CALIFORNIA STATE UNIVERSITY SAN MARCOS
COLLEGE OF EDUCATION
EDMS 545 Science Education in Elementary Schools
Alvin Dunn Elementary School
CRN: 22909 - Spring 2010

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COE MISSION STATEMENT

The mission of the College of Education Community is to collaboratively transform public education by preparing thoughtful educators and advancing professional practices. We are committed to diversity, educational equity, and social justice, exemplified through reflective teaching, life-long learning, innovative research, and on-going service. Our practices demonstrate a commitment to student-centered education, diversity, collaboration, professionalism and shared governance. (adopted by COE Governance Community, October 1997)

COURSE PREREQUISITES:

Admission to the Multiple Subject Credential Program/CLAD Teacher Credential Program

COURSE DESCRIPTION

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

REQUIRED TEXT & MATERIALS

- Friedl, A.E. & Koontz, T.Y. (2005). *Teaching Science to Children: An Inquiry Approach,* 6th Ed. NY: McGraw-Hill. ISBN: 0-07-256395-8

- *Science Framework for California Public Schools*. (2004) Sacramento: California Dept. of Education.
- 1 Large Blue Books
- 1 Laboratory Composition Book
- $1.50 cash for visit to Jack's Pond Nature Center
- TaskStream account
- Other handouts and resources will be distributed in class or through WebCT

COURSE OBJECTIVES

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

1. Demonstrate proficiency with inquiry skills of observing, measuring, inferring, classifying, predicting, verifying predictions, hypothesizing, isolating variables, interpreting data, and experimenting.
2. Identify exemplary materials (curriculum kits, science programs, textbooks, equipment, technology, ancillary materials) appropriate for elementary school children.
3. Demonstrate knowledge and understanding of the California Science Framework, the California Science Content Standards, and the National Science Education Standards.

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

COURSE TOPICS

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

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 district in implementing effective programs for all students. The successful candidate will be able to merge theory and practice in order to realize a comprehensive and extensive educational program for all students.

TPE Primary Emphases in EDMS 545:

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

TPE Secondary Emphases in EDMS 545:

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

California Teacher Performance Assessment (CalTPA)

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

To assist your successful completion of the TPA, a series of informational seminars are offered over the course of the program. TPA related questions and logistical concerns are to be addressed during the seminars. Your attendance to TPA seminars will greatly contribute to your success on the assessment. Additionally, COE classes use common pedagogical language, lesson plans (lesson designs), and unit plans (unit designs) in order to support and ensure your success on the TPA and more importantly, in your credential program.

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

INFUSED COMPETENCES

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

Authorization to Teach English Learners
This credential program has been specifically designed to prepare teachers for the diversity of languages often encountered in California public school classrooms. The authorization to teach English learners is met through the infusion of content and experiences within the credential program, as well as additional coursework. Students successfully completing this program receive a credential with authorization to teach English learners.
(Approved by CCTC in SB 2042 Program Standards, August '02)

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

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

COURSE POLICIES

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

For this class, **if you are absent 2 days, your highest possible grade is a B. If you are absent more than 2 days, your highest possible grade is a C**, which means that you will not pass the course. **Late arrivals and early departures** will lower your course grade. For every two times that you are late or

leave early, your course grade will be lowered by one letter grade. If you have an emergency or have extenuating circumstances, please see the instructor to make arrangements accordingly. Absences do not change assignment due dates. With few exceptions, late assignments will not be accepted.

Writing Requirement
In keeping with the All-University Writing Requirement, all 3-unit courses must have a writing component of at least 2,500 words (approximately 10 pages), which can be administered in a variety of ways. Writing requirements for this course will be met as described in the assignments.

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

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 College 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.

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

Students With Disabilities Requiring Reasonable Accommodations
Students are approved for services through the Disabled Student Services Office (DSS). This office is located in Craven Hall 5205, and can be contacted by phone at (760) 750-4905, or TTY (760) 750-4909. Students authorized by DSS to receive reasonable accommodations should meet with their instructor during office hours or, in order to ensure confidentiality, in a more private setting.

CSUSM Academic Honesty Policy
"Students will be expected to adhere to standards of academic honesty and integrity, as outlined in the Student Academic Honesty Policy in the CSUSM University Catalog. All written work and oral assignments must be original work. All ideas/materials that are borrowed from other sources must have appropriate references to the original sources. Any quoted material should give credit to the source and be punctuated with quotation marks.

Students are responsible for honest completion of their work including examinations. There will be no tolerance for infractions. If you believe there has been an infraction by someone in the class, please bring it to the instructor's attention. The instructor reserves the right to discipline any student for academic dishonesty in accordance with the general rules and regulations of the university. Disciplinary action may include the lowering of grades and/or the assignment of a failing grade for an exam, assignment, or the

class as a whole." In addition, all incidents of academic dishonesty will be reported to the Dean of Students.

Plagiarism
It is expected that each student will do his/her own work, and contribute equally to group projects and processes. Plagiarism or cheating is unacceptable under any circumstances. If you are in doubt about whether your work is paraphrased or plagiarized, see the Plagiarism Prevention for Students website http://library.csusm.edu/plagiarism/index.html. If there are questions about academic honesty, please consult the University catalog.

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.

Students With Disabilities Requiring Reasonable Accommodations
Students must be approved for services by providing appropriate and recent documentation to the Office of Disabled Student Services (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.

GRADING STANDARDS

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

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.

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

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

Keep digital copies of all assignments for your Credential Program Electronic Portfolio. You will not be assigned a course grade unless all the assignments are turned in.

ASSIGNMENTS

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

1.	Active Participation and Collaboration (all or nothing credit given)	10%
2.	Reading Accountability: Concept Maps	15%
3.	California Science Framework and Standards Activity	10%
4.	Hands-on Learning Cycle Science Lesson Design and Presentation	30%
5.	Learning Cycle Lesson Drawings and Explanations (5% each)	10%
6.	Science Exploratorium Lesson Plan/Presentation	25%

DESCRIPTIONS OF ASSIGNMENTS

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

Teacher education is a professional preparation program and students will be expected to adhere to standards of dependability, professionalism, and academic honesty (refer to rubric attached to this syllabus).

Grading will include a component of "professional demeanor." Students will conduct themselves in ways that are generally expected of those who are entering the education profession, including the following:

- On-time arrival to all class sessions and attendance for the entire class period
- Advance preparation of readings and timely submission of assignments
- A positive attitude **at all times** in class, with classmates and with the instructor.
- 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
- Equitable and timely collaboration in the lesson design and the curriculum unit assignments

2. Reading Accountability: Concept Maps (Individual) **- 15%**

The purpose of the journal entries is to help you carry the science content from short term into long term memory and understanding so that you can more easily teach science when you become a classroom teacher. The assigned readings provide an important foundation for your increasing understanding of how to effectively teach science. You will need a large Blue Book. Reading journals (blue books) will be collected and will only receive full points if completed by the date indicated in the schedule. You must use a Blue Book, and spiral paper stuck in Blue Books will not be accepted.

You will be required to complete 3 Concept Maps for this course. Use your Big Blue Book for these entries. Concept Maps may be done by hand but must be neat and legible. For each Concept Map, choose one different chapter from the text readings indicated in the Course Schedule of Topics and

Assignment attached to this syllabus. Concept Maps are to be turned in according to the date assigned to the chapter reading.

- The Concept Map should include **ALL major concepts** discussed in **one** chapter. **Do not include information from the investigations**, only the science content. The Concept Map must follow the Concept Mapping procedures taught in class.

  Each concept map has a possible total of 10 points.

  a. Most general, inclusive Concept at top……1 point
  b. Map must show structured hierarchy……..2 points
  c. All major concepts included……..3 points
  d. 1-2 words (nouns) for Concepts…….....2 points
  e. Verbs or prepositions for Linking Words between Concept……..2 points
  f. NOT mind-mapping or mind-webbing

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

PLEASE CONSULT THE COURSE SCHEDULE OF TOPICS AT THE END OF THIS SYLLABUS FOR DUE DATES OF CONCEPT MAPS

3. California Science Framework and Standards Activity - 10%

Purpose of the assignment: To read a portion of the California Science Framework and the Standards for a particular grade. 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 that you do the reading and the write-ups BEFORE you meet with your partner.

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

- Read the first part of the California Science Framework, up to page 22. This includes Board Policy, the Introduction and Chapters One and Two.
- Think about the reading holistically.
- Type about a page, in your own words, that effectively 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 class prepared to discuss the questions and turn in your answers.

3b. Grade level Science standard response: (Individual) – 5 pts

- Using the standard for your chosen grade, each one of you will pick a line item from physical science, life science, or earth science (All 3 will be represented within each group of 3 students). 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 2-4 sentence description of an activity that combines the two. The whole thing should be about a page. Write your name on top of the page
- See example next page.

3c. Team Preparation and Presentation – (Small group) – 10 pts

Get together with your partners. Collectively, look at the activities that you <u>each</u> wrote up for Assignment 3b and do the following:

- Choose one **STRONG** activity from among all the activities.
- With your partner(s), write up an abbreviated lesson plan for the activity (with a title, content and I/E standards, objectives, assessment plan, and a brief description of the activity). Put it on chart paper (**please make it legible and readable from afar**) or PowerPoint so it can be easily presented to the class. Make sure you quote the line(s) from the standard(s) on which your lesson plan is based.
- With your partners, 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 an overview of what students are supposed to learn in physical, earth, and life science and in investigation and experimentation in that grade (consider bulleting the **main science concepts** within the grade level standards for your group**)**.
- Your group will have about 8 minutes maximum to present your lesson plan and standards overview. Be prepared to explain why your lesson plan represents really good science for kids.
- Your grade for this assignment will be based on the content and quality of your presentation, and on the level of collaboration with your partners.

Sample Response to Assignment 3b.

Grade Four

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

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

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

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

Investigation and Experimentation

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

<u>Activity</u>

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

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

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

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

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

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

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

You will work in groups of three to lead a science lesson based on the Learning Cycle Model of Instruction. You will prepare and teach this lesson to your classmates. Each team will be assigned a specific science topic for which you will plan and teach the lesson. This topic will determine the grade level and California Science Standard your team lesson design will cover. Use activities from the textbook, Internet sites or other science resources. The team should teach the lesson as you would to elementary school students. Your classmates will not role-play elementary students, but will learn the science content and how to teach it. Treat your classmates as teachers, not elementary students. Each team will be allocated a maximum of 40 minutes of class time to teach their lesson.

The lessons should follow the **Learning Cycle** Instructional Model (make sure that you include all **3 stages**), must include hands-on activities, and should emphasize specific science concepts. The Exploration and Application phases of the Learning Cycle require different hands-on science activities using manipulatives. Before the lesson, write the essential questions about the lesson on the board for students to consider during the lesson. These questions should be **higher level questions** (analysis, synthesis or evaluation level) according to Bloom's Taxonomy.

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

Be sure you understand the concepts you are emphasizing, and that you can explain them. The lessons should be developmentally appropriate for 6-8, and should follow the NSTA Safety Guidelines. Your lesson plan should also identify and explain strategies for English language learners

and adaptations for both students with special needs and for GATE students.

Prepare a PowerPoint Presentation to use in your lesson that is a **strong overview of all your lesson design components.** Include the following:

1. Lesson title
2. grade level, content area and subject matter
3. state science standards
4. objectives
5. definitions of important science concepts in the lesson
6. essential questions
7. learning cycle phases
8. a briefly detailed explanation of the science content, assessment plan and criteria
9. accommodations/adaptations for ELs, GATE, SPED
10. Three (3) everyday applications.
11. A list of at least 3 interactive web sites (with short descriptions) that address the science topic and concepts through simulations, graphics and movies. You should have links to these web sites
12. Reference two children's literature books that connect to your lesson's science concepts.

Science Lesson Plan Document

- Prepare a comprehensive document that includes the information under Lesson Design Format (see pages 11-13 of this syllabus), making sure you include:
  - Your names at the top
  - All components in the Lesson Design Format
  - References and other required information at the end of the lesson plan.

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

On the day of your lesson presentation, please begin the lesson by turning in 1 hard copy of your lesson design and data sheets to me. Please staple all pages of the team lesson design and data sheets. Unstapled papers will not be accepted.

You should also give me copies for each team member of the Lesson Design Rubric available in the Handouts and Readings folder of your WebCT homepage.

LESSON DESIGN (Items 1-13)

1. **Elements of the Learning Experience**

   - **Lesson Title**: What is the title of your lesson?
   - **Grade Level**: What is the grade level?
   - **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:** *Example: one 60 minute session*
   - **Student Groupings**: How will you group students for instruction?

2. **State adopted science content standards**:
    - Include at least 1 science area (life science, physical science, or earth science) standard
    - Include 1 Investigation/Experimentation Standard.

3. **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 _____"

4. **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.

5. 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.

   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.

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

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

   <u>English Learners</u>: Beginning, intermediate, and advanced (use the ELD standards to determine the needs of each of these students).

   <u>Special education</u>: one student with a learning disability(ies) and one with another special education identified disability

   <u>GATE students/accelerated learners/early finishers</u>: identify the students' needs

   <u>Remaining students</u>:
   Developmental needs of the students at this age
   Give examples based on the different learning needs for k-6
   Developmental age appropriate skills and needs of the students

   Example: engaging activities (hands on, etc)

7. **Assessment Plan Tied to Learning Objectives**
   Type of assessment: Prior knowledge (pre assessment), Formative (progress monitoring), Summative (final product)

   Description of assessment

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

Reflection of the assessment: Strengths and weaknesses in relationship to the learning goal. Describe your alternative assessment based on the potential gaps in the students learning.

8. Assessment Criteria Tied to Learning Objectives

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?

9. Materials/Resources

What will the teacher need? What will the students need?
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 to present this lesson.

10. Differentiation Strategies

How will you differentiate your lesson for the following students:

- *English Language Learner (intermediate level)*
- *Student with Special Needs*
- *Student in Gifted Program*

11. Instructional Strategies: Lesson Procedures

Explain the procedures for each phase of the Learning cycle. Include what the teacher will do and what the students will do. Include suggested number of minutes for each component of the lesson.

The Learning Cycle	**INSTRUCTIONAL STRATEGIES** *What the teacher does.*	**STUDENT ACTIVITIES** *What the students do.*
<u>Engagement</u>	How will you focus/motivate students? ___ mins	What will students be doing during the anticipatory set? ___mins
<u>Exploration</u>	Explain what and how you will provide an exploration science activity (must be hands-on). ___ mins	Explain what students will be doing during the exploration activity. ___ mins
<u>Concept Invention</u> a. Students share what they did and learned during Exploration b. Teacher introduces students to new information.	How will you have students share their ideas, knowledge and questions from the exploration phase? Explain how <u>you</u> will introduce students to relevant information, terminology and concepts to reinforce what they learned during exploration. ____ mins	Explain how students will share their ideas, knowledge and questions from exploration phase. Explain what students will be doing while you are introducing relevant information, terminology and concepts to reinforce what they learned during exploration. ____mins
<u>Concept Application</u>	Concept Application- Explain what and how you will provide a second hands-on science activity that extends students' thinking and learning from the two previous two phases? ____mins	Explain what students will be doing during the concept application activity. ____mins

12. Reflection

Explain why the instructional strategies, student activities and resources are appropriate for this lesson.

- Why are the instructional strategies and student activities appropriate for this class based on content and student development?
- How do they address the developmental needs of these students?
- How do they help the students make progress toward achieving the state adopted academic content standards for students in this content area?
- Understand connections between lesson content and the outside world.

13. Also include in Lesson Design:

- **Applications to Everyday Life and Explanations (at least 3):**
- **Science Content Background: (**1-2 pages minimum) summary of the content background
- **Web Sites**: at least 3 interactive relevant web sites with descriptions
- **Children's Literature Books**: Title, author, publisher, year of 2 children's books on the topic.
- **References:** Title, author, publisher, year.

5. Learning Cycle Lesson Drawings and Explanations (Individual) **- 10% total**

Learning Cycle Lesson Drawings – 5%

In your Lab Book—Reserve the first 2 pages in your Lab Book for a **Title Page** and for a **Table of Contents**. After a given Learning Cycle presentation, you will make drawings (at least one per lesson) illustrating what you learned during the lesson. Number each drawing for each lesson (Drawing #1, #2, #3, etc.). **At the top of each page, write the date, title of the lesson and the number of the Drawing. Label each of your drawings legibly.**. Be sure to pay attention during the lesson so that you have something to draw and a given drawing illustrates your understanding of the lesson. **Drawings should illustrate the major science concepts** that students were supposed to learn!! **Do not draw procedures, only science concepts in a lesson!**

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

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

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

Learning Cycle Lesson Explanations – 5%

In your Lab Book--On the page immediately following each Drawing for a chosen Learning Cycle lesson presentation, you will write an explanation of the science concepts taught—about ½-1 page in length. Number each Explanation (Explanation #1, #2, #3, etc.). **At the top of each page, write the date, title of the lesson, and the number of the Explanation. Your writing should be in legible, complete sentences**. Be sure to pay attention during the lesson so that you have something to explain! Each explanation should be a **complete description of the major science concepts** that students were to learn during the lesson. **Do not explain procedures, only science concepts in a lesson!**

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

- Does the Explanation describe the major science concepts taught in the lesson?

- Does the Explanation make "sense"? Can one read it and understand what was taught?
- Is each Explanation on a separate page from the drawings and the other explanations?

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

6. Science Exploratorium Lesson Plan & Presentation (in pairs) – **25%**

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

You will prepare a hands-on science lesson and board (trifold) about a discrepant event that leads to a science concept. You will present the lesson at Woodland Park Middle School Science Fair Exploratorium. The audience will be 6-8 grade students at Woodland Park MS. Be sure you understand the concept(s) you are emphasizing, and that you can explain it. The activity should be developmentally appropriate, and should follow the NSTA Safety Guidelines. Prior to teaching the lesson, turn in the lesson plan to your instructor for review. After teaching the lesson, turn in a copy of your Reflection. The activity should include hands-on tasks and should emphasize particular science concepts. The activity should allow students to explore, and then you will explain the concept behind the activity. Make sure you have a concept application activity (different than that used in the exploration activity) in case there is time available for students.

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

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

1. Lesson title – Create a "catchy" title that will attract and motivate students to engage in your activities.
2. Grade level
3. Content Area (Life, Physical, or Earth Science) & Subject Matter (for example, air pressure)
4. **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.)**
5. Essential Questions (ensure high order questions!)
6. 1-3 Learning (Behavioral) Objectives: The student will be able to _____ or,
7. Materials and Resources (what the teacher needs; what the students need)
8. Description of the Learning Cycle Model of Instruction
    a. Exploration (students start by making predictions followed by a hands-on science activity)
    b. Concept Invention (students share findings from exploration; teacher gives concepts)
    c. Concept Application Activity (a second hands-on science activity).

Exploratorium Reflection (individual)
*Turn in at class session after the Exploratorium.
*Respond to the following
a. How did the children respond? (What did they say and do?)
b. How do the children's actions and responses demonstrate their level of understanding?
c. How did you (or can you) improve upon your lesson to facilitate understanding?

EDMS 545 Tentative Course Schedule: SPRING 2010 (Friday)

Date	Course Topics & Activities	Readings & Work Due
Session 1 1/29/10 **NOTE: While this syllabus is carefully planned, it may be modified or adjusted at any time in response to the learning needs of the class.**	• **Course Overview/Syllabus Review** • **The Nature of Science** • **CA Science Content Standards & Frameworks Overview** • **Framework and Standards Task 3A 3B, 3C - Explained** • **Framework & Standards group formation** • **Concept maps and science content** • **Hands-on Learning Cycle Science** • **Hands-on Learning Cycle Lesson Plan group sign- ups** • **Instructor-led Learning Cycle Lesson: Matter**	- Bring course syllabus to class - Read CA Science Framework: pgs 1-22 and complete Task 3A, due next week (bring hard copy). - Read Learning Cycle Handout - Complete Task 3B due next week (bring hard copy). - Be prepared for reading prompt next week. Read Chapters 1 and 2, 3 of *Teaching Science to Children* as a framework for course concepts & skills. - Bring hard copy of the Science Content Standards (K-6) to all classes. - Bring course text to class
Session 2 *2/05/10* **NOTE: While this syllabus is carefully planned, it may be modified or adjusted at any time in response to the learning needs of the class.**	***FOCUS: Sequencing Instruction to Support Learning Outcomes*** • ***Complete work on Framework & Standards Task 3C with team.*** • ***Task 3C Presentations*** • ***Science Processing Skills Lecture*** • ***Instructor-led Learning Cycle Lesson: Science processing skills*** • ***Safety guidelines for the science classroom*** • ***Lesson Planning: Using The Learning Cycle to teach science as inquiry*** • ***Technology in the classroom*** • ***Webquests***	*- Bring Science Content Standards (K-6) to all classes.* *- Be prepared for reading prompt next week. Read Chapters 4, 5 and 6 of Teaching Science to Children as a framework for course concepts & skills.* ***- DUE: Framework and Standards Task 3A (individual)*** ***- DUE: Framework and Standards Task 3B (Individual).*** ***- DUE: Post Framework and Standards Task 3C to WebCT – (one posting per team)*** ***- DUE: Concept Map due in Blue Book on one of the following chapters of text: 1, 2 or 3.*** ***View Disability Video*** *http://www.washington.edu/doit/Video/winequ.html* *Be prepared for class discussion*

Session 3 *2/12/10* **NOTE: While this syllabus is carefully planned, it may be modified or adjusted at any time in response to the learning needs of the class.**	***FOCUS on Assessment: What are the best indicators to assess that students have learned and understood the intended outcomes?*** • ***Making Science Content Accessible to ALL students: Strategies to ensure participation of ALL students*** • ***How do we make decisions about what to teach and the best strategies/processes to teach it?*** • ***What teaching strategies ensure participation of ALL students?*** • ***Writing Essential Questions*** • ***Writing Learning Objectives to support assessment in science.*** • ***Team 1 Learning Cycle Lesson*** • ***Team 2 Learning Cycle Lesson*** • ***Team 3 Learning Cycle Lesson*** • ***Instructor-led learning cycle lesson***	*- Be prepared for reading prompt next week. Read Chapters 7, 8 and 9 of Teaching Science to Children as a framework for course concepts & skills.* ***- DUE: Concept Map due in Blue Book on one of the following chapters of text: 4, 5 or 6***
Session 4 *2/19/10*	• ***Teaching Science to English Learners*** • ***Adapting science curriculum for children with special needs.*** • ***Developing Science Web Quests and Technology Resources for Science Teaching*** • ***Team 4 Learning Cycle Lesson*** • ***Team 5 Learning Cycle Lesson*** • ***Team 6 Learning Cycle Lesson*** • ***Team 7 Learning Cycle Lesson***	*- Be prepared for reading prompt next week. Read Chapters 10, 11 and 12 of Teaching Science to Children as a framework for course concepts & skills.* *DUE:* ***Concept Map due in Blue Book on one of the following chapters of text: 7, 8 or 9*** ***DUE: Post Learning Cycle Lesson Plan Teams 1, 2 & 3 (one posting per team).***
Session 5 *2/26/10*	• ***Integrating writing into science activities*** • ***Science kits*** • ***Team 8 Learning Cycle Lesson*** • ***Team 9 Learning Cycle Lesson*** • ***Team 10 Learning Cycle Lesson***	*- Be prepared for reading prompt next week. Read Chapters 13, 14 and 15 of Teaching Science to Children as a framework for course concepts & skills.* *DUE:* ***Concept Map due in Blue Book on one of the following chapters of text: 10, 11 or 12*** ***DUE: Post Learning Cycle Lesson Plan Teams 4, 5 & 6 (one posting per team).***

	• ***Science Fair/Exploratorium and the Inquiry Model*** • ***Instructor-led learning cycle lesson*** • ***Time to work on Science Fair/Exploratoriium***	
Session 6 3/05/10	• ***Science Fair Exploratorium Presentations at Alvin Dunn Elementary (School, grade level and time TBA)*** ****** DUE: Learning Cycle Lesson Drawings and Explanations Composition Book***	*- Be prepared for reading prompt next week. Read Chapters 17, 18 and 19 of Teaching Science to Children as a framework for course concepts & skills.* *DUE:* ***Concept Map due in Blue Book on one of the following chapters of text: 14, 15, or 16.*** *DUE:* ***Concept Map due in Blue Book on one of the following chapters of text: 17, 18, or 19.*** ***DUE: Post Learning Cycle Lesson Plan Teams 7 & 8 (one posting per team).*** *DUE:* ***Science Exploratorium LPs due in folders***
Session 7 3/12/10	• ***Course Evaluations*** • ***Course Wrap-Up***	***Post Science Exploratorium LP to WebCT (one per team)*** ***Please ensure that your team lesson plan and data sheets are posted to the appropriate thread on the discussion board of WebCT.***

*****Note:** Complete 3 Concept Maps from your choice of 3 Chapter readings. Each Concept Map is due on
the date the chapter reading is due per the course schedule

NOTE: While this syllabus is carefully planned, it may be modified or adjusted at any time in response to the learning needs of the class.

Important Note to Students

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

My Spring 2010 Semester furlough dates are January 26, February 10, February 24, March 19, April 30 and May 7. Common Faculty Furlough days are January 19, March 26, and April 5.