



**EDMI 545**  
**Middle Level Science Education**  
**CRN #27713**  
**Days: Arranged**  
**Time: Arranged**  
**Woodland Park Middle School**  
**Spring 2014**

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*Conceptual Framework Theme: Engaging diverse communities through leading and learning for social justice.*

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Hours:	Before and after class. Other times are also available by appointment. Please call or e-mail me to set up a convenient time to meet.

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**School of Education Mission & Vision Statement**  
*(Adopted by SOE Governance Community, January 2013)*

*Vision*

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

*Mission*

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

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

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

Focuses on developing an understanding of theory, methodology, and assessment of science in self-contained or departmentalized settings.

Ochanji: This course focuses on developing an understanding of theory, methodology, and assessment of science in self-contained or departmentalized settings in integrated and inclusive middle level 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 and middle school children. A series of 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.

### Course Prerequisites

Admission to a Multiple Subject/CLAD Teacher Credential Middle Level Program.

### 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 and Middle school children.
3. Demonstrate knowledge and understanding of the California Science Framework, the California Health Framework, the California Health Education 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. Use technology in elementary and middle school science teaching.
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 student learning of science concepts and processes.
10. Design an integrated science web quest.
11. Practice strategies to include all students in science (linguistically and culturally diverse, students with disabilities and other students with special needs).

### Unique Course Requirements (optional)

Any unusual requirements should be listed here. These might include field trips, observations in schools or access to students, etc.

### Required Texts

- 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/sciencestnd.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.**

### **Other Recommended Books**

National Research Council (1996), *National Science Education Standards*, Washington D.C.: National Academy Press. **Also available online**

National Research Council (2000), *Inquiry and National Science Education Standards*, Washington D.C.: National Academy Press. **Also available online**

National Research Council (2001), *Classroom Assessment and the National Science Education Standards*, Washington D.C.: National Academy Press. **Also available online**

## **INFUSED COMPETENCIES**

### **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. Candidates successfully completing this program receive a credential with authorization to teach English learners. *(Approved by CCTC in SB 2042 Program Standards, August 02)*

### **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.

### **Technology**

This course infuses technology competencies to prepare candidates to use technologies, emphasizing their use in both teaching practice and student learning.

### **Computer/Cell Phone Use during Class**

You are welcome to use a laptop computer in class when working on in-class assignments. The use of computers for taking notes is discouraged because most students find it disruptive when they are focusing listening to presentations and can hear keyboarding in the classroom. Please use cell phones, computers or other personal electronic devices to text, check email, or conduct personal business OUTSIDE of class. Your kind consideration is greatly appreciated by all!

## **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 EDM I 545:**

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

#### **TPE Secondary Emphases in EDM I 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 to 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: <http://www.csusm.edu/education/CalTPA/ProgramMaterialsTPA.html>

### Assessment of Professional Dispositions

Assessing a candidate's dispositions within a professional preparation program is recognition that teaching and working with learners of all ages requires not only specific content knowledge and pedagogical skills, but positive attitudes about multiple dimensions of the profession. The School of Education has identified six dispositions – social justice and equity, collaboration, critical thinking, professional ethics, reflective teaching and learning, and life-long learning—and developed an assessment rubric. For each dispositional element, there are three levels of performance - *unacceptable*, *initial target*, and *advanced target*. The description and rubric for the three levels of performance offer measurable behaviors and examples.

The assessment is designed to provide candidates with ongoing feedback for their growth in professional dispositions and includes a self-assessment by the candidate. The dispositions and rubric are presented, explained and assessed in one or more designated courses in each program as well as in clinical practice. Based upon assessment feedback candidates will compose a reflection that becomes part of the candidate's Teaching Performance Expectation portfolio. Candidates are expected to meet the level of *initial target* during the program.

## COURSE REQUIREMENTS

### School of Education Attendance Policy

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

For this class, you may miss up to one class without penalty. Each subsequent class session that you are absent from class drops your maximum final grade by 5% points. Late arrivals and early departures will affect your final grade as well. For each late arrival or early departure you will lose 2% points. A make-up assignment will be available for one missed class beyond the allowable limit (5% points for one class missed). This means that if you are absent twice and complete the 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.

### All University 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.

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

Candidates with disabilities who require reasonable accommodations must be approved for services by providing appropriate and recent documentation to the Office of Disable Student Services (DSS). This office is located in Craven Hall 4300, and can be contacted by phone at (760) 750-4905, or TTY (760) 750-4909. Candidates 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. All written work and oral presentation 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.”

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

### **Plagiarism:**

As an educator, it is expected that each candidate 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.

### **Electronic Communication Protocol**

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

Things to consider:

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

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

## Topics Outline

- The Nature of Science
- Science Process Skills and Scientific Attitudes
- CA Science/Health Content Standards Grades 5-8
- California Science/Health Framework
- Next Generation Science Standards
- The Learning Cycle Model of Instruction (5E Lesson Plan)
- Learning Cycle Science Lesson Demonstrations
- Teaching Science to ELL Students (SDAIE Strategies)
- Teaching Science to GATE and Special Needs Students
- Authentic Assessments and Rubrics in Science
- Safety issues in Science
- Science Projects, Student Research and Science Fairs
- Infusing Technology into Science Teaching
- Infusing Writing Activities in Science Lessons
- Science Curriculum Kits and Supplementary curricula and materials
- Current Issues in Science Education

## Course Assignments and Learning Outcomes

1. Class Participation – 5 pts
2. Science Concept Maps – 20pts
3. California Science Framework and Health [Science Content Standards](#) Activity I, II , III – 10 pts
4. 5E Hands-on Learning Cycle Science Lesson Plan – (Groups TBD) 10pts
5. 5E Hands-on Learning Cycle Science Lesson Presentation – (Groups TBD) - 10pts
6. 5E Hands-on Learning Cycle Science Lesson Reflection – 5pts
7. Science Exploration Fair (Lesson Plan, Presentation, Display Board & Reflection) (Groups TBD)– 20 pts
8. Integrated Science & Social Studies Unit and Webquest – 20 pts
9. Make Up Assignment – Up to 5 points for missed classes

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.

## 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. Points earned will determine grades:

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

## Assignment Descriptions

### 1. Class 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. Science 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 Children: 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, on ipads 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 pts

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 22. 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 8 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. 5E Hands-on Learning Cycle Science Lesson Plan – 10 pts - 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)*

**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.*

**5E –Learning Cycle 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.

**5E- Learning Cycle:**

**Learning Cycle Part 1: Engage:** the “catch”

- Tap students’ Prior Knowledge
- Focus learners thinking by piquing their interest
- Spark interest in the topic

**Learning Cycle Part 2: Explore:** the “do”

- Provide hands- on activities
- Provide common, concrete, tactile experiences with skills and concepts
- Student driven
- Inquiry based

**Learning Cycle Part 3: Explain:** “the lesson”

- Connect the pieces together
- Use language of instruction
- Higher order thinking questions
- Use students previous experiences as the basis for explaining concepts
- Clarify and correct misconceptions

**Learning Cycle Part 4: Elaborate/Concept Application:** the “enrich”

- Apply real life application using another similar activity
- Deepen understanding of concept
- Apply concept in new context
- Expect students to use content (topic) terms appropriately
- Apply or extend concepts and skills in new situation

**Learning Cycle Part 5: Evaluate:** the “did they get it?”

- How will your students demonstrate that they have met the objective(s)?
- What evidence demonstrates that they have achieved the objective?
- Student demonstrates knowledge of concept and/or skills

**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).

**Three (3) Applications to everyday life and explanations**

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

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

**5. 5E Hands-on Learning Cycle Science Lesson Presentation – 10 pts (See assignment grading rubric on cougar courses) See class schedule for due dates**

Each team will be allocated a maximum of 30 minutes of class time to teach their lesson. Prepare and use a PowerPoint Presentation or a similar presentation platform using iPADS to present your lesson. The

PowerPoint should include all elements of the lesson plan so that peers can see explicitly the flow of the lesson from standards, objectives, assessment plan, what you did for each segment of the 5E learning cycle. The presentation should also 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. 5E Hands-on Learning Cycle Science Lesson Reflection – 5 points: Due one week from the date of your presentation

After teaching the lesson in class, you should individually complete a lesson reflection. The reflection should describe the how the activities and assessment plan address the learning goals of the lesson and the strengths, weaknesses, and recommendations for improvement. This should be done by responding to the following prompts guide your reflection:

- Describe the learning goals and the activities that you chose to help students make progress towards achieving these goals.
- Explain why you chose these activities for addressing the stated learning goals/needs.
- How effective were the activities in helping students make progress towards achieving the learning goals?
- How effective was your assessment plan in providing information about student progress on the learning goals? Explain the strengths and weaknesses of your assessment in relationship to the learning goals/objectives and the evidence it provided on student learning. If the assessment did not provide sufficient information, what alternative assessments would you put in place based on the potential gaps in student learning assessment?

*\*No longer than 2 pages*

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

In this activity you will have the opportunity to teach a mini hands-on science lesson to real students and practice differentiating instruction on the spot based on student needs. You will work in groups as assigned in class

- Develop an inquiry activity that uses a discrepant event appropriate for elementary students.
- Prepare a hands-on science lesson and poster about a discrepant event that leads to a science concept.
- You will present the lesson at a Middle School Science Exploratorium. The audience will be 6/7 grade students (subject to confirmation) at a local middle 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.

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

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

### 8. Integrated Science & Social Studies Unit, Webquest and Presentation–20 Points

This assignment is tied to the Unit Plan Project from other classes. For this assignment, you will plan a unit of instruction for an appropriate grade for an interdisciplinary team that includes science and other subject areas as desired. This unit will be appropriate for approximately two – three weeks of instruction for a heterogeneous elementary classroom as described in EDM I 544. For the science lesson of the unit, you will create a webquest that demonstrates your understanding of organizing web-based resources to specific science lessons. Your task is to think about how you can invite 5-8 grade students to participate in some aspects of your resource project through the use of a webquest.

#### Procedures to follow for the webquest:

a. Read Chapter 3 in the Friedl Text.

b. You will integrate technology in your unit plan by creating a webquest that provides opportunities for 5-8 students to use technology to explore or access the content and/or skills associated with your unit plan theme. 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** – Should identify a need that students can relate to and the learning objectives that will be achieved by meeting the need it achieve?

**Task and product** - What will the students do? The activity or task should be such that it solves the need identified in the introduction. It could be a challenge, creation of a product. Describe the problem or challenge to solve or product to create that that you will task to students with the students as your audience. What will be the final product they students will submit?

**Process:** How will the students go about completing the task? Describe the step-by-step process.

**Resources:** What resources (should include web resources) are available for students to complete the task? Note the Zunal allows you to add resources to every section of the webquest.

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

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

### 9. Make-up Assignment: 5 make up points 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 videos 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.

**TENTATIVE CLASS SCHEDULE**  
(Updated 1/21/14)

Date	Course Topics & Assignments	Readings And Assignments Due
1/24/2014 P.M. Class Session 1	<ul style="list-style-type: none"> <li>• Course Overview: Syllabus and Text</li> <li>• The Nature of Science (Discrepant Events, Inquiry Process Skills)</li> <li>• Science Content Standards/Framework Overview</li> <li>• Work time for Standards Task I &amp; II</li> </ul>	Bring Syllabus to class Read Chapters 1 and 2 <i>Bring required textbook</i>
1/29/2014 A.M. Class Session 2	<p>What are the overarching themes that we want our students to learn in science?</p> <ul style="list-style-type: none"> <li>-Focus on standards and Framework Task II and III</li> <li>-Focus on sequencing instruction</li> <li>-Writing Concept Maps</li> </ul>	<p>Download and print out CA Science Content Standards (5-8). Download and read CA Science Framework chapter 1 and 2( pp. 1-22)</p> <p><b>DUE:</b> Framework and Standards Task I (individual) <b>Due:</b> Framework &amp; Standards Task II A &amp; II B (Individual). Post to Moodle <b>Due:</b> Framework and Standards Task III Presentations (team). Post to Moodle – (one posting per team)</p>
1/31/2014 P.M. Class Session 3	<p>How shall we sequence the learning activities so that students can learn the intended themes?</p> <ul style="list-style-type: none"> <li>- using the Learning Cycle to teach science as inquiry</li> <li>- Teaching Science to English Language Learners</li> <li>-Teaching Science to Gate and Students with Special Needs</li> <li>-Class time for Sign-Up: 5E Lesson Presentations.</li> </ul>	- <i>Read Learning Cycle Handout and bring a copy to class.</i>
2/3/2014 A.M. Class Session 4	<p>What shall we use as the best indicators that students have learned and understand the intended outcomes?</p> <ul style="list-style-type: none"> <li>- Concept Map Sharing #1</li> <li>- Focus on Lesson Planning</li> <li>- Focus on Assessments (performance assessments, developing criteria for assessing learning and using rubrics)</li> <li>- Instructor Led Learning Cycle Lesson</li> </ul>	<p>- <i>Read Chapter 4 or 5 or 6 of Teaching Science to Children.</i> - <b>DUE: Concept Map #1 on one of Ch. 4, 5, 6.</b></p>
2/7/2014 A.M. Class Session 5	<p>Developing creative Learning Cycle Lesson Plans Team time for 5E Lesson Plan/Presentation (time permitting) - Share Concept Maps #2</p>	<p><i>Read Chapter 7 or 8 or 9 of Teaching Science to Children.</i> <b>DUE: Concept Map #2 on one of Ch. 7, 8, 9.</b></p>
2/12/2014 A.M. Class Session 6	Project-based Learning	Field Trip to High Tech High School <b>-DUE: hands-on Lesson Plans Due</b>

2/18/2014 P.M. Class Session 7	- Share Concept Maps #3 - Safety Guidelines for Science Classrooms	- Read Chapter 10 or 11 or 12 - <b>DUE: Concept Map #3 on one of Ch. 10, 11, 12 due</b>
2/19/2014 A.M. Class Session 8	What Activities of Teaching shall we use to make the content accessible to ALL students? - Share Concept Maps #4 - <b>Team 1</b> The 5E Science Lesson Presentation - <b>Team 2</b> The 5E Science Lesson Presentation	Read Chapter 13 or 14 or 15 - <b>CONCEPT MAP #4 on one of Ch. 13, 14, 15 due</b> -Hands-on lesson Presentations x 2
2/19/2014 P.M. Class Session 9	What Activities of Teaching shall we use to make the content accessible to ALL students? - <b>Team 3</b> The 5E Science Lesson Presentation - <b>Team 4</b> The 5E Science Lesson Presentation	- Hands-on lesson Presentations x2
2/21/2014 A.M. Class Session 10	What Activities of Teaching shall we use to make the content accessible to ALL students? - Share Concept Maps #5 - <b>Team 5</b> The 5E Science Lesson Presentation - <b>Team 6</b> The 5E Lesson Presentation - <b>Science Exploratorium Discussion</b>	- Read Chapter 16 or 17 or 18 - <b>DUE: Concept Map #5 on one of Ch. 16, 17, 18</b> - Hands-on lesson Presentations x2
2/25/2014 A.M. Class Session 11	- Share Concept Maps #6 -Writing Science Web Quests & Technology for science Teaching - Informal Science Site Visit Presentations Science Fair Exploratorium Preview	- Read Chapter 19 or 20 or 21 - <b>DUE: Concept Map #6 on one of Ch. 19, 20, 21</b> Read Chapter 3 of Teaching Science to Children
2/26/2014 A.M. Class Session 12	Current Issues in Science Education & Scientific Community Adapting Science curriculum for children with Special Needs <b>Science Fair Exploratorium Planning</b>	- <b>DUE 2/26:</b> Hands-on Lesson Reflection from 1 <sup>st</sup> presenters - <b>DUE (on Friday 2/28/14):</b> Hands-on Lesson Reflection from 2 <sup>nd</sup> presenters  - <b>DUE 3/14/14:</b> Science Exploration Fair Lesson Plan and ½ page student data sheet
3/28/2014 A.M. Class Session 13	<b>Science Fair Exploratorium</b>	
3/28/2014 P.M. Class Session 14	<b>Science Fair Exploratorium</b>	
5/09/2014A.M. Class Session 15	Unit Plan/Webquest Presentations Course Review and Reflection	<b>DUE:</b> Unit-based WebQuests