CALIFORNIA STATE UNIVERSITY SAN MARCOS
COLLEGE OF EDUCATION
EDMS 545: Elementary Science Education
Fall 2009
Friday: 8:00 AM – 2:15 PM UH 441
3 Units

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COE 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 on-going service. Our practices demonstrate a commitment to student-centered education, diversity, collaboration, professionalism and shared governance. (adopted by COE Governance Community, October 1997)

Course Prerequisite: Admission to the Multiple Subject Credential Program/CLAD Teacher Credential Program.

COURSE DESCRIPTION

This course focuses on developing an understanding of theory, methodology, and assessment of science in integrated and inclusive elementary classrooms. *This course is aligned with California's SB 2042 Standards*, and it is designed to provide a comprehensive overview of the objectives, skills, concepts, experiments, materials, and methods necessary to teach science to elementary school children. A series of individual and team activities will provide you with first-hand experiences in these areas. This course focuses on instructional methods, techniques, materials, lesson planning, curriculum development, organization and assessment in science. The integration of curricular areas is addressed. Methods of cross-cultural language and academic development will be integrated into the course.

REQUIRED TEXT & MATERIALS

- Friedl, A.E. & Koontz, T.Y. (2005). *Teaching Science to Children: An Inquiry Approach, 6th Ed.* NY: McGraw-Hill.
- *Science Framework for California Public Schools.* (2004). Sacramento: California Dept. of Education. Also available online.
- 2 Large Blue Books (Course text, Science Framework, and Large Blue Books are available at CSUSM) bookstore)
- 1 Laboratory Composition Book
- TaskStream account

Other handouts and resources will be distributed in class or through WebCT

Other Recommended Books

Great Explorations in Math & Science (G.E.M.S.) Lawrence Hall of Science. http://www.lhs.berkeley.edu/GEMS/

Activities Integrating Math and Science. Aims Education Foundation.
http://www.aimsedu.org/

COURSE OBJECTIVES: By the end of this course, students should be able to:

1. Demonstrate proficiency with inquiry skills of observing, measuring, inferring, classifying, predicting, verifying predictions, hypothesizing, isolating variables, interpreting data, and experimenting.
2. Identify exemplary materials (curriculum kits, science programs, textbooks, equipment, technology, ancillary materials) appropriate for elementary school children.

3. Demonstrate knowledge and understanding of the California Science Framework, the California Science Content Standards, and the National Science Education Standards.
4. Demonstrate an understanding of the physical, earth and life science concepts included in the K-8 California Science Content Standards, and how to design lessons to teach the concepts.
5. Use the Learning Cycle model of instruction to teach science in a contemporary manner.
6 Use technology in elementary science teaching.
7. Demonstrate confidence in leading and performing investigations designed to teach science concepts, science process skills, and scientific attitudes.
8. Use authentic methods of assessment to evaluate learning of science concepts and processes.
9. Practice strategies to include all students in science (linguistically and culturally diverse, students with disabilities and other students with special needs).

INFUSED COMPETENCIES

Special Education
Consistent with the intent to offer a seamless teaching credential in the College of Education, this course will demonstrate the collaborative infusion of special education competencies that reflect inclusive educational practices.

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)

Technology
This course infuses technology competencies to prepare candidates to use technologies, emphasizing their use in both teaching practice and student learning. Students are expected to demonstrate competency in the use of various forms of technology (i.e. word processing, electronic mail, WebCT 6, use of the Internet, and/or multimedia presentations). Specific requirements for course assignments with regard to technology are at the discretion of the instructor. Most assignments will be submitted in hard copy to the instructor, and some specific assignments will also be submitted on WebCT. Keep a digital copy of all assignments for use in your teaching portfolio.

You must use your WebCT email account for this class. The best way to contact me is by WebCT e-mail.

STUDENT LEARNING OUTCOMES

Teacher Performance Expectation (TPE) Competencies

The course objectives, assignments, and assessments have been aligned with the CTC standards for the Multiple Subject Credential. This course is designed to help teachers seeking a California teaching credential to develop the skills, knowledge, and attitudes necessary to assist schools and districts in implementing effective programs for all students. The successful candidate will be able to merge theory and practice in order to realize a comprehensive and extensive educational program for all students.

California Teacher Performance Assessment (CalTPA)

Beginning July 1, 2008 all California credential candidates must successfully complete a state-approved system of teacher performance assessment (TPA), to be embedded in the credential program of preparation. At CSUSM this assessment system is called the CalTPA or the TPA for short.

To assist your successful completion of the TPA, a series of informational seminars are offered over the course of the program. TPA related questions and logistical concerns are to be addressed during the seminars. Your attendance of TPA seminars will greatly contribute to your success on the assessment.

Additionally, COE classes use common pedagogical language, lesson plans (lesson designs), and unit plans (unit designs) in order to support and ensure your success on the TPA and more importantly, in your credential program.

The CalTPA Candidate Handbook, TPA seminar schedule, and other TPA support materials can be found on the COE website provided at the website provided:
http://www.csusm.edu/coe/CalTPA/ProgramMaterialsTPA.html

COURSE POLICIES AND REQUIREMENTS

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. Absences and late arrivals/early departures will affect the final grade. 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.

For this class, **if you are absent 1 class session, your highest possible grade is a "B". If you are absent 2 class sessions, your highest possible grade is a "C+". Late arrivals and early departures** will lower your course grade. For every two times that you are late and/or leave early, your course grade will be lowered by one letter grade. If you have an emergency, or very extenuating circumstances, please see the instructor to make arrangements accordingly. Absences do not change assignment due dates. If you find that you cannot attend class due to an emergency or very extenuating circumstances, email any due assignments by the start of the class session it is due. NOTE: With few exceptions, late assignments will not be accepted.

Writing Requirement

In keeping with the All-University Writing Requirement, all courses must have a writing component of at least 2,500 words (approximately 10 pages), which can be administered in a variety of ways.

Computer Use During Class Sessions

You are welcome to use a laptop computer in class when working on class assignments, for example. However, you will need to save checking email or other personal computer use for time outside of class. Most students find it disruptive when they are focusing on class activities or listening to presentations and can hear keyboarding in the classroom. Your kind consideration is greatly appreciated by all!

Person-First Language

Use "person-first" language in all written and oral assignments and discussions (e.g., "student with autism" rather than "autistic student"). Disabilities are not persons and they do not define persons, so do not replace person-nouns with disability-nouns. Further, emphasize the person, not the disability, by putting the person-noun first.

Students With Disabilities Requiring Reasonable Accommodations

Students are approved for services through the Disabled Student Services Office (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.

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 in the CSUSM University Catalog. All written work and oral assignments must be original work. All ideas/materials 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 with quotation marks.

Students are responsible for honest completion of their work including examinations. There will be no 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." In addition, all incidents of academic dishonesty will be reported to the Dean of Students.

Plagiarism
It is expected that each student 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.

COURSE TOPICS OUTLINE

- The Nature of Science
- The Learning Cycle Model of Teaching
- Learning Cycle Science Lesson Demonstrations
- Writing Objectives for Student Learning
- Developing Essential Questions
- Writing Science Concept Definitions
- CA Science Content Standards Grades K-8
- California Science Framework
- SDAIE Strategies in Science: Teaching Science to English Learners
- Infusing Writing Activities in Science Lessons
- Science Curriculum Kits and State Approved Texts
- Science Process Skills and Scientific Attitudes
- Current Issues in Science Education
- Infusing Technology into Science Teaching
- Authentic Assessments in Science
- Science Projects, Student Research, Science Fairs
- Safety in the Science Class
- Inclusion and Teaching Science to Students with Special Needs
- Concept Mapping
- Benchmarks and the National Science Education Standards

COURSE ASSIGNMENTS/LEARNING OUTCOMES

Each written assignment is expected to have a clear organizational presentation and be free of grammar, punctuation and spelling errors. There will be a reduction in points for the above mentioned errors. Late assignments are not accepted. Prepare carefully for class, and be ready to discuss readings and assignments thoughtfully. Note the Description of Exemplary Students at the end of this syllabus.

1. Active Participation and Collaboration (all or nothing credit given)	10%
2. Concept Maps (2) - Individual	15%
3. California Science Framework and Standards Tasks and Presentation - Indiv. & Grp	10%
4. Learning Cycle Hands-on Science Lesson Design & Presentation – In pairs	30%
5. Learning Cycle Lesson Reflections- Individual	10%
6. Science Fair Exploratorium Lesson and Presentation - Group	15%
7. Learning Cycle Lesson Drawings and Explanations (5% each part) – Individual	10%

NOTE*:* Each student is responsible for ensuring that assignments are submitted correctly and on time.

All assignments will be submitted in hard copy at the start of class (per course schedule), and some specific assignments will also be submitted electronically to WebCT as class resources. Keep a digital copy of all assignments for your credential program electronic portfolio.

DESCRIPTIONS OF ASSIGNMENTS

1. Active Participation and Collaboration - 10% (all or nothing credit)

Teacher education is a professional preparation program and students will be expected to adhere to standards of dependability, professionalism, and academic honesty (refer to rubric attached to this syllabus).
Grading will include a component of "professional demeanor." Students will conduct themselves in ways that are generally expected of those who are entering the education profession, including the following:

- On-time arrival to all class sessions and attendance for the entire class period
- Advance preparation of readings and timely submission of assignments
- A positive attitude at all times
- Active participation in all class discussions and activities
- Respectful interactions and courteous language with the instructor and other students in all settings
- Carefully considered, culturally aware approaches to solution-finding

Class Discussions and Participation: Students will engage in active learning each class session, and will be expected to actively participate. You may loose points for lack of participation based on the following criteria:

- Do you participate in class discussions productively, sharing your knowledge and understandings?
- Do you interact productively with your peers, taking on a variety of roles (leader, follower, etc.)?
- Do you contribute appropriately to group work—do you "do your share"?
- Are you able to accept others' opinions?
- Are you supportive of others' ideas?
- Do you support your peers during their presentations?
- Can you monitor and adjust your participation to allow for others' ideas as well as your own to be heard?

2. Concept Maps (Individual) - 15%

Each class session, you will be required to complete the assigned readings according to the Course Schedule located in this syllabus. You should read the chapters to develop an indepth understanding of the science content.

The assigned readings provide an important foundation for your increasing understanding of both science content and how to effectively teach science. To further aid you in remembering the readings and assist you with meaningful class participation, you are asked to respond to the reading assignments with concept maps. **You will be required to complete two (2) Concept Maps during the course (based on your choice of which three chapters from the assigned readings listed in the Course Schedule)**. Concept mapping skills and procedures will be taught in class (Session 2) and your concept maps must follow the protocols taught in class.

Concept maps will be due at the beginning of class time on the assigned dates. You will only receive credit points if concept maps are completed by the start of class on date indicated in the course schedule. You must use a Big Blue Book for both Concept Maps. Spiral paper inserted in Blue Books will not be accepted.

Both Concept Maps should include ALL major concepts discussed in **one** chapter. Do not include information from the investigations, only the science content. All concepts should be enclosed in an oval, with linking verbs connecting at least two ovals in a hierarchical manner.

Each concept map has a possible total of 9 points:

a. Most general, inclusive Concept at top…….....1 point
b. Map clearly demonstrates hierarchy or relationships……2 point
c. ALL major concepts included…….. 3 points
d. 1-2 words (nouns) for Concepts…….....2 points
e. Verbs or prepositions for linking words between concepts…….. .2 points

For each Concept Map, (a) indicate on each page of your Large Blue Book the title of the Chapter you are outlining, and (b) write your name and date at the top of each page

3. California Science Framework and Standards Activity - 10%

Purpose of the assignment: To read a portion of the California Science Framework and the Standards for an assigned grade level. You will write your individual response to the readings. Then you will work with your partner to prepare and do a presentation to the class. It is essential for you to do the reading and the write-ups BEFORE you meet with your partner.

3a. Task I: Framework summary response: (Individual) – 5 pts

- Read the first part of the California Science Framework, up to page 22. This includes Board Policy, the Introduction and Chapters One and Two.
- Think about the reading holistically.
- Type about a page, in your own words, that answers these questions: What were the most important ideas addressed in the reading? How does science teaching differ from instruction in other subjects? What are the most important elements of a strong science instructional program?
  Come to the next class session (#2) prepared to discuss the questions and turn in your answers.

3b. Task II: Grade level Science standard response: (Individual) – 10 pts

Using the standard for your chosen grade, pick a line item from physical science, life science, and earth science. For each one, come up with a brief description of an activity that children in that grade can do that also addresses one of the Investigation and Experimentation standards for the grade. You should end up with three sections, each of which includes a content line (physical, life, or earth science), an Investigation and Experimentation line, and a one or two sentence description of an activity that combines the two. The whole thing should be about a page. See an example on the next page. Due date: class session 2.

3c. Task III: Team preparation and presentation – (In class with your team) – 10 pts
You will be given 30-40 minutes of class time to work with your partner.

Get together with your team. Look at the activities that you both wrote up for Activity 3b (Task II). Choose one activity.

- As a team, write up a lesson sketch/description for the activity (with a lesson title, science content and Investigation and Experimentation standards, learning objectives, an assessment plan, and a brief description of the activity). Neatly put it on chart paper so it can be easily presented to the class. Make sure you quote the standards on which your lesson plan is based.
- As a team, come up with a brief overview of the Science Standards for your grade. Don't try to give us every single line of the standard. Summarize it in such a way that we see generally what students are supposed to learn in physical, earth, and life science and in investigation and experimentation in that grade. On chart paper, list the competencies indicated in the Science Standards for your grade
- In 8 minutes or less, present your lesson plan sketch and standards overview to the class. Be prepared to explain why your lesson activity represents really good science for kids.
- Your grade for this assignment will be based on the content and quality of your presentation, and on the level of collaboration with your team.

Sample Response to Assignment 3b.

Grade Four

Physical Science
1b. Students know how to build a simple compass and use it to detect magnetic effects, including the Earth's magnetic field

Investigation and Experimentation
6f. Follow a set of written instructions for a scientific investigation.

Activity

Following directions from the Internet, the students will work in partner pairs to build compasses, using paper cups, thread, a needle and a magnet. They will observe and record the action of the compass indoors and outdoors, and in proximity to various objects.

Life Science
2c. Students know decomposers; including many fungi, insects, and microorganisms, recycle matter from dead plants and animals.

Investigation and Experimentation

6c. Formulate and justify predictions based on cause-and-effect relationships.

Activity
The students will predict the growth of mold on bread that has no preservatives. They will observe and record the progress of the mold in various circumstances (if the bread is left in the open air, if the bread is in a closed sandwich bag, etc.)

Earth Science
5c. Students know moving water erodes landforms, reshaping the land by taking it away from some places and depositing it as pebbles, sand, silt, and mud in other places (weathering, transport, and deposition).

Investigation and Experimentation
6b. Measure and estimate the weight, length, or volume of objects.

Activity
In groups of four, students will create landforms (using common dirt) on cookie sheets. They will add measured amounts of water to their landforms, and will collect and measure the dirt that runs off.

4. Learning Cycle Hands-on Science Lesson Plan & Presentation - 30%
(Due on assigned day for the lesson per course schedule)

Purpose: To develop and teach a particular kind of a science inquiry lesson that teaches both science thought processes and science content.

Students will lead hands-on science lessons during class. The lessons should (a) model inquiry teaching and learning (b) be based on strong essential questions, (c) be content-understandable, and (d) be based on the CA Science Content Standards. *Differentiated strategies for English language learners, students with special needs and GATE students as well as technology integration are required components of this assignment.*

You will work in groups of two (partners TBD in class) to lead a science lesson based on the Learning Cycle Model of Instruction. You will prepare and teach this lesson to your classmates. Each team will be assigned a specific science topic for which you will plan and teach the lesson. This topic will determine the grade level and California Science Standard your team lesson design will cover. Use activities from the textbook, Internet sites or other science resources. The team should teach the lesson as you would to elementary school students. Your classmates will not role-play elementary students, but will learn the science content and how to teach it. Treat your classmates as teachers, not elementary students. Each team will be allocated a maximum of 35 minutes of class time to teach their lesson.

The lessons should follow the **Learning Cycle** Instructional Model (make sure that you include and explain all 3 stages in sufficient detail so that there is no doubt about how to plan and conduct your science lesson), must include hands-on activities, and should emphasize specific science concepts. The Exploration and Application phases of the Learning Cycle require different hands-on science activities using manipulatives. Before the lesson, write the essential questions about the lesson on the board (or project from your required PPT described below) for students to consider during the lesson. These questions should be **higher level questions** (application, analysis, synthesis or evaluation level) according to Bloom's Taxonomy.

Begin Exploration with students making predictions/answering questions or accomplishing challenges. 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 of paper" and require students to use the science process skills with science manipulatives. **You need to know and demonstrate the stages of the Learning Cycle, or you will not be given credit for your lesson.**

Be sure you understand the concepts you are emphasizing, and that you can explain them. The lessons should be developmentally appropriate for K-6, and should follow the NSTA Safety Guidelines. Your lesson plan should also identify and explain strategies for English language learners and adaptations for both students with special needs and for GATE students.

Prepare a PowerPoint Presentation to use in your lesson that is a strong overview of all your lesson design components. Include: Lesson title, grade level, content area and subject matter, state science standards, objectives, definitions of important science concepts in the lesson, essential questions, learning cycle phases, a briefly detailed explanation of the science content, assessment plan and criteria, accommodations/adaptations for ELs, GATE, SPED, and 3 everyday applications. Additionally, include a list of at least 3 interactive web sites (with short descriptions) that address the science topic and concepts through simulations, graphics and movies. You should have links to these web sites and show examples during the lesson. **Bring children's literature reflecting science concepts relating to your lesson topic to showcase.**

Science Lesson Plan Document

- Prepare a comprehensive document that includes the information under Lesson Design Format (see pages 8-10 of this syllabus), making sure you include:
    - Your names at the top
    - All components in the Lesson Plan Format
    - References and other required information at the end of the lesson plan.

IMPORTANT NOTE: At least three full days PRIOR to your presentation, email your complete lesson plan and your PowerPoint Presentation to me for review. Include all team members' names and the date you will present to the class in the email. After I email you back regarding possible needed changes and you make revisions, please post your revised lesson design and PPT on the appropriate thread in the WebCT discussion board for access by your classmates.

On the day of your lesson presentation, please begin the lesson by turning in 1 hard copy of your lesson plan and data sheets to me. NOTE: Please provide the lesson plan and data sheets in stapled form—unstapled lesson plans will not be accepted.

You should also give me copies for each team member of the Lesson Plan Rubric available in the "Science Assignments Rubrics" folder of your WebCT homepage.

Lesson Plan Elements

Lesson Title: *What is the title of your lesson?*

Grade Level: *What is the grade level of your lesson?*

Content Area: *Example: Life Science, Physical Science or Earth Science*

Subject Matter: *Example: Heat Transfer, Plant Reproduction, The Digestive System, etc*

Time period for the learning experience: *How long will the lesson be?*

California Science Content Standards: *Include at least 1 science area (life science, physical science, or earth science) standard and 1 Investigation/Experimentation standard.*

Lesson objective(s) based on the content standards: What do you want students to be able to do?

Write in complete sentences. Use an action verb and explain how students will demonstrate their new knowledge and understanding. Example: "The student will demonstrate understanding of _____." Or, "The student will be able to _____"

Science Concept(s): What Big Idea(s) are you trying to teach? Do NOT say "The students will ____." (That is an objective, not a concept.)
Example: Electricity is a form of energy generated by the flow of electrons through a conducting substance.

Essential Questions: List at least two essential questions specific to the concept that you want students to be able answer during the lesson. What is it that students should be able to answer by having successfully participated in your lesson? These are based on the BIG Ideas (tied to the learning objectives) of your lesson to focus student learning and should be high order questions (see Bloom's Taxonomy).

Examples: How does sound travel? (Also: Explain how sound travels.)
How is frequency related to the volume of a sound?
How can you prove that air is a real substance that occupies space?

Class Description - For the purpose of this assignment, the class description must include English Language Learners, Special Education Students and GATE students

Type of class (self contained, subject specific), time of year, general background of students learning in relationship to new learning (challenges and prior learning)

English Learners:
Special education:
GATE student:
Regular education:

Developmental needs of the students at this age

Learning needs and developmental, age-appropriate skills needed by your students based on grade level.

Student Groupings: *How will you group students for instruction?*

Materials/Resources/Technology: *What does the teacher need? What do the students need?*

Assessment Plan

Note: Goals/objectives that will be assessed are based on the content standards and are tied to the Big Ideas (concepts) in your lesson.

Types of assessment: Prior knowledge (pre assessment), Formative (progress monitoring), Summative (final product)

Description and Purpose of the Assessment:

Feedback strategies: How students will be informed of specific successes and challenges?
.

Description and Purpose of Differentiated/Adapted Assessment Methods for:

- *English Learners*
- *Learners with Special Needs*
  - *Learning Disability*
  - *Physical Disability*
- *GATE Students/Advanced Learners/Accelerated Learners*

How assessment results will be used to inform instruction:

Criteria for Assessment

What criteria will you use to grade the assessment? How will you know if a student has successfully completed the assessment and accomplished the learning goals? What will they do to show you they have succeeded? **NOTE:** Criteria are based on the science content standards and the learning goals/objectives in your lesson.

Lesson Procedures/ Instructional Strategies

Explain the procedures thoroughly for each phase of the Learning Cycle. Include what the teacher will do and what the students will do.

Engagement: How will you focus/motivate students during this anticipatory set?

The Learning Cycle:

a) **Exploration:** (Begin with students making predictions; then have a hands-on SCIENCE activity.)

b) **Concept Invention** (Make sure students share and discuss data and ideas in the first part of this stage):

1. Students share their ideas, data, knowledge and questions gathered from Exploration phase.
2. Teacher introduces students to new terms, new information and provides further explanations of science concepts.

c) **Concept Application** (Should be a 2nd hands-on SCIENCE activity that extends students' thinking and learning from the two previous phases.

Also include at the end of the Lesson Plan document:

Instructional Adaptations and/or accommodations for ELL students and for students with special needs (Special Education and GATE students) *How will you differentiate and/or accommodate instructional strategies and activities for EACH of these student populations?*

Science Content Background: 1-2 pgs minimum summary of the science content background that **teachers** need to know to effectively teach the lesson (goes beyond lesson content knowledge a teacher needs to know).

Web Sites: At least 3 interactive relevant (K-8) science web sites with descriptions

Three (3) Applications to everyday life and explanations

Two (2) examples of children's literature on your science topic- BRING BOOKS TO CLASS

References: Title, author, publisher, year of all resources consulted for lesson plan concepts/ideas/activities.

For your lesson plan presentation:

In addition to presenting your lesson to your cohorts, your group should be prepared to present a strong overview of your lesson plan using PowerPoint (given after your lesson presentation). For an exemplar of what elements your PPT should contain, a model will be provided on the "PowerPoint Presentations" folder on the home page of WebCT (refer to page 8 of this syllabus for what your PPT should contain.

5. REFLECTIONS: All discussion points should relate to lesson learning goal(s/objectives) and Big Ideas

Due the Class Session after Your Lesson Presentation – 10% total (10 pts each)

A. Reflection on the Instructional Strategies of the Hands-on Learning Cycle Lesson Plan: 5%

After teaching the lesson in class to your cohorts, each team member should write an individual reflection (and turn it in at the next class session) addressing the following prompts:

Why were the instructional strategies, student activities, and resources appropriate for this class based on content and student development?

How did they address the developmental needs of these students?

How did they help the students make progress toward achieving the state adopted academic content standards for students in this content area?

How were students able to understand & make connections between lesson content and the outside world?

What are strengths and weaknesses in your instructional strategies, student activities and resources?

What are possible recommendations for improvement?

B. Reflection on the Assessment Methods of the Hands-on Learning Cycle Lesson Plan*: 5%*

After teaching the lesson in class to your cohorts, each team member should write an individual reflection (and turn it in at the next class session) addressing the following prompts:

1. *Strengths and weaknesses in your general assessment methods: Prior knowledge (pre assessment) Formative (progress monitoring), Summative (final product)*

2. *Strengths and weaknesses in your differentiated/adapted assessment methods: English Learners, Special Needs, GATE Students/Advanced Learners/Accelerated Learners*

3. *Describe an alternative assessment based on the potential gaps in the students' learning.*

6. Science Exploratorium Lesson Plan & Presentation (in pairs) – **15%**

Develop an inquiry activity that uses a discrepant event appropriate for elementary students. You will work in groups as assigned in class.

You will prepare a hands-on science lesson and poster about a discrepant event that leads to a science concept. You will present the lesson at an Elementary School Science Fair Exploratorium. The audience will be K-6 grade students at an elementary school to be identified later in the semester. Be sure you understand the concept(s) you are emphasizing, and that you can explain it. The activity should be developmentally appropriate, and should follow the NSTA Safety Guidelines. Prior to teaching the lesson, turn it in to your instructor for review. After teaching the lesson, turn in a copy of your Reflection. The activity should include hands-on tasks and should emphasize particular science concepts. The activity should allow students to explore, and then you will explain the concept behind the activity. Make sure you have a concept application activity(different than that used in the exploration activity) in case there is time available for students.

On the day of the fair, you will do the activity repeatedly (about 10 times) to teams of about 7 students.

Type up an abbreviated group Lesson Plan (due a week before the Science Fair Exploratorium) with your names at the top and REFERENCES at the end of the lesson plan.

1. Lesson title – Create a "catchy" title that will attract and motivate students to engage in your activities.
2. Grade level
3. Content Area & Subject Matter

4. Science Concept(s) you are teaching. Write it out in a complete sentence(s). Do not say, "The students will ____." (That is an objective, not a science concept.)
5. Essential Questions (ensure high order questions!)
6. 1-3 Learning (Behavioral) Objectives: The student will be able to _____ or, The SWDUO_____
7. California Science Content Standards addressed (both science content and I/E standards)
8. Materials and Resources (what the teacher needs; what the students need)
9. Exploration Activity
10. Concept Invention
11. Concept Application Activity
12. The Reflection (individual work and due the following class session) answering the following questions:
    a. How did the children respond? (What did they say and do?)
    a. How do the children's actions and responses demonstrate their level of understanding?
    b. How did you (or can you) improve upon your lesson to facilitate understanding?

7. Learning Cycle Lesson Drawings and Explanations (individual) **- 10% total**

LC Lesson Drawings – 5%

In your Lab Book—Reserve the first 2 pages in your Lab Book for a **Title Page** and for a **Table of Contents**. After a given Learning Cycle presentation, you will make drawings (at least one per lesson) illustrating what you learned during the lesson. Number each drawing for each lesson (Drawing #1, #2, #3, etc.). **At the top of each page, write the date and title and number of the drawing. Label each of your drawings legibly, and clearly indicate the title of the lesson**. Be sure to pay attention during the lesson so that you have something to draw and a given drawing illustrates your understanding of the lesson. You must **legibly label** parts of drawings. **Drawings should illustrate the major science concepts** that students were supposed to learn.

Each drawing will count 5 points towards your L.C. Lesson Drawings grade.
Drawings will be assessed based on the following criteria:

- **Does the Drawing illustrate the major science concepts taught in the lesson?**
- **Does the Drawing include legible labels?**
- **Does the Drawing make "sense"? Can one look at it and understand what was taught?**

You must have at least a total of 10 drawings in your lab book. We will have more than 10 Learning Cycle Lessons; you are to choose at least 10 from among these.

LC Lesson Explanations – 5%

In your Lab Book--On the page immediately following each Drawing for a chosen Learning Cycle lesson presentation, you will write a STRONG explanation of the science concepts taught—about ½-1 page in length. Number each Explanation (Explanation #1, #2, #3, etc.). **At the top of each page, write the date, title and number of the Explanation. Label the Explanation with the title of the lesson**. Be sure to pay attention during the lesson so that you have something to explain! Each explanation should be a complete description of the major science concepts that students were to learn during the lesson. **NOTE:** THESE EXPLANATIONS ARE **NOT** THE PROCEDURES USED DURING THE LESSON, BUT RATHER ARE EXPLANATIONS OF **SCIENCE CONCEPTS** REFLECTED IN A LESSON!!

Each explanation will count 5 points towards your L.C. Lesson Explanations grade.
Explanations will be assessed based on the following criteria:

- **Does the Explanation describe the major science concepts taught in the lesson?**
- **Does the Explanation make "sense"? Can one read it and understand what was taught?**
- **Is each Explanation on a separate page from the drawings and the other explanations?**

You must have a total of at least <u>10 explanations that correspond to the 10 drawings (at the very least) in your lab book</u>. We will have more than 10 Learning Cycle Lessons; you are to choose 10 from among these for both drawings and explanations.

RESOURCES LIST THAT CAN HELP IN YOUR LEARNING OF SCIENCE CONTENT AND METHODS

<u>JOURNALS</u>

Science	Science Scope	Physics Teacher
Science and Children	The Science Teacher	Journal of Chemical Education
Science Education	School Science and Math	Innovations in Science & Technology Education
Science News	American Biology Teacher	Journal of Research in Science Teaching

EDMS 545 Tentative Course Schedule: Fall 2009 (Friday)

Date	Course Topics & Activities	Readings & Work Due
Session 1 9/04/09	~ Course Overview/Syllabus Review ~ **The Nature of Science** ~ **Inquiry Processes in Science** Science process skills & scientific attitudes ~ **CA Science Content Standards & Frameworks** ~ **Framework and Standards Task I, II, III** explained Framework & Standards groups formation ~ **Hands-on Learning Cycle Science Lesson Plan groups sign- ups** ~ A Private Universe (tentative)	**Bring course syllabus to class** **Bring course text to class** - Read Chapters 1 and 2, 3 of *Teaching Science to Children* as a framework for course concepts & skills - Bring Science Content Standards (K-8) to all classes. - Read CA Science Framework: pgs 1-22 for Framework & Standards: Task I due next week. - **Read Learning Cycle Handout on WebCT and bring a copy to next class** - Access learning cycle info on "Weblinks" (WebCT)
Session 2 9/11/09	**FOCUS: Sequencing Instruction to Support Learning Outcomes** ~ Overarching themes students should learn in Science: **Big ideas** in Science Teaching/Learning ~ **Lesson Planning**: Using **The Learning Cycle** to teach science as inquiry. How do we make decisions about what to teach and the best strategies/processes to teach it? What teaching strategies ensure participation of ALL students? Writing **Essential Questions** Writing **Learning Objectives** to support assessment in science ~ Instructor-led learning cycle lesson ~ Hands-on Learning Cycle Lesson Plan group formation (if not done in session 1) ~ **Concept maps and science content** ~ **Complete work on Framework & Standards Task III (with team) and Presentations**	- Bring Science Content Standards (K-8) to all classes. - Read Chapter 4, 5 or 6 of *Teaching Science to Children* **DUE: Framework and Standards Task I (individual)** **Due: Framework and Standards Task II (Individual). Post to WebCT** **Framework and Standards Task III & presentations due (team). Post to WebCT – (one posting per team)** **View Disability Video** http://www.washington.edu/doit/Video/winequ.html
Session 3 9/18/09	**FOCUS on Assessment: What are the best indicators to assess that students have learned and understood the intended outcomes?** Making Science Content Accessible to ALL students: Strategies to ensure participation of ALL students ~ Adapting science curriculum for children with special needs	- Read Chapter 7, 8 or 9 of *Teaching Science to Children* - ****Concept Map due in BBB on one of: Ch 7, 8 or 9**

	~ Instructor-led learning cycle lesson ~ Safety guidelines for the science classroom ~ National Science Education Standards **Learning Cycle Lesson Plan--in class work**	
Session 4 9/25/09	~ Teaching Science to English Learners ~ Developing Science WebQuests and Technology Resources for Science Teaching *Developing Science Podcasts* ~ Instructor-led learning cycle lesson ~ Science kits	- Read Chapter 10, 11, or 12 of *Teaching Science to Children* - ****Concept Map Due In BBB on one of: Ch. 10, 11, or 12** - *****Learning Cycle Lesson Presentations: Teams 1, 2 & 3. Post to WebCT—one posting per team.**
Session 5 10/02/09	~ Integrating writing into science activities ~ Instructor-led learning cycle lesson ~ **Science Fairs/Exploratorium and the Inquiry Model**	- Read Chapter 14, 15, or 16 of *Teaching Science to Children* - ****Concept Map due in BBB on one of: Ch. 14, 15, or 16** *****Learning Cycle Lesson Presentations: Teams 4, 5, & 6. Post to WebCT--one posting per team.**
Session 6 10/09/09	~ Instructor-led learning cycle lesson	- Read Chapter 17, 18 or 19 of *Teaching Science to Children* ****Concept Map due in BBB on one of Ch. 17, 18, or 19** ***** Learning Cycle Lesson Presentations: Teams 7, 8, & 9. Post to WebCT—one posting per team.** **Science Exploratorium LPs due in folders**
Session 7 10/16/09	**~ Science Fair Exploratorium Presentations at Elementary school site** **School, grade level and time TBD** ***** DUE: Learning Cycle Lesson Drawings and Explanations Composition Book**	**Post Science Exploratorium LP to WebCT—one per team** **Please ensure that your team lesson plan and data sheets are posted to the appropriate thread on the discussion board of WebCT.**
Session 8 10/23/09	~ Course Evaluations **~ Podcast Demonstrations:** ~ Course Wrap-Up	

******* Choose three Concept Maps to submit according to the assigned dates for text readings chapters in course schedule.*
****BBB = Big Blue Book*

GRADING STANDARDS

A = 93-100	B = 83–86	C = 73-76	F = 0-59
A– = 90-92	B- = 80-82	C- = 70-72	
B+ = 87-89	C+ = 77-79	D = 60-69	

It is expected that students will proofread and edit all their assignments prior to submission. Students will ensure that the text is error-free (grammar, spelling), and ideas are logically and concisely presented. The assignment's grade will be negatively affected as a result of this oversight. Each assignment will be graded approximately 80% on content and context (detail, logic, synthesis of information, depth of analysis, etc.), and 20% on mechanics. All reference/resource citations should use appropriate citation form. Please consult with the American Psychological Association (APA) format in the APA Manual, 5th edition for citation guidance.

NOTE: You must maintain a B average (3.0 GPA) in your teacher education courses to receive a teaching credential from the State of California. Courses are not accepted if final course grades are below a C+.

Exemplary "A" Students

1. Demonstrate serious commitment to their learning, making full use of the learning opportunities available and searching out the implications of their learning for future use.
2. Complete all assignments thoroughly, thoughtfully and timely.
3. Make insightful connections between assignments and their developing overall understanding of science concepts; continually questioning and examining assumptions in a genuine spirit of inquiry.
4. Attends every class, always timely, and shows high level achievement of course goals.
5. Display a "can do" attitude, give 100%, and works to help others learn too.
6. Contributes a great deal to class environment, showing respect and concern for all members.

"B" Students

1. Completes all assignments, all on time, and demonstrates the ability to summarize, analyze, and/or reflect at fairly high levels, showing consistent improvement over time.
2. Completes all of the reading assignments and develops thoughtful and fairly thorough responses.
3. Produces work that is close to professional level in terms of both content and writing, working to develop a strong command of writing, speaking, planning and presenting.
4. Develops presentations demonstrating significant learning.
5. Presents confidently and intelligently, demonstrating effective teaching skills.
6. Attends every class meeting and is regularly engaged during class.
7. Contributes to the positive environment of the class by respecting all members.

It is expected that students will proofread and edit all their assignments prior to submission. Students will ensure that the text is error-free (grammar, spelling), and ideas are logically and concisely presented. The assignment's grade will be negatively affected as a result of this oversight. Each assignment will be graded approximately 80% on content and context (detail, logic, synthesis of information, depth of analysis, etc.), and 20% on mechanics. All reference/resource citations should use appropriate citation form. Please consult with the American Psychological Association (APA) format in the APA Manual, 5th edition for citation guidance.

*** Note to Students**

Due to the devastating effects of current budget crisis in California, I have been furloughed nine days each semester of this academic year, representing a 9.23% reduction in both workload and compensation. A furlough is an unpaid day off on a faculty member's regularly-scheduled workday. In order to satisfy legal and ethical requirements of the California Labor Code, I am required to submit formal certification that I will not work on my furlough days. I am prohibited from teaching, conducting scholarly research, consulting with students, responding to email or voicemail, providing assignment feedback, or participating in any CSU work-related activities on my furlough days. Furlough dates vary by professor; my Fall Semester furlough dates are September 15, October 20 and 30; November 23, 24, 25 and 30; December 4 and 7.

The CSU faculty agreed to take furlough days in order to preserve jobs for as many CSU employees as possible, and to serve as many students as possible, in the current budget crisis. The agreement that governs faculty furloughs acknowledges that "cuts of this magnitude will naturally have consequences for the quality of education that we can provide." Within the furlough context, I will make every effort to support your educational experience at CSUSM.

Furlough plans may be altered after the beginning of the semester as a result of administrative actions or other emergencies; thus, subsequent revisions to this syllabus may occur.