1. Your 2-3 page CASE STUDY PAPER.
 2. Your own answers to questions (in A above) as you observed in the classroom
 3. Teacher Interview questions (B above) and answers
 4. Student Surveys (C above) with student answers
 5. Comparison Chart (D above) of your observations, teacher interview answers and student survey answers.

Manuscript Project (30%)

Each student will complete a project that demonstrates his/her understanding of science curriculum theory, development, implementation, and evaluation. This project is an opportunity to exercise creativity and individual preference in selecting what is to be specifically done. The project will involve writing a short manuscript suitable for publication in one of the typical science teaching journals such as *The Science Teacher* or *The Journal of College Science Teaching*. The exact manuscript submission guidelines for the journal chosen are to be followed in preparing the manuscript. The manuscript can be one of two types. One type would be an article that shares an original, innovative curriculum idea such as a lab or demonstration activity that exemplifies either the NYS MST or National Science Education Standards. The other type would be a manuscript that is opinion- or issue-based that provides a critical commentary on a major topic in the area of science curriculum being faced by science educators. The manuscript guidelines for the two science teacher journals mentioned above are included as attachments to this syllabus.

Tentative Schedule

| | DATE | TOPIC | DUE |
|----|------|---|--|
| 1 | 1/21 | Introductions; Discussion on Definition of Science; Group Formation; Introduction to School science | |
| 2 | 1/28 | Creating an Inquiry based classroom | Chapter1 & 3 Discussion Question Due |
| 3 | 2/4 | Knowledge Construction Processes | Chapter 2 Learning Cycle handout Discussion question due |
| 4 | 2/11 | Processes Based Learning | Chapter 4 <i>Discussion Question Due</i> |
| 5 | 2/18 | Cooperative Learning | Chapter 10 Discussion Question Due |
| 6 | 2/25 | Problem based learning | <i>Chapter 6&8 Discussion Question Due</i> |
| 7 | 3/3 | Meaningful Learning /Conceptual Change | <i>Handouts</i> |
| 8 | 3/10 | Cross curricula learning /multidisciplinary | Chapter 5 |
| 9 | 3/17 | Library Search and Literature review for Manuscript | <i>No class meeting</i> |
| 10 | 3/24 | Technology based learning | <i>Chapter 14, 15 & 16</i> |
| 11 | 3/31 | SPRING BREAK | ☺ Enjoy the week! |
| 12 | 4/7 | Assessment: Knowing your students and their abilities | Chapter 12 &13 |
| 13 | 4/14 | Adapting Science Curriculum | <i>Chapter 17 &18</i> |
| 14 | 4/21 | Curriculum Design models | Chapter 20 |
| 15 | 4/28 | Case Study Presentations & sharing | <i>Case Study Due</i> |
| 16 | 5/5 | Case Study Presentations | |

Appendix 1
Appendix 2