CALIFORNIA STATE UNIVERSITY SAN MARCOS
COLLEGE OF EDUCATION
EDMS 545: Elementary Science Education
Spring 2011
Wednesday: 8:30 AM – 2:45 PM (San Marcos Elementary School)
3 Units

Instructor: Dr. Ingrid M. Flores **Office Hours:** Wednesday: 3:00 PM - 3:30 PM or by appt. Please email me to set up a convenient time to meet.
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COE MISSION STATEMENT

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

Course Prerequisite: Admission to the Multiple Subject Credential Program

COURSE DESCRIPTION

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

REQUIRED TEXT & MATERIALS

- Friedl, A.E. & Koontz, T.Y. (2005). *Teaching Science to Children: An Inquiry Approach, 6th Ed.* NY: McGraw-Hill. ISBN: 0-07-256395-8
- *Science Framework for California Public Schools K-12.* (2004). Sacramento: California Dept. of Education. Also available online.
- 2 Large Blue Books (Course text, Science Framework, and Large Blue Books are available at CSUSM) bookstore)

Other handouts and resources will be distributed in class or through Moodle course site

Other Recommended Resources

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

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

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

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

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

INFUSED COMPETENCIES

Special Education
Consistent with the intent to offer a seamless teaching credential in the 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 2002)

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

STUDENT LEARNING OUTCOMES

Teacher Performance Expectation (TPE) Competencies

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

TPE Primary Emphases in EDMS 545:

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

TPE Secondary Emphases in EDMS 545:

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

California Teacher Performance Assessment (CalTPA)

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

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

Additionally, 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/CalTPA.html

COURSE POLICIES AND REQUIREMENTS

Attendance Policy

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

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

Writing Requirement

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

Computer Use During Class Sessions

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

Cell Phones

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

Person-First Language

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

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

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

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

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

COURSE TOPICS OUTLINE

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

COURSE ASSIGNMENTS/LEARNING OUTCOMES

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

1. Active Participation and Collaboration (all or nothing credit given) 10%
2. Concept Maps (3) - Individual 15%
3. California Science and Health Standards Tasks and Presentation - Indiv. & Grp 10%
4. Learning Cycle Hands-on Science Lesson Design & Presentation – In pairs or small group 30%
5. Learning Cycle Lesson Reflections- Individual 10%
6. Science Fair Exploratorium Lesson and Presentation – In pairs or small Group 15%
7. Integration of Technology in Science Teaching & Learning – In LD Group 10%

NOTE*:* Each student is responsible for ensuring that assignments are submitted correctly and on time. Most assignments will be submitted in hard copy at the start of class (per course schedule), and some specific assignments will also be submitted electronically to Moodle as class resources. Keep a digital copy of all assignments for your credential program electronic portfolio.

DESCRIPTIONS OF ASSIGNMENTS

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

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

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

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

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

2. Concept Maps (Individual) - 15%

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

The assigned readings provide an important foundation for your increasing understanding of both science content and how to effectively teach science. To further aid you in remembering the readings and assist you with meaningful class participation, you are asked to respond to the reading assignments with concept maps. **You will be required to complete three (3) Concept Maps during the course (based on your choice of which three chapters from the assigned readings listed in the Course Schedule)**. Concept mapping skills and procedures will be taught in class (Session 2) and your concept maps must follow the protocols taught in class.

PLEASE CONSULT THE COURSE SCHEDULE OF TOPICS ON PAGES 16-17 OF THIS SYLLABUS FOR DUE DATES OF CONCEPT MAPS

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

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

Each concept map has a possible total of 9 points:

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

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

3. California Science Framework and Science Content Standards Activity - 10%

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

Task I: Framework Summary Response: (Individual) – 5 pts

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

Task II A: Grade level Science Content Standards Response: (Individual) – 10 pts

Using the standards for your chosen grade, pick a line item from physical science, life science, and Earth science. For each one, come up with a brief description of an activity that children in that grade can do that **also** addresses one of the Investigation and Experimentation standards for the grade. You should end up with three sections for science, each of which includes a content line (physical, life, or earth science), an Investigation and Experimentation line, and a 2-3 sentence description of an activity that combines the two. See example on page 8.

Task II B: Grade level Health Education Content Standards Response (Individual) – 5 pts

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

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

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

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

The complete write up for Tasks II A and II B should be no more than two pages. See page 8.

Task III: Team preparation and presentation – (in class with your team) – 10 pts

Get together with your team. Look at the activities that were collectively written up for Task II A. Choose one activity. Then…

- As a team, word process a lesson sketch/description for the activity (with a lesson title, science content and Investigation and Experimentation standards, learning objectives, an assessment plan, and a brief but detailed description of the activity). Make sure you quote the standards on which your lesson plan is based. Add group lesson sketch to group PPT below.
- As a team, come up with a brief overview of the Science Standards for your grade. Don't try to give us every single line of the standard. Summarize it in such a way that we see generally what students are supposed to learn in Physical, Earth, and Life Science and in Investigation and Experimentation in that grade—the Big ideas. On a PPT, list the competencies indicated in the Science Standards for your grade. Upload your group PPT to Moodle session 2.
- In 10 minutes or less, present your lesson plan sketch and science standards overview to the class. Be prepared to explain why your lesson activity represents really good science for kids.
- Each team member should also add to the group PPT his/her Health Content Standard/Health Content Area idea (i.e., Task II B)

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

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

Sample Response to Assignment Tasks II A and II B.

Grade Four

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

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

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

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

Investigation and Experimentation

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

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

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

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

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

Health Content Area: Nutrition and Physical Activity
Health Content Standard 1.8.N - Identify ways to increase and monitor physical activity.

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

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

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

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

You will work in groups of 2 or 3 (partners TBD in class) to lead a science lesson based on the Learning Cycle Model of Instruction. You will prepare and teach this lesson to your classmates. Each team will be assigned a specific science topic for which you will plan and teach the lesson. This topic will determine the grade level and California Science Standard your team lesson design will cover. Use activities from the textbook, Internet sites or other science resources. The team should teach the lesson as you would to elementary school students. Your classmates will not role-play elementary students, but will learn the science content and how to teach it. Treat your classmates as teachers, not elementary students. Each team will be allocated a maximum of 35 minutes of class time to teach their lesson.

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

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

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

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

Science Lesson Plan Document

- Prepare a comprehensive document that includes the information under Lesson Design Format (see pages 10-12 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.

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

You should also give me copies for each team member of the Lesson Plan Rubric available in the "Science Assignments Rubrics" folder of the course Moodle site.

Lesson Plan Elements

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

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

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

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

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

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

Lesson objective(s) based on the content standards: What do you want students to be able to do? Write in complete sentences. Use an action verb and explain how students will demonstrate their new knowledge and understanding. Example: "The student will demonstrate understanding of _____." Or, "The student will be able to _____"

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

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

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

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

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

English Learners:
Special education:
GATE Students/Advanced Learners/Accelerated Learners
Remaining students:

Developmental needs of the students at this age

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

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

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

Assessment Plan

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

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

Description and Purpose of each Assessment Category

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

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

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

How assessment results will be used to inform instruction:

Criteria for Assessment

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

Lesson Procedures/ Instructional Strategies

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

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

The Learning Cycle:

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

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

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

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

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

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

-
-
-

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

-
-
-

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

-
-
-

Also include at the end of the Lesson Plan document:

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

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

Three (3) Applications to everyday life and explanations

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

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

For your lesson plan presentation:

In addition to presenting your lesson to your cohorts, your group should be prepared to present a strong overview of your lesson plan using PowerPoint (given after your lesson presentation). For an exemplar of what elements your PPT should contain, a model will be provided on the "Course Resources and Documents " folder on the home page of Moodle (**refer to page 9 of this syllabus for what your PPT should contain**).

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

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

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

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

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

How did they address the developmental needs of these students?

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

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

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

What are possible recommendations for improvement?

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

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

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

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

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

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

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

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

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

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

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

7. Integration of Technology in Science Teaching and Learning – 10%

Technology provides unique resources for teaching and learning in science. In this assignment, you will apply your understanding of educational technology to a specific science lesson.

Procedures to follow:

a. Read Chapter 3 in the Friedl & Koontz text.
b. You will use your hands-on learning cycle lesson plan already created by you and your teammates..
c. You will integrate technology in your lesson by providing **opportunities for your students to engage in standards-based technology activities during the lesson**.

The following questions should frame your planning:

1. What do you want students to do related to your lesson objectives?
2. How will you organize and manage the environment so that all students have access to the technology that they will use in your lesson?
3. How will you assess whether or not your students have reached the learning objectives of your lesson?
4. How will you determine whether or not the technology your students used helped them reach the learning objectives?

Action Plan:

1. Determine on which NETS•S you will base your technology integration plan. Also determine which NETS• T you are meeting. You must have these specifically stated at the beginning of your document.

2. 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? Consider the following:

   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.
   V. How will you manage and organize the learning environment for equitable access to learning by students?

3. Describe in full detail how you will organize and manage the technology and the learning environment so that all students can use the technology.

4. List & describe all resources (print, online, software, hardware, digital tools for ex) that you will use to plan and students will use to meet learning objectives

A complete listing of the ISTE NETS for Teachers (NETS•T) is provided for your convenience. However, you should consult the ISTE NETS for Students (NETS•S) to help you plan standards-based technology activities. Please have a complete understanding of both sets of NETS.

Student use of technology may include (but is not limited to):

a. PowerPoint presentations by students.
b. Smartboard technology
c. Mimio notebooks
d. Inspiration or Kidspiration for concept mapping.
e. Kid Pix in which students graphically represent their learning.
f. Students using video technology such as digital video cameras (e.g. Flip™ Video Camera)/other videocams.
g. Students using digital cameras.
h. Smartphones
i. iPad, iPod, iPod Touch, etc
j. A Filamentality hot list that YOU create for students to access and perhaps research questions to answer.

Please do not just say “you will give students Websites to interact with”. You would create a Filamentality.

k. Interactive templates accessed online for teacher-created science games for students to access at a home or school computer.
l. A science-based WebQuest
m. Student-created Website
n. Another idea of your own choosing for technology integration.

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

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

EDMS 545 Tentative Course Schedule: Spring 2011 (Wednesday)

Date	Course Topics & Activities	Readings & Work Due
Session 1 1/26/11	~ **Course Overview/Syllabus Review** ~ **The Nature of Science** ~ **CA Science Content Standards & Frameworks** ~ **Framework and Standards Task I, II, III** explained Framework & Standards groups formation ~ **Hands-on Learning Cycle Science Lesson Plan groups sign- ups** ~ A Private Universe (tentative)	**Bring course syllabus to class** **Bring course text to class** - Read Chapters 1 and 2, 3 of *Teaching Science to Children* as a framework for course concepts & skills - Bring Science Content Standards (K-8) to all classes. - Read CA Science Framework: pgs 1-22 for Framework & Standards: Task I due next week. - **Read Learning Cycle Handout on Moodle and bring a copy to next class**
Session 2 2/02/11	**FOCUS: Sequencing Instruction to Support Learning Outcomes** ~ Overarching themes students should learn in Science: **Big ideas** in Science Teaching/Learning ~ **Lesson Planning**: Using **The Learning Cycle** to teach science as inquiry. How do we make decisions about what to teach and the best strategies/processes to teach it? What teaching strategies ensure participation of ALL students? Writing **Essential Questions** Writing **Learning Objectives** to support assessment in science ~ Instructor-led learning cycle lesson ~ Hands-on Learning Cycle Lesson Plan group formation (if not done in session 1) ~ **Concept maps and science content** ~ **Complete work on Framework & Standards Task III (with team) and Presentations**	- Bring Science Content Standards (K-8) to all classes. - Read Chapter 4, 5 or 6 of *Teaching Science to Children* **DUE: Framework and Standards Task I (individual)** **Due: Framework & Standards Task II A & II B (Individual). Post to Moodle** **Framework and Standards Task III & presentations due (team). Post to Moodle – (one posting per team)** **View Disability Video** http://www.washington.edu/doit/Video/winequ.html
Session 3 2/09/11	**FOCUS on Assessment: What are the best indicators to assess that students have learned and understood the intended outcomes?** Making Science Content Accessible to ALL students: Strategies to ensure participation of ALL students ~ Adapting science curriculum for children with special needs ~ Instructor-led learning cycle lesson:	- Read Chapter 7, 8 or 9 of *Teaching Science to Children* - ****Concept Map #1 due in BBB on one of: Ch 7, 8 or 9: EVERYONE**

	Inquiry Processes in Science Science process skills & scientific attitudes ~ Safety guidelines for the science classroom ~ National Science Education Standards **Learning Cycle Lesson Plan--in class work**	
Session 4 2/16/11	~ Teaching Science to English Learners ~ Developing Science WebQuests and Technology Resources for Science Teaching and Learning ~ Instructor-led learning cycle lesson ~ Science kits	- Read Chapter 10, 11, or 12 of *Teaching Science to Children* - ****Concept Map #2 Due In BBB on one of: Ch. 10, 11, or 12: EVERYONE** - *****Learning Cycle Lesson Presentations: Teams 1, 2 & 3. Post to Moodle—one posting per team. Post data sheets as well.**
Session 5 2/23/11	~ Integrating writing into science activities ~ Instructor-led learning cycle lesson ~ **Science Fairs/Exploratorium and the Inquiry Model**	- Read Chapter 14, 15, or 16 of *Teaching Science to Children* - ****Concept Map due in BBB on one of: Ch. 14, 15, or 16: OPTION FOR CM #3** *****Learning Cycle Lesson Presentations: Teams 4, 5, & 6. Post to Moodle--one posting per team. Post data sheets as well.**
Session 6 3/02/11	~ Instructor-led learning cycle lesson **Work to complete Science Exploratorium LP**	- Read Chapter 17, 18 or 19 of *Teaching Science to Children* ****Concept Map due in BBB on one of Ch. 17, 18, or 19: OPTION FOR CM #3** ***** Learning Cycle Lesson Presentations: Teams 7, 8, & 9. Post to Moodle—one posting per team. Post data sheets as well.**
Session 7 3/09/11	**~ Science Fair Exploratorium Presentations at Elementary school site – Grade 5 (School and time TBD)**	**Post Science Exploratorium LP to Moodle—one per team** **Science Exploratorium LPs due in folders** **Please ensure that your team lesson plan AND data sheets are posted to the appropriate link in Moodle.**
Session 8 3/16/11	Integration of Technology Plan assignment due Integration of Technology presentations ~ Course Wrap-Up	**Please ensure that your team Integration of Technology Plan is posted to the appropriate link in Moodle.**

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

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.

GRADING STANDARDS

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

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

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

Exemplary "A" Students

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

"B" Students

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

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