

**CALIFORNIA STATE UNIVERSITY SAN MARCOS  
SCHOOL OF EDUCATION  
EDMS 545B: Science Education in Elementary Schools  
Spring 2012  
Mondays 1.00 – 3.45 p.m. - Room UH 444  
3 Units**

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| <b>Instructor:</b> Dr. Moses K. Ochanji<br><b>Office:</b> Univ. Hall 313<br><b>Phone:</b> 760-750-8546<br><b>E-mail:</b> <a href="mailto:mochanji@csusm.edu">mochanji@csusm.edu</a> | <b>Office Hours:</b> Mondays 12.00 – 1.00 p.m. or by appointment. Please email me to set up a convenient time to meet. |
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**SOE MISSION STATEMENT**

The mission of the School 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 ICP Multiple Subject 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*, 6<sup>th</sup> Ed. NY: McGraw-Hill. **PLEASE BRING TO EACH CLASS**
- California Department of Education (1998). *Science Content Standards for California Public Schools*. Sacramento, CA: CDE. <http://www.cde.ca.gov/BE/ST/SS/documents/sciencetnd.pdf>  
**PLEASE BRING TO EACH CLASS (5-8)**
- California Department of Education (2003). *Science Framework for California Public Schools*. Sacramento, CA: CDE. <http://www.cde.ca.gov/ci/cr/cf/documents/scienceframework.pdf>

- California Department of Education (2008). *Health Education Content Standards for California Public Schools*. Sacramento, CA: CDE.  
<http://www.cde.ca.gov/be/st/ss/documents/healthstandmar08.pdf>
- *Other handouts will be distributed in class or through Cougar Courses.*

### **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. Demonstrate an understanding of the Health Education Standards for California Public Schools and their connection/application to science content standards.
6. Use the Learning Cycle model of instruction to teach science in a contemporary manner.
7. Demonstrate the use of technology in elementary science teaching and learning.
8. Demonstrate confidence in leading and performing investigations designed to teach science concepts, science process skills, and scientific attitudes.
9. Use authentic methods of assessment to evaluate learning of science concepts and processes.
10. 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 School 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 2002)

#### **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, 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. Most assignments will be submitted in hard

copy to the instructor, and some specific assignments will also be submitted electronically on Moodle. Keep a digital copy of all assignments for use in your teaching portfolio.

## **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.

#### **TPE Primary Emphases in EDMS 545:**

- TPE 1a-Subject Specific Pedagogical Skills for MS Teaching Assignments (Science)
- TPE 5-Student Engagement

#### **TPE Secondary Emphases in EDMS 545:**

- TPE 4-Making Content Accessible
- TPE 7-Teaching English Learners
- TPE 9-Instructional Planning
- TPE 14-Educational Technology in Teaching

and Learning

### **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, SOE 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 SOE website provided at the website provided:

<http://www.csusm.edu/education/CalTPA/ProgramMaterialsTPA.html>

## **COURSE POLICIES AND REQUIREMENTS**

### **Attendance Policy**

Due to the dynamic and interactive nature of courses in the School 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.

**For this class**, students missing more than one class session cannot earn an A or A-. Students missing more than two class sessions cannot earn a B or B+. Students missing more than three classes cannot earn a C+. Arriving late or leaving early by more than 20 minutes counts as an absence. Notifying the instructor does not constitute an excuse. A make-up assignment will be available for up to two missed classes (5% points for each assignment for each class missed). This means that if you are absent twice and complete one makeup assignment and earn full credit points on this assignment, you may not be penalized on attendance. The makeup assignment applies to ALL absences excused or otherwise. Absences do not change assignment due dates.

### **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. Please be considerate of your instructor and peers in this regard. It is greatly appreciated by all!

### **Cell Phones**

Please turn off your cell phone before the start of each class. In addition, there will be no texting during class. It is unprofessional for teachers to use their cell phone during meetings with peers or during professional development activities (our class is considered professional development!)

### **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 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.

### **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 and Health Science 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 AND LEARNING OUTCOMES

1. Class Participation (Individually Assigned) - 5%
2. Reading Accountability Journal Entries (CONCEPT MAPS) (Individually Assigned) - 20%
3. California Science and Health Standards Tasks and Presentation - Individ. & Grp 10%
4. Hands-on Science Lesson Plan (In Groups, sizes TBD) - 10%
5. Hands-on Science Lesson Presentation (In groups with individual points) – 20 points
6. Hands-on Science Lesson Reflection (Individually Assigned) – 5%
7. Science Exploratorium Lesson & Presentation (Groups sizes TBD) – 20%
8. Technology & Web Resources for Science Teaching and Learning (Individually Assigned) 10%
9. Make Up Assignment – 5% for each completed task. Up to 10% points for missed classes (Optional & Individually)

Each student is responsible for ensuring that assignments are submitted correctly and on time. Late assignments will be penalized by a 10% point reduction each day they are late. Online assignments not correctly posted do not count as submitted and will be subjected to the late assignment policy. Keep digital copies of all assignments for your Credential Program TPE Portfolio where necessary.

### STANDARDS FOR PERFORMANCE - CRITERIA FOR GRADING ASSIGNMENTS

- A. 90-100%: Outstanding work on assignment, excellent syntheses of information and experiences, great insight and application, and excellent writing.
- B. 80-89%: Completion of assignment in good form with good syntheses and application of information and experiences; writing is good.
- C. 70-79%: Completion of assignment, adequate effort, adequate synthesis of information, and application of information and experiences, writing is adequate.
- D. 60-69%: Incomplete assignment, inadequate effort and synthesis of information, writing is less than adequate.

The above criteria will be applied in conjunction with specific assignment rubrics

Grades will be determined by points earned:

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

### ASSIGNMENT DESCRIPTIONS

#### 1. Active Participation and Collaboration: 5%

Teacher education is a professional preparation program and students will be expected to adhere to standards of dependability, professionalism, and academic honesty. **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 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 lose 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 – 20% points - See class schedule for due dates

Assigned readings from the course text provide an important foundation for your increasing understanding of science content and how to effectively teach science. Three or four chapters from the course text *Teaching Science to Science: An Inquiry Approach*, will be designated for reading on specific class meeting (see class schedule for chapter assignment). To demonstrate your comprehension of the readings, and assist you with meaningful class participation, you are asked to respond to specific science content-related reading assignments by completing a reading accountability journal entry in the form of a Concept Map. The concept map will be due at the beginning of class on the dates corresponding to the date the readings are assigned. You will only receive credit points if the concept map is completed by the start of class on date indicated in the schedule.

You will choose one of these chapters and read it to develop an in-depth understanding of its contents. For the chosen chapter, you will prepare a concept map (that has 20-25 concepts with linking words), using correct **concept mapping procedures**. The concept maps should be generated using a concept mapping software of your choice. Some recommended software include; Inspiration (Available on all public university student computers and at [www.inspiration.com](http://www.inspiration.com)). Other free concept mapping software is available through common internet search tools. You must print and bring a copy of your concept map to class. Put your name, chapter and date when the reading was assigned at the top of each page. You will be asked to share your concept maps with your peers at the beginning of each class session. You should be prepared to share in depth the breadth of your concepts presented in the chapter you read. Individuals will be called on randomly to share their concept maps in class. You will automatically lose half the points on the day’s concept map if you are unable to share the concepts with the class.

Each concept map has a possible total of 4 points based on the following criteria:

- a) Map shows clear hierarchy or relationship
- b) The Map includes at least 20 concepts
- c) Maps cover the depth of the science content in the assigned chapter
- d) Maps use 1-2 words or nouns for Concepts (not sentences)
- e) Maps use verbs or prepositions for linking words between concepts

### **3. California Science Framework and Health Science Content 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.

#### **Task I: Framework Summary Response: (Individual) – 2% pts**

- Read the first part of the California Science Framework, up to page 32. This includes Board Policy, the Introduction and Chapters One and Two.
- Think about the reading holistically.
- Type a response to the reading (about one page long), 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.

At least one full page of text is required. Turn in a hard copy of Task I in class on the second class session and post on the Cougar Courses class page under the appropriate link.

#### **Task II A: Grade level Science Content Standards Response: (Individual) – 3 pts**

Using the standards for your assigned grade level, 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 for science, each of which includes a content line (physical, life, or earth science), an Investigation and Experimentation line, and a 2-5 sentence description of an activity that combines the two. See example on page 8.

#### **Task II B: Grade level Health Education Content Standards Response (Individual) – 2 pts**

[The Health Education Content Standards for California Public Schools](#) are categorized into 8 Health

Content Standards: Essential Health Concepts; Analyzing Health Influences; Assessing Valid Health Info; Interpersonal Communication; Decision Making; Goal Setting; Practicing Health Enhancing Behaviors; and Health Promotion. These 8 content standards are included in 6 Health Content Areas: Nutrition and Physical Activity; Growth, Development & Sexual Health; Injury Prevention and Safety; Alcohol, Tobacco, and Other Drugs; Mental, Emotional, and Social Health; and Personal and Community Health.

For the same grade level assigned to you for Task II A, you will select one Health Content Standard under one of the Health Content Areas and write an activity that students in that grade level can do.

You should end up with one section for Health Education, which includes one Health Content area, one Health Content Standard, and a 2-3 sentence description of an activity that reflects both.



**Hard Copy due date: Class session 2. Upload your Task II A AND Task II B (One document) to Moodle session 2.**

The complete write up for Tasks II A and II B should be no more than two pages. See page 9.

**Task III: Team preparation and presentation – (in class with your team) –3 pts**

Get together with your team. Look at the activities that were collectively written up for Task II

A. Choose one activity. Then...

- As a team, word process 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 but detailed description of the activity). Make sure you quote the standards on which your lesson plan is based. Add group lesson sketch to group PPT below.
- 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—the Big ideas. On a PPT, list the competencies indicated in the Science Standards for your grade. Upload your group PPT to Moodle session 2.
- In 10 minutes or less, present your lesson plan sketch and science standards overview to the class. Be prepared to explain why your lesson activity represents really good science for kids.
- Each team member should also add to the group PPT his/her Health Content Standard/Health Content Area idea (i.e., Task II B)

Your grade for this assignment will be based on the content and quality of your presentation, and the level of collaboration with your team.

Hard Copy of Lesson Sketch due date: Class session 2: Upload the group lesson sketch done for Task III and the group PPT to Moodle session 2.

**Sample Response to Assignment Tasks II A and II B.**

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.

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## 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.)

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## 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.

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## Health Content Area: Nutrition and Physical Activity

Health Content Standard 1.8.N - Identify ways to increase and monitor physical activity.

### Activity

In pairs, students will take turns in a jump rope activity. Starting with 5 jumps and increasing the jumps by 5, they will observe and record the maximum number of jumps that their partner can comfortably complete.

## **4. Hands-on Science Lesson Plan –10% - See class schedule for due dates**

The spirit of the assignment is to develop and teach a particular kind of a science inquiry lesson that teaches both science process skills and science content using the learning cycle instructional model.

You will work in groups of three to create and lead a science lesson based on the Learning Cycle Model of Instruction. You will prepare and teach this lesson to your classmates. Use activities from the textbook, Internet sites or other science resources. The team should teach the lesson as you would to elementary or middle school students.

The lessons should include hands-on activities that emphasize specific science process skills and specific science concepts. The Exploration and Application phases of the Learning Cycle require

different hands-on science activities and manipulatives. Hands-on activities are NOT reading or completing worksheets (though they may require students to read something or complete lab observation sheets).

Your lesson plan should also identify and explain Strategies for English language learners and adaptations for students with special needs and adaptations for GATE students.

### **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 Students/Advanced Learners/Accelerated Learners*

*Remaining students:*

### **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 each Assessment Category*

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

*Description and Purpose of Differentiated/Adapted Assessment Methods for **ALL** the following:*

- *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 plan.*

### **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 2<sup>nd</sup> hands-on SCIENCE activity that extends students' thinking and learning from the two previous phases.)

**Differentiation and/or accommodation of instructional strategies and activities for EACH of these student populations (one student per population) described in your lesson plan:**

Instructional Adaptations and/or Accommodations (3) for ELL students:

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Instructional Adaptations and/or Accommodations (3) for students with special needs (SPED):

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Instructional Adaptations and/or Accommodations (3) for GATE students

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**Also include at the end of the Lesson Plan document:**

**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 if possible during the day of the presentation

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

### **5. Hands-on Science Lesson Presentation – 20% (See Appendix B for the assignment rubric) See class schedule for due dates**

Each team will be allocated a maximum of 30 minutes of class time to teach their lesson. Prepare a PowerPoint Presentation to use in your lesson. The presentation should include a detailed explanation of the science content, as well as a list and definitions of science concepts important to the lesson. Include a list of websites (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.

**Begin Exploration with students making predictions or answering essential questions or completing a challenge.** You should take the activities “off the 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-8 grade students, and should follow the NSTA Safety Guidelines.

Bring one copy of your lesson plan to class for the instructor on the day of your presentation and post a copy of the lesson plan on the online forum of the Cougar Courses page for access by your classmates.

### **6. Hands-on Learning Cycle Lesson Reflection – 5% points: Due one week from the date of your presentation**

After teaching the lesson in class, you should each complete a lesson reflection. The reflection should include strengths, weaknesses, and recommendations for improvement addressing the following questions:

- Why were the instructional strategies and student activities appropriate for this class based on learning objectives and student development needs?
- How did the instructional strategies and activities address the development need of these students?
- How did the instructional strategies and student activities help the students make progress toward achieving the state adopted academic content standards for student in this content area?
- Explain the strengths and weaknesses of your lesson and assessment in relationship to the learning goals/objectives. Describe your alternative assessment based on the potential gaps in the students learning.

*\*No longer than 2 pages*

### **7. Science Exploratorium Lesson & Presentation: 20% points**

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 Exploratorium. The audience will be 4/5 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. 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.

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

Turn in your typed Lesson Plan with your names at the top and REFERENCES at the bottom.

1. Science Concept (and definition) you are teaching. Write it out in a complete sentence. Do not say “The students will \_\_\_\_.” (That is an objective, not a science concept.)
2. Lesson Objectives
3. California Science Content Standards addressed
4. Exploration Activity
5. Concept Invention
6. Concept Application Activity

### **8. Technology & Web Resources for Science Teaching and Learning – 10 points See class schedule for due dates**

Technology provides unique resources for teaching and learning in science. In this assignment, you will apply your understanding of web-based resources to specific science lessons. This assignment is tied to your Capstone research project in ID 381. In the capstone research project, you will be conducting a scientific research on a given science topic. In this assignment, your task is to think about how you can invite K-8 students to participate in some aspects of your resource project through the use of a webquest.

#### Procedures to follow:

- a. Read Chapter 3 in the Friedl Text.
- b. You will integrate technology in your capstone research project by providing opportunities for K-8 students to use technology to explore or access the content and/or skills associated with your capstone project by creating a webquest tied to your project research. Use zunal ([www.zunal.com](http://www.zunal.com)) or a similar webquest creation template. Your webquest must include but not limited to the following:

**Introduction** – What is the task about and what learning objectives will it achieve

**Task** - What will the students do? Describe the task that you will assign to students. This may be framed as a “challenge” task.

**Process:** How will the students go about doing the task?

**Resources:** What resources are available for students to complete the task (should include web resources)

**Product:** What products (student work) will the students generate from the webquest?

**Evaluation:** How will the products be assessed and evaluated? Include the rubric that will be used.

**Your final webquest will be submitted as a link through the Cougar Course site and you will share your webquest as part of your capstone project presentation. Credit for this assignment includes the webquest itself and the presentation.**

### **9. Make-up Assignment up to 10%: 5% points make up for each missed class or late arrivals/early departures**

By completing this assignment you have the opportunity to offset penalty points for missing up to two entire classes or a combination of up to three late arrivals and/or early departures. Attend a science related informal site or formal event or presentation equivalent in time and effort to one class session (3 hrs). This could be a field trip, museum, lecture or some other equivalent experience that will assist you either directly or indirectly in becoming a science teacher and expands your science knowledge. Your

choice! But you may not use an activity attended prior to the first day of this class! However, you may revisit a site you have previously visited.

To complete this assignment: 1) Visit a science related informal site or formal event or presentation; 2. Participate and learn some new scientific knowledge and new ways in which the activity can be used to teach science. Document through pictures and video or artifact collection where possible 3) Prepare a written summary of your visit documenting what you did for the 3 hours you were at the site, what science ideas and concepts you learned from the visit or presentation and how the visit or presentation can be applied to teaching in K-12 environments; 4) Post your write up to the Cougar Course site related forum; 5) do a 5 minute PowerPoint presentation to the class during class one of the classes addressing the what you did, what you learned, how it can be applied, highlighting resources from the site . Discuss with the instructor about the class time in which you may do the presentation. The presentation must be done during one of the scheduled class sessions.

#### APENDIX A: Tentative Class Schedule

| Class | Date | Topic   | Readings & Work Due   |
|-------|------|---|---|
| 1     | 1/23 | Course Overview<br>The Nature of Science and Inquiry<br>Process in Science<br>How do we make decisions about what to teach and how we teach it?   | Bring Syllabus to class   |
| 2     | 1/30 | What are the overarching themes that we want our students to learn in science?<br>-Focus on standards and Frameworks<br>-Focus on sequencing instruction  | - <i>Read Chapter 1 &amp; 2 of Teaching Science to Children</i><br>- <i>Read the CA Science Framework pgs 1-22</i><br>- Bring <u>Science Content Standards</u> (K-8) to all classes.<br><b>DUE: Framework and Standards Task I (individual)</b><br><b>Due: Framework &amp; Standards Task II A &amp; II B (Individual). Post to Moodle Framework and Standards Task III &amp; Presentations due (team).</b><br><b>Post to Moodle – (one posting per team)</b> |
| 3     | 2/06 | How shall we sequence the learning activities so that students can learn the intended themes?<br>-Focus on using the Learning Cycle to teach science as inquiry<br>– Instructor-Lead Hands-on Activity  | - <i>Read Learning Cycle Handout and bring a copy to class</i><br>- <i>Read Chapter 4 or 5 or 6 of Teaching Science to Children</i><br>- <b>CONCEPT MAP #1 on one of Ch. 4, 5, 6 due</b>  |
| 4     | 2/13 | What shall we use as the best indicators that students have learned and understand the intended outcomes?<br>- Focus on Assessment<br>- Focus on Lesson Planning<br>– Instructor-lead Hands-on Activity | - <i>Read Chapter 7 or 8 or 9 of Teaching Science to Children</i><br>- <b>CONCEPT MAP #2 on one of Ch. 7, 8, 9 due</b>  |
| 5     | 2/20 | - Learning Cycle in Unit plans<br>- Instructor-lead Hands-on Activity<br>- Safety Guidelines for Science Classrooms   | - <i>Read Chapter 10 or 11 or 12 - CONCEPT MAP #3 on one of Ch. 10, 11, 12 due</i>  |
| 6     | 2/27 | <a href="#">Developing creative Learning Cycle Lesson Plans</a>   | <a href="#">Group Work</a>  |
| 7     | 3/05 | What Activities of Teaching shall we  | <i>Read Chapter 13 or 14 or 15</i>  |



|           |             |  |  |
|-----------|-------------|--|--|
|           |             | use to make the content accessible to ALL students?<br>-Hands-on Lessons Presentations                                   | - <b>CONCEPT MAP #4 on one of Ch. 13, 14, 15 due</b><br>- <b>hands-on Lesson Plans Due</b><br>- <b>Hands-on lesson Presentations x 3</b>   |
| 8         | 3/12        | What strategies can use to ensure participations of ALL students in science learning?<br>-Hands-on Lessons Presentations | - <i>Read Chapter 16 or 17 or 18</i> - <b>CONCEPT MAP #5 on one of Ch. 16, 17, 18 due</b><br>- <b>Hands-on lesson Presentations x 3</b><br>- <b>hands-on Lesson Reflection Due from 1<sup>st</sup> presenters</b>  |
| 9         | 3/26        | -Science Fair Exploratorium Preview  | - <i>Read Chapter 19 or 20 or 21</i><br>- <b>CONCEPT MAP #6 on one of Ch. 19, 20, 21 due</b><br>- <b>Hands-on lesson Presentations x 2</b><br>- <b>hands-on Lesson Reflection Due from 2<sup>nd</sup> presenters</b><br>- <b>Science Fair Exploratorium Lesson Due</b> |
| <b>10</b> | <b>4/02</b> | <b>Science Fair Exploratorium</b><br><a href="#">Class meets at an Elementary School</a>                                 | - <b>Science Fair Exploratorium Presentations Due</b><br>- <b>hands-on Lesson Reflection Due from 3<sup>rd</sup> presenters</b>  |
| 11        | 4/09        | -Science Fair Exploratorium Reflection<br>- Developing Science Web Quests & Technology for science Teaching              |  |
| 12        | 4/16        | <a href="#">Capstone Project Integration</a>   | <i>Read Chapter 3 of Teaching Science to Children</i><br>Group Work  |
| 13        | 4/23        | Adapting Science curriculum for children with Special Needs.   | - <b>Web Resources Assignment Due</b>  |
| 14        | 5/02        | Capstone Project Presentations   | - Capstone Presentations   |
| 15        | 5/07        | Capstone and Course Reflections  |  |

\*\* Tasks in bold will be graded and account directly to course grade

NOTE:

The California Faculty Association is in the midst of difficult contract negotiations with the CSU administration. In response to the CSU's stance, it is possible that the faculty union will call for a one-day strike or other work stoppage. When a decision for such action has been reached, you will be informed about the decision and of any disruption to the posted schedule.