

**CALIFORNIA STATE UNIVERSITY SAN MARCOS**  
**COLLEGE OF EDUCATION**  
**EDMI 545 – Middle Level Science Education**  
**Summer 2008 – Meeting Time: Mondays & Wednesdays 5.30 – 10.00 p.m.**  
**University Hall 439**

General Information:

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Office Hours: Before and After class

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

**Mission Statement**

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

**Required Textbooks:**

- Friedl, A.E. & Koontz, T.Y. (2005). *Teaching Science to Children, An Inquiry Approach, 6<sup>th</sup> Ed.* NY: McGraw-Hill.
- California Department of Education (2003). *Science Framework for California Public Schools.* Sacramento, CA: CDE. [Also available online.](#)

*Other handouts will be distributed in class or through WebCT*

**Other Recommended Books:**

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

Activities Integrating Math and Science. Aims Education Foundation.  
<http://www.aimsedu.org/aimscatalog/default.tpl>

These and many other hands-on science books are in bookstores, museums, zoos, even grocery stores!

**COURSE DESCRIPTION**

This course focuses on developing an understanding of theory, methodology, and assessment of science in integrated and inclusive elementary and 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 the Middle Level/CLAD Teacher Credential 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 Science Content Standards, and the National Science Education Standards.
4. Demonstrate an understanding of the physical, earth and life science concepts included in the K-8 California Science Content Standards, and how to design lessons to teach the concepts.
5. Use the Learning Cycle model of instruction to teach science in a contemporary manner.
6. Use technology in elementary and middle school science teaching.
7. Demonstrate confidence in leading and performing investigations designed to teach science concepts, science process skills, and scientific attitudes.
8. Use authentic methods of assessment to evaluate student learning of science concepts and processes.
9. Design a middle school science-teaching mini-unit.
10. Practice strategies to include all students in science (linguistically and culturally diverse, students with disabilities and other students with special needs).

## **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. Students 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 Use During Class**

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

## **COURSE REQUIREMENTS**

### **COE Attendance Policy**

Due to the dynamic and interactive nature of courses in the College of Education, all students are expected to attend all classes and participate actively. At a minimum, students must attend more than 80% of class time, or s/he may not receive a passing grade for the course at the discretion of the instructor. Individual instructors may adopt more stringent attendance requirements. Should the student have extenuating circumstances, s/he should contact the instructor as soon as possible.

For this class, each class session that you are absent from class drops your maximum final grade by 10% 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 assignment will be available only for up to one class (10% points). This means that if you are absent once and complete a make up assignment and earn full credit on this assignment, you will receive no penalty on attendance. The makeup assignment applies to ALL absences excused or otherwise. Absences do not change assignment due dates.

### **Writing**

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**

Students are approved for services through the Disabled Student Services Office (DSS). This office is located in Craven Hall 5205, and can be contacted by phone at (760) 750-4905, or TTY (760) 750-4909. Students authorized by DSS to

receive reasonable accommodations should meet with their instructor during office hours or, in order to ensure confidentiality, in a more private setting.

### **CSUSM Academic Honesty Policy**

“Students will be expected to adhere to standards of academic honesty and integrity, as outlined in the Student Academic Honesty Policy. 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 cases of academic dishonesty will be reported to the Dean of Students.

### **Plagiarism:**

As an educator, 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.

### **TOPICS OUTLINE**

The Nature of Science  
The Learning Cycle Model of Teaching  
Learning Cycle Science Lesson Demonstrations  
Writing Objectives for Student Learning  
Writing Science Concept Definitions  
CA Science Content Standards Grades K-8  
California Science Framework  
SDAIE Strategies in Science  
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

### **COURSE ASSIGNMENTS AND LEARNING OUTCOMES**

1. Class Participation (Individually) - 5%
2. Reading Accountability Journal Entries (RAJEs) (Individually) - 10%
3. Standards and Frameworks Task & Presentation (Partly Individual & Partly in Groups)-10%
4. Leadership on Hand-on science lesson (In Groups, sizes TBD) - 20%
5. Hands-on Science Reflection (Individually)- 5%
6. Science Curriculum Map and Unit plan (Partly Individual & Partly in Groups) - 20%
7. Web Resources for Science Teaching and Learning (Individually) 20%
8. TPE reflection and response Via Task Stream (Individually) 10%
9. Make Up Assignment – Up to 10% points for missed class (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. WebCT 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 Electronic Portfolio and for your science notebook. You will not be assigned a course grade unless all the assignments are turned in.

## **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 (all or nothing credit) - 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. Reading Accountability Journal Entries (RAJEs) – 10% points**

**See class schedule for due dates**

The assigned readings provide an important foundation for your increasing understanding of science content and how to effectively teach science. To aid you in remembering the readings, and assist you with meaningful class participation, you are asked to respond to the reading assignment by coming to class with a concept map entry in your Reading Accountability Journal. Reading accountability journals will be due at the beginning of class time on the assigned dates. You will only receive credit points if journal entries are completed by the start of class on date indicated in the schedule.

Three or four chapters from the course text *Teaching Science to Science: An Inquiry Approach*, will be designated for each class meeting (see class schedule for chapter assignment). 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 (10-15 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; Cmap Tools (free download available at [http://cmap.ihmc.us/download/dlp\\_CmapTools.php?myPlat=Win](http://cmap.ihmc.us/download/dlp_CmapTools.php?myPlat=Win)) or Inspiration (free trial download available at [www.inspiration.com](http://www.inspiration.com)). You must print and bring a copy of your concept map to class. We will share the concept maps with peers in at the beginning of each class session. Put your name, chapter and date when the reading was assigned at

the top of each page. 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 days RAJE if you are unable to share the concepts with the class.

Each concept map has a possible total of 5 points.

- a. Most general, inclusive Concept at top/center.....worth 1 point
- b. Map shows clear hierarchy or relationship.....worth 1 point
- c. 15-25 concepts included.....worth 1 point
- d. 1-2 words (nouns) for Concepts.....worth 1 point
- e. Verbs or prepositions for Linking Words between Concept...worth 1 point

### **3. California Science Framework and Standards Assignment Tasks – 10 points**

Spirit of the assignment: to read a portion of the California Science Framework and the Standard for a particular grade. You will write your individual response to the readings. Then you will work with your grade level team to prepare and do a presentation to the class. It's important that you do the reading and the write-ups BEFORE you meet with your team.

#### **3a. Task I: Framework summary response I 2 points**

- 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.
- Write about a page, in your own words, that answers these questions: What do you think are the most important ideas addressed in the reading? Were there any ideas in the reading which were new to you, or which disagreed with something you thinking?

#### **3b. Task II: Grade level Science standard response I 6 points**

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

#### **3c. Task III: Team preparation and presentation T 2 points**

**You will be given 30-40 minutes of class time to work with your team.**

- Get together with your team. Take turns presenting the activities that everyone wrote up for Assignment 2b. Choose one.
- As a team, write up a lesson plan for the activity (with objectives, assessment, and a brief description of the activity). Put it on chart paper or an overhead transparency so it can be easily presented to the class. Make sure you quote the line from the standard on which your lesson plan is based.
- As a team, come up with a brief overview of the Science Standard 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.
- In 8 minutes or less, present your lesson plan and standards choices. Be prepared to explain why your lesson plan represents good science learning for kids.
- Your grade for this assignment will be based on the content and quality of your presentation, and on the level of collaboration of the group.

## Sample response to Assignment 3b.

Grade Four

Physical Science

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

Investigation and Experimentation

6. f 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

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

Investigation and Experimentation

6. c. 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

5.c. 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

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

Activity

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

#### **4. Hands-On Science Lesson Presentation –20 Points - Due on assigned day for the lesson**

Spirit of the Assignment: to develop and teach a particular kind of a science inquiry lesson that teaches both science thought processes and science content.

You will work in groups of two or three (Group sizes TBD based on class size) to lead a science lesson based on the Learning Cycle Model of Instruction. You will prepare and teach this lesson to your classmates. Each team will be allocated a maximum of 30 minutes of class time to teach their lesson. Use activities from the textbook, Internet sites or other science resources. The team should teach the lesson as you would to middle school students. However do not ask your colleagues to act as middle school kids.

Each group will be assigned a specific grade level for which you will plan and teach the lesson. This will determine the grade level and California Science Standards your lessons will cover. The group will work together reviewing each other's lesson ideas, sharing resources, and making sure each member presents a different part of the lesson. Collaboration between group members is essential to divide up the work, and support each other.

The lessons should include hands-on activities, and should emphasize specific science concepts. The Exploration and Application phases of the Learning Cycle require different hands-on science activities using manipulatives. **Begin Exploration with students making predictions/ questions or challenges.** Hands-on activities are NOT reading or completing worksheets (though they may require students to read something or complete lab observation sheets). You should take the activities "off of paper" and require students to use the science process skills with science manipulatives. **You need to know and demonstrate the stages of the Learning Cycle, or you will not be given credit for your lesson.**

Be sure you understand the concepts you are emphasizing, and that you can explain them. The lessons should be developmentally appropriate for 6-8 grade students, and should follow the NSTA Safety Guidelines. 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.

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 web sites (with short descriptions) that address the science topic and concepts through simulations, graphics and movies. You should have links to these web sites and show examples during the lesson.

#### **Science Lesson Handout**

- Prepare a handout which includes the information under Lesson Plan Format, making sure you include:
  - team members' names at the top
  - References at the bottom.

**IMPORTANT NOTE:** At least **three full days PRIOR to your team's presentation**, email your complete lesson plan and your PowerPoint Presentation to the instructor for review. Include your cohort and the date you will present to the class. After I have approved these, you should post a copy of the lesson plan on WebCT for access by your classmates and bring one copy to class for the Instructor on the day of your presentation.

After your presentation (by the next class), turn in your **Reflection as described in assignment #5 and your Peer Evaluation Form.**

#### **Elements to Include Within Your Lesson Plan Format (pages 9-10 of this syllabus)**

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

**Grade Level:** What is the grade level?

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

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

**California Science Content Standard(s):** What standards are addressed? Include at least 1 science area (life science, physical science, or earth science) standard and 1 investigation standard.

**Lesson Objective(s):** 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. “The students will demonstrate understanding of \_\_\_\_\_.”

**Science Concept(s):** What are you trying to teach? Do not say “The students will \_\_\_\_.” (That is an objective, not a concept.)

**Essential Question(s):** 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? Use high level questions and ensure that these are not lower level fact or info. questions (refer to [Bloom’s Taxonomy](#)). For example, instead of “Why did warming the bottle cause the attached balloon to inflate?” ask “How can you prove that air is a real substance that occupies space?”

**Assessment:** How will your students demonstrate that they have met the objective(s)? What evidence demonstrates that they have achieved the objective?

**Criteria for Assessment:** What criteria will you use to grade the assessment? How will you know if someone has successfully completed the assessment?

**Lesson Procedures:** Explain the procedures for each phase of the Learning Cycle. Include what the teacher will do and what the students will do:

### **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; then the teacher introduces new terms and provides further explanations.)
- c. **Concept Application** (Should be a 2<sup>nd</sup> hands-on SCIENCE activity.)

**Applications to everyday life and explanations (at least 3)**

**Web Sites:** 3 interactive relevant web sites with descriptions

**Adaptations and accommodations for students with special needs (ELL, Special Education and GATE students)**

**References:** Title, author, publisher, year

### **Lesson Plan Format - Elements of the learning experience**

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

Grade Level

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

Subject Matter *Example: Heat Transfer, Plant Reproduction etc*

Time period for the learning experience *Example: two 30 minute sessions*

State adopted content standards *Example: write all content standards directly from the state frameworks*

**Science Concept(s):** What are you trying to teach (one paragraph)? Do not say “The students will \_\_\_\_.” (That is an objective, not a concept.)

Learning Goals/learning objectives: SWBAT

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

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

*Example: English Learner: Beginning, intermediate, and advanced (use the ELD standards to determine the needs of each of these students.*

*Example: Special education: one student with learning disabilities and one with another special education identified disability*



Example: GATE student: identify the students needs

Example: Regular education: remaining students

**Developmental needs of the students at this age**

Example: give examples based on the different learning needs for 5-8 students

Example: developmental age appropriate skills and needs of the students

Example: engaging activities (hands on, etc)

**Assessment Plan**

Example: Goals/objectives assessed based on the content standards and learning goals

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

Example: Feedback strategies: how students will be informed of specific successes and challenges and future activities to fill the individual students gaps.

**Assessment Criteria**

Example: What criteria will you use to grade the assessment? How will you know if someone has successfully completed the assessment?

**Materials**

Example: Review teacher’s manuals, pacing guides, and appropriate supplemental materials to determine the materials you will need to present this lesson. Materials should include lists of supplies that will be needed to present this lesson.

**Instructional strategies**

- 1. Address the subject matter learning goals and developmental needs of the students described.

Example: Instructional strategies are what the teacher does during the instruction

Example: Student activities are what the students do during the lesson and independent practice

<b>INSTRUCTIONAL STRATEGIES</b>	<b>STUDENT ACTIVITIES</b>
Example: Put one instructional strategy in each box with an explanation and amount of time you are anticipating. Expand the number of boxes to match each strategy.	Example: Put one student activity to match the instructional strategy in each box with an explanation and amount of time you are anticipating. Expand the number of boxes to match each student activity.
Exploration	
Concept Introduction	
Concept Application	

Applications to everyday life and explanations (at least 3)

**Web Sites:** At least 3 interactive relevant web sites with descriptions

**Differentiated instruction based on the learning goals and instructional strategies for English Learners**

<b>TASKS</b>	<b>Beginning EL</b>	<b>Intermediate EL</b>	<b>Advanced EL</b>
Identify one instructional strategy or student activity that could challenge the student			
Describe how you would adapt the strategy or activity to meet the learning needs of the student considering subject matter pedagogy in your description			
Explain how your adaptation would be effective for the student in making progress towards the goals of your lesson			

**Differentiated instruction based on the learning goals and instructional strategies for Special Education**

TASKS	LEARNING DISABILITY	GROUP DISABILITY	SELECTED
Identify 1 instructional strategy or student activity from the plans that could be challenging for the student considering the description of your student			
Describe how you would adapt the strategy or activity to meet the needs of the student			
Explain how your adaption would be effective for the student making progress toward achieving the learning goal			

**Differentiated instruction based on the learning goals and instructional strategies for GATE students**

TASKS	Describe GATE students needs:
Identify 1 instructional strategy or student activity from the plans that will be challenging for the student considering the description of your student	
Describe how you would adapt the strategy or activity to meet the needs of the student	
Explain how your adaption would be effective for helping the student make progress going beyond the learning goal	

**References:** Title, author, publisher, year

**5. Hands-on Learning Cycle Lesson Reflection – 5% points**

After teaching the lesson in class, you should each complete the peer evaluation and reflection form (*form provided separately*). The reflection should include strengths, weaknesses, and recommendations for improvement. Each person should turn in the reflection at the next class session, along with a copy of your Peer Evaluation form.

1. Explain why the instructional strategies, student activities and resources were appropriate for this lesson. Include strengths, weaknesses, and recommendations for improvement.

*Example: Why were the instructional strategies and student activities appropriate for this class based on content and student development?*

*Example: How did they address the development need of these students?*

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

*Example: Understand connections between lesson content and the outside world.*

2. Reflection of the assessment: Explain the strengths and weaknesses of your assessment in relationship to the learning goals/objectives. Describe your alternative assessment based on the potential gaps in the students learning.

The goal of this assignment is for you to develop year-long plans for instruction in science based on the California Science Content Standards, as well as develop skills for teaching in the elementary and middle grades. For this assignment, you will plan a year of science instruction for one grade level, based on the California Science Content Standards. You will divide the Science Content Standards for one grade level into four units. For each unit, you will use the science standards (and their descriptions in the Science Framework) to design enduring understandings, desired outcomes, end-of-unit assessments, and rubrics to use in grading the assessments. For the final part of this assignment you will develop ideas for three learning cycle lessons for each unit, based on the Science Standards, Enduring Understandings, Desired Outcomes and Final Assessments in the units. You will work in a group of four.

When you complete this assignment, you will have a curriculum plan for teaching the science standards, units and lessons for teaching science for a full year for one grade level. We will share these, so that everyone leaves with curriculum plans, units and lessons for a full year of teaching science at all grade levels. You may share these with your cooperating teachers and use them in your student teaching.

### Year-Long Science Curriculum

Grade: \_\_\_\_\_

Unit Title \_\_\_\_\_

I. Timeline in weeks \_\_\_\_\_

#### II. Standards

Content (Physical, Life, Earth Science) Standards

Investigation and Experimentation Standards

III. **Enduring Understandings** (info and processes you hope students remember and understand next year)

IV. **Desired Outcomes** (reads like an objective; tell what students can DO after instruction)

V. **Final Summative Assessment over Unit** (end of unit assessment over the whole unit, all standards)

VI. **Rubric listing Criteria that you will look for in Final Assessment**

Rubric over Final Assessment

Criteria	Exceeds Expectations	Meets Expectations	Below Expectations	Points Comments

#### VII. Ideas for 3 Lessons for each Unit-

Each Lesson should include:

1. Title
2. Standard numbers
3. Ideas for
  - a. Exploration (2-3 lines)  
(Begin with students making predictions; then have a hands-on SCIENCE activity.)
  - b. Concept Invention (2-3 lines)  
(Make sure students share and discuss data and ideas in the first part of this stage; then teacher introduces new terms and provides further explanations.)
  - c. Concept Application (2-3 lines)  
(Should be a 2<sup>nd</sup> hands-on SCIENCE activity.)

**Your name:** \_\_\_\_\_ **Grade Level:** \_\_\_\_\_

	<b><u>Included (Y/N)</u></b>	<b><u>Page in Unit/Comments</u></b>
Unit Title (Descriptive)- 1 pt		
Unit Timeline in weeks – 3 pts		
Complete Content Standards 1 pt		
Complete Invest/Exper Standards – 1 pt		
Enduring Understandings – 1 pts		
Desired Outcomes 1 pt		
Final Summative Assessment 1 pt		
Rubric over final Assessment listing criteria – 1 pt		
<u>Lesson 1</u> - 3 pts 1. Title 2. Standard numbers 3. Learning Cycle Stages a. Exploration b. Concept Invention c. Concept Application		
<u>Lesson 2</u> - 3 pts 1. Title 2. Standard numbers 3. Learning Cycle Stages a. Exploration b. Concept Invention c. Concept Application		
<u>Lesson 3</u> - 3 pts 1. Title 2. Standard numbers 3. Learning Cycle Stages a. Exploration b. Concept Invention c. Concept Application		
* <u>Your Unit Presentation</u> - 1 pts 1. Overview of your Unit 2. Description of 3 Lessons		

**Presentation:** To receive full points, be sure to describe your unit and its lessons.

**Checklist:**

1. Did you include a listing of complete Content and Investigation and Experimentation Standards? \_\_\_\_\_  
 Content (Physical, Life, Earth Science) Standards  
 Investigation and Experimentation Standards
2. Are your Enduring Understandings what you hope students remember and understand next year? \_\_\_\_\_
3. Are your Desired Outcomes what students can DO after instruction? \_\_\_\_\_
4. Is your Summative Assessment a final cumulative assessment over the whole unit, enduring understandings, desired outcomes, and all standards? \_\_\_\_\_
5. Does your rubric have a list of Criteria that you will look for in the Final Assessment, with levels of achievement (such as exceeds, meets, does not meet expectations)? \_\_\_\_\_
6. Do you have 3 lessons in each unit? \_\_\_\_\_
7. Did you include the standards in each lesson? (be sure to include at least standard numbers) \_\_\_\_\_
8. Did you include the 3 stages of the Learning Cycle? \_\_\_\_\_
9. Did you begin your Explorations with students making predictions/challenge? \_\_\_\_\_
10. Did your Explorations all have a hands-on science activity? \_\_\_\_\_
11. Did you begin each Concept Invention with students sharing and discussing data and ideas? \_\_\_\_\_
12. Did you include the teacher introducing new terms and providing further explanations during the second part of Concept Invention? \_\_\_\_\_
13. Did you include a 2<sup>nd</sup> hands-on science activity in each Concept Application? \_\_\_\_\_

**REMINDER: For your presentation, describe your unit and its lessons.**

**7. Web Resources for Science Teaching and Learning – 20 points**

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.

Procedures to follow:

- a. Read Chapter 3 in the Friedl Text.
- b. Select one science lesson from your Curriculum Unit.
- c. You will integrate technology in your selected lesson by providing **opportunities for your students to use technology**. The following questions should frame your planning:
  - (1) How will you organize and manage the environment so that all students have access to the technology they will use in your lesson?
  - (2) How will you assess whether or not your students have reached the learning objectives of your lesson?
  - (3) How will you assess whether or not the technology your students used helped them reach the learning objectives?

In summary, in your lesson plan create a category called “Integration of Technology”:

1. Describe in full detail the integration of student use of technology in your lesson. What technology are you integrating in your lesson relative to science content and your learning objectives?
2. Describe in full detail how you will organize and manage the technology and the learning environment so that all students can use the technology by responding to the following questions:

- I. What do you want the students to learn or be able to do by using your planned technology?
- II. What will the students do? Describe the task that you will assign to students. This may be framed as a “challenge” task.
- III. What forms of products (student work) will the students generate from the technology experience?
- IV. Describe how you will assess whether or not your students reached the learning objectives, and whether or not the technology you planned helped them reach the learning objectives.

**NOTE\*\*\*** Please access the ISTE NETS for Teachers (NETS•T) for this assignment. Use Standards II and III as a checklist during your planning

Student use of technology may include:

- a. PowerPoint presentations by students.
- b. Interactive websites you select for students to use. (Note: you must provide 5 examples of interactive websites connected to your lesson content and learning objectives.)
- c. Inspiration or Kidspiration for concept mapping.
- d. Kidpix in which students graphically represent their learning.
- e. Students using video technology.
- f. Students using digital cameras.
- g. A filamentality hot list.
- h. Interactive templates accessed online for teacher-created science games, for students to access at computers.
- i. Another idea of your own choosing for technology integration.

## **8. Teaching Performance Expectations (TPEs) Competencies Via Taskstream – 10 Points**

### **Standards of Quality and Effectiveness for Professional Teacher Preparation Programs California Commission on Teacher Credentialing**

This course is designed to help those seeking a Multiple Subjects Credential 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. Students will document their knowledge and understanding of TPE 1A and TPE5 through assignments completed in EDM 545

For each of the TPEs write a one page maximum reflection on how the course activities enable you to meet these two TPEs. You will be required to attach artifacts from the course that demonstrate your abilities as explained in your reflections.

#### **A. MAKING SUBJECT MATTER COMPREHENSIBLE TO STUDENTS**

**TPE 1A: Subject-Specific Pedagogical Skills for Multiple Subject Teaching Assignments - Teaching Science in a Multiple Subject Assignment**

Candidates for a Multiple Subject Teaching Credential demonstrate the ability to teach the state-adopted academic content standards for students in science (K-8). They balance the focus of instruction between science information, concepts, and investigations. Their explanations, demonstrations, and class activities serve to illustrate science concepts and principles, scientific investigation, and experimentation. Candidates emphasize the importance of accuracy, precision,

#### **C. ENGAGING AND SUPPORTING STUDENTS IN LEARNING**

**TPE 5: Student Engagement**

Candidates for Teaching Credentials clearly communicate instructional objectives to students. They ensure the active and equitable participation of all students. They ensure that students understand what they are to do during instruction and monitor student progress toward academic goals. If students are struggling and off-task, candidates examine why and use strategies to re-engage them. Candidates encourage students to share and examine points of view during lessons. They

use community resources, student experiences, and applied learning activities to make instruction relevant. They extend the intellectual quality of student thinking by asking stimulating questions and challenging student ideas. Candidates teach students to respond to and frame meaningful questions.

**You will be using assignments and tasks from this course to meet these TPEs in the electronic portfolio.**

**\*\*NOTE: If you do not post the entries as directed, (1) you will not receive credit for the TPE entries and (2) you will not pass the class.**

**9. Make Up Assignment – 10% points make up for missed class or late arrivals/early departures:**

By completing this assignment you have the opportunity to offset penalty points for missing one entire class or a combination of up to three late arrivals and/or early departures. Attend a science related informal 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. Your choice!! To complete this requirement: 1) complete a one-page summary with applications to teaching; 2) send by email to all of us; 3) do a 5 minute presentation to the class during class one of the classes. Discuss with the instructor about the class time in which you may do the presentation. The report and oral presentation should include a summary of what you learned and implications for your own teaching.

**RESOURCES**

**JOURNALS**

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

**APENDIX A: Tentative Class Schedule**

<b>Class</b>	<b>Date</b>	<b>Topic</b>	<b>Readings &amp; Work Due</b>
1	6/02	Course Overview The Nature of Science and Inquiry Process in Science How do we make decisions about what to teach and how we teach it?	<b>Bring Syllabus to class</b> - <i>Read Chapter 1 of Teaching Science to Children</i>
2	6/04	What are the overarching themes that we want our students to learn in science? -Focus on standards and Frameworks -Focus on sequencing instruction – Circuits Activity	- <i>Read Chapter 2 of Teaching Science to Children</i> -Bring Science Education Standards to Class - Read the CA Science Framework pgs 1-32 - <b>Framework and Standards Task I Due</b>
3	6/09	-Using the Learning Cycle to teach science as inquiry – Balancing Activity -Science Kits	- Read Learning Cycle Handout on WebCT and bring a copy to class - <i>Read Chapter 6 or 7 or 8 of Teaching Science to Children</i> - RAJE #1 on one of Ch. 6, 7, 8 due
4	6/11	What shall we use as the best indicators that students have learned and understand the intended outcomes? -Focus on Assessment Adapting Science curriculum for children with Special Needs	<b>ONLINE CLASS</b> <b>Standards Task II final version due</b> <b>Draft Lesson Plan Due at end of class</b>
5	6/16	How shall we sequence the learning activities so that students can learn the intended themes? – Lesson Planning – Pendulum Activity	- <i>Read Chpts 11 or 12 or 15 of Teaching Science to Children</i> - RAJE #2 on one of Ch. 11,12,15 due
6	6/18	What Activities of Teaching shall we use to make the content accessible to ALL students? -Hands-on Lessons – Focus on 6 <sup>th</sup> grade	- <i>Read Chapter 5 or 16 or 17 of Teaching Science to Children</i> - RAJE #3 on one of Ch. 5,16,17 due - <b>Hands-on lesson Presentations x 3</b>
7	6/23	What Activities of Teaching shall we use to make the content accessible to ALL students? -Hands-on Lessons – Focus on 7 <sup>th</sup> grade	- <i>Read Chapter 18 or 19 or 21 of Teaching Science to Children</i> - RAJE #4 on one of Ch. 18, 19, 21 due - <b>Hands-on lesson Presentations x4</b>
8	6/25	What strategies can use to ensure participations of ALL students in science learning? -Hands-on Lessons – Focus on 8 <sup>th</sup> grade	- <i>Read Chpt 4 or 9 or 14 of Teaching Science to Children</i> - RAJE #5 on one of Ch. 4, 9, 14 due - <b>Hands-on lesson Presentations x 3</b>
9	6/30	Developing Science WebQuests & Technology for science Teaching	<b>ONLINE CLASS</b> <i>Read Chpt 3 of Teaching Science to Children</i> <b>Web Resources Assignment Due</b>
10	7/02	Safety Guidelines for Science Classrooms Units Planning & Integrating Science with other subjects Curriculum Plan Sharing	- <b>Curriculum Maps/Unit Plans Due</b> - <b>TPEs Due via taskstream on 7/5/07</b>

- RAJE = Reading Accountability Journal Entry



**SB 2042 - AUTHORIZATION TO TEACH ENGLISH LEARNERS COMPETENCIES**

<b>PART 1: LANGUAGE STRUCTURE AND FIRST- AND SECOND-LANGUAGE DEVELOPMENT</b>	<b>PART 2: METHODOLOGY OF BILINGUAL, ENGLISH LANGUAGE DEVELOPMENT, AND CONTENT INSTRUCTION</b>	<b>PART 3: CULTURE AND CULTURAL DIVERSITY</b>
<b>I. Language Structure and Use: Universals and Differences (including the structure of English)</b>	<b>I. Theories and Methods of Bilingual Education</b>	<b>I. The Nature of Culture</b>
A. The sound systems of language (phonology)	A. Foundations	A. Definitions of culture
B. Word formation (morphology)	B. Organizational models: What works for whom?	B. Perceptions of culture
C. Syntax	C. Instructional strategies	C. Intra-group differences (e.g., ethnicity, race, generations, and micro-cultures)
D. Word meaning (semantics)	<b>II. Theories and Methods for Instruction In and Through English</b>	D. Physical geography and its effects on culture
E. Language in context	A. Teacher delivery for <u>both</u> English language development <u>and</u> content instruction	E. Cultural congruence
F. Written discourse	B. Approaches with a focus on English language development	<b>II. Manifestations of Culture: Learning About Students</b>
G. Oral discourse	C. Approaches with a focus on content area instruction (specially designed academic instruction delivered in English)	A. What teachers should learn about their students
H. Nonverbal communication	D. Working with paraprofessionals	B. How teachers can learn about their students
I. Language Change		C. How teachers can use what they learn about their students (culturally responsive pedagogy)
<b>II. Theories and Factors in First- and Second-Language Development</b>	<b>III. Language and Content Area Assessment</b>	<b>III. Cultural Contact</b>
A. Historical and current theories and models of language analysis that have implications for second-language development and pedagogy	A. Purpose	A. Concepts of cultural contact
B. Psychological factors affecting first- and second-language development	B. Methods	B. Stages of individual cultural contact
C. Socio-cultural factors affecting first- and second-language development	C. State mandates	C. The dynamics of prejudice
D. Pedagogical factors affecting first- and second-language development	D. Limitations of assessment	D. Strategies for conflict resolution
E. Political factors affecting first- and second-language development	E. Technical concepts	<b>IV. Cultural Diversity in U.S. and CA</b>
		A. Historical perspectives
		B. Demography
		C. Migration and immigration