

Course & Section Nos.	EDMI 545, Section 1
Course Title	Science Education in Middle Schools
Class Roster No.	22421
Course Day(s)	Wednesdays
Time	9:00-11:45/12:45-3:30
Course Location	Via Zoom Meeting ID: 895 5234 4795 Passcode: EDM1545
Semester / Year	Spring 2021
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WELCOME

Welcome to EDM1 545, all things science. We will work together to learn about the NGSS and learn how to ignite excitement and curiosity around science for middle school students.

SCHOOL OF EDUCATION MISSION & VISION STATEMENT

(Adopted by SOE Governance Community, January 2013)

Vision

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

Mission

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

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

BASIC TENETS OF OUR CONCEPTUAL FRAMEWORK

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

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COURSE DESCRIPTION

Focuses on developing an understanding of theory, methodology, and assessment of science in self-contained or departmentalized settings. This course is aligned with California's SB 2042 Standards and is designed to provide a comprehensive overview of the objectives, skills, concepts, experiments, materials, and methods necessary to teach science to elementary and middle school children. A series of 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.

Course Prerequisites

Admission to the Middle Level Credential Program

Course Objectives

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

1. Demonstrate proficiency with inquiry skills of observing, measuring, inferring, classifying, predicting, verifying predictions, hypothesizing, isolating variables, interpreting data, and experimenting.
2. Identify exemplary materials (technology and technology resources, curriculum, science programs, textbooks, equipment, ancillary materials) appropriate for K-9 school children.
3. Demonstrate knowledge and understanding of the California Science Framework, the California Science Content Standards, and the Next Generation Science Standards.
4. Demonstrate an understanding of the physical, earth and life science concepts included in the 5-9 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. Plan, teach, and videotape a lesson focusing on a discrepant event in science.
7. Apply the Learning Cycle model of instruction as it relates to teaching science in a contemporary manner.
8. Identify simulation tools and demonstrate the use of technology to enhance science teaching and learning.
9. Demonstrate confidence in leading and performing investigations designed to teach science concepts, science process skills, and scientific attitudes.
10. Use authentic methods of assessment to evaluate the learning of science concepts and processes.
11. Practice strategies to include all students in science (linguistically and culturally diverse, students with disabilities and other students with special needs).
12. Use reflection as a tool to increase conceptual understanding of science concepts and the ability to improve teaching.

REQUIRED TEXTS, MATERIALS AND/OR ACCOUNTS

Required Texts

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

Cougar Course Resources: Download and save to your laptop these course resources

- A Framework for K-12 Science Education: Practices, Cross-Cutting Concepts, and Core Ideas. Available at: <https://www.nextgenscience.org/framework-k-12-science-education>
- Next Generation Science Standards Framework for California (2016). Available at: <https://www.cde.ca.gov/ci/sc/cf/scifwprepubversion.asp>
- Next Generation Science Standards for California Public Schools, K-12 <http://www.cde.ca.gov/pd/ca/sc/ngssstandards.asp>
- Next Generation Science Standards (Achieve, 2013). Available from: <http://www.nextgenscience.org/>
- Health Education Content Standards for California Public Schools K-12. (2008). Sacramento: California Dept. of Education. Available from: <http://www.cde.ca.gov/be/st/ss/documents/healthstandmar08.pdf>

** If the hyperlinks do not open a document, copy and paste the URL into a browser.

Other handouts (assignments guidelines and rubrics) and resources will be distributed in class and through the Cougar course site.

***Additional course material and videos will be available in the Cougar Courses

COURSE LEARNING OUTCOMES

The course objectives, assignments, and assessments have been aligned with the CTC standards for the Single Subject Credential and 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.

Authorization to Teach English Learners

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

Teacher Performance Expectation (TPE) Competencies

The course objectives, assignments, and assessments have been aligned with the CTC standards for Multiple and Single Subject Credentials. The course activities and assignments are designed to meet the 2016 CA Teacher Performance Expectations (TPEs). The full text of the TPEs can be accessed at

<https://www.ctc.ca.gov/docs/default-source/educator-prep/standards/adopted-tpes-2016.pdf>

You will be required to formally address the following TPEs in this course:

TPE 1: Engaging and supporting all students in learning

TPE 1.1 **Practiced** through 5E hands-on science lesson plan assignment

TPE 1.4 **Introduced** through 5E Hands-on science lesson plan assignment

TPE 1.6 **Introduced** through 5E Hands-on science lesson plan assignment

TPE 1.8 **Assessed** through the 5E hands-on lesson presentation assignment)

TPE 2: Creating and maintaining effective environments for student learning

TPE 2.5 **Assessed** through the 5E hands-on lesson presentation assignment

TPE 3: Understanding and organizing subject matter for student learning

TPE 3.3 **Assessed** through the 5E hands-on lesson presentation assignment

TPE 4: Planning instruction and designing learning experiences for all students

TPE 4.5 **Introduced** through 5E Hands-on science lesson plan assignment

TPE 4.6 **Practiced** through 5E hands-on lesson presentation assignment

TPE 4.8 **Assessed** through the Integrated Unit Webquest & Presentation Assignment

TPE 5: Assessing Student Learning. Beginning teachers

TPE 5.3 **Practiced** through 5E hands-on lesson Reflection assignment

TPE 5.8 **Introduced** through 5E hands-on lesson Reflection assignment

Developmentally Appropriate Practices in Relation to Subject-Specific Pedagogy and English Language Development in Relation to Subject-Specific Pedagogy for Science

Developmentally Appropriate Practices in Relation to Subject-Specific Pedagogy and English Language Development in Relation to Subject-Specific Pedagogy for Health Science

Teacher Performance Assessment

CalTPA

To assist with your successful completion of the CalTPA, a series of informational seminars are offered throughout the course of the program. TPA related questions and logistical concerns are to be addressed during the seminars. Your attendance at TPA seminars will greatly contribute to your success in the assessment. The CalTPA Candidate Handbook, TPA seminar schedule, and other TPA support materials may be found on the SOE website:

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

Additionally, to support your success in your credential program and with TPA, SOE classes use common pedagogical language, lesson plans (lesson designs), and unit plans (unit designs).

Expected Dispositions for the Education Profession

Education is a profession that has, at its core, certain dispositional attributes that must be acquired and developed. Teaching and working with learners of all ages requires not only specific content knowledge and pedagogical skills but positive attitudes about multiple dimensions of the profession. The School of Education has identified six dispositions that must be evident in teacher candidates: social justice and equity, collaboration, critical thinking, professional ethics, reflective teaching and learning, and life-long learning. These dispositions have observable actions that will be assessed throughout the preparation program. For each dispositional element, there are three levels of performance - unacceptable, initial target, and advanced target. The description and rubric for the three levels of performance offer measurable behaviors and examples.

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

COURSE REQUIREMENTS

SOE Attendance Policy

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

For this course: Students who miss 2 class sessions cannot receive an A. Students who miss 3 class sessions cannot receive a B. Students who miss 4 or more class sessions will not pass the course. *Leaving early or arriving late by more than 15 minutes constitutes one absence. Illness and emergencies are considered on a case-by-case basis; however, notification of absence does not constitute an excuse.*

Writing

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

Students with Disabilities Requiring Reasonable Accommodations

Students with Disabilities Requiring Reasonable Accommodations

Students with disabilities who require reasonable accommodations must seek approval for services by providing appropriate and recent documentation to the Office of Disability Support Services (DSS). This office is in Craven Hall 4300, contact by phone at (760) 750-4905. Students authorized by DSS to receive reasonable accommodations should meet with their instructor during office hours or make an appointment.

CSUSM Academic Honesty Policy

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

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

Plagiarism

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

TOPICS OUTLINE

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

COURSE ASSIGNMENTS AND LEARNING OUTCOMES

COURSE ASSIGNMENTS AND LEARNING OUTCOMES

1. Class Participation/Online Forum Activities – 10% of total course points
2. Science Concept Graphic Organizers – 10% of total course points
3. California Science Framework and Health [Science Content Standards](#) Tasks – 10% of total course points
4. 5E Hands-on Learning Cycle Science Lesson Plan – 20% of total course points
5. 5E Hands-on Learning Cycle Science Lesson Presentation – 10% of total course points
6. 5E Hands-on Learning Cycle Science Lesson Reflection – 5% of total course points
7. Media Resources Exploration Activity – 15% of total course points
8. Informal Science Learning Field Trip Planning, Exploration & Presentation – 10% of total course points
9. Integrated Science & Social Studies Unit – 10% of total course points

Each student is responsible for ensuring that assignments are submitted correctly and on time. Late assignments will be penalized by a 10%-point reduction each day they are late. Online assignments not correctly posted do not count as submitted and will be subjected to the late assignment policy. Keep digital copies of all assignments. DO NOT SUBMIT LINKS TO GOOGLE DOCS.

CRITERIA FOR GRADING ASSIGNMENTS

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

The above criteria will be applied in conjunction with specific assignment rubrics. Points earned will determine grades:

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

ASSIGNMENT DESCRIPTIONS

1. Class Participation and Collaboration

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

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

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

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

2. Science Concept Graphic Organizer – 10 points - See class schedule for due dates

Assigned readings from the course text provide an important foundation for your increasing understanding of science content and how to effectively teach science. Three or four chapters from the course text *Teaching Science to Children: An Inquiry Approach* will be designated for reading on specific class meetings (see class schedule for chapter assignment). To demonstrate your comprehension of the readings, and assist you with meaningful class participation, you are asked to respond to specific science content-related reading assignments by completing a reading accountability graphic organizer. Your graphic organizer should demonstrate your knowledge and understanding of ALL of the Big Ideas contained in the readings using one of the following options: a graphic organizer, a concept map, a bulleted list, drawings, or another method of your choice that representing a graphic organization of the concepts in the chapter. The graphic organizer will be due at the beginning of class on the dates corresponding to the date the readings are assigned. You will only receive credit points if the graphic organizer is completed by the beginning of class on the date indicated in the schedule.

You will choose one of the assigned chapters and read it to develop an in-depth understanding of its contents. For the chosen chapter, you will prepare a reading response graphic organizer as described above that focuses on the science concepts (not the teaching activities) in the chosen chapter. You must have a copy of your graphic organizer (either hardcopy or electronic) during class time when it is due. Put your name, chapter, and date when the reading was assigned at the top of each page. You will be asked to share your graphic organizer in a small group at the beginning of each class session by show and tell. You should be prepared to share in-depth the breadth of your concepts presented in the chapter you read. Individuals will be called on randomly to share their graphic organizer with the whole class.

Each graphic organizer has a possible total of 2 points based on the following criteria:

- a) The graphic organizer shows clear relationships among concepts
- b) The graphic organizer includes at least 20 concepts
- c) The graphic organizer uses 1-2 words or nouns for Concepts (not sentences or long phrases)
- d) The graphic organizer covers the depth of the science content in the assigned chapter

3. **Next Generation Science Standards (NGSS) and Health Education Standards Activity - 10 points**

Purpose of the assignment: To provide an in-depth introduction to the NGSS as a framework and foundation for creating any science curriculum and application in other course assignments.

Part I: Getting to know the NGSS -

Use this link to access the assigned readings and resources for this part of the assignment

<https://www.nextgenscience.org/get-to-know>.

Read the following Framework sections and take notes using the "Noticing and Wondering about" format for discussion in class/online forum from the NGSS that are representative of a beginning understanding: 1) NGSS Front Matter (Executive Summary); 2) Structure of the NGSS (How to Read it); 3) Conceptual Shifts (How is it different); 4) View these two videos: "Why NGSS" and "NGSS Overview"; 5) Briefly scan the introductions to Sections D-J. For at least three of these five sections, come up with at least one "I notice" and at least one "I wonder" response and post to the discussion forum on cougar courses. Read the posts by your peers to notice the similarities and differences in what you notice and wonder about.

Task II A: Grade Level Next Generation Science Standards Response: (Individual)

Using the NGSS for your assigned grade level, pick ONE Performance Expectation (PE) from EACH standard. For each PE, come up with a brief description of an activity that children in that grade can do. You should end up with a standard (e.g MS-LS4-5), a PE, and a 3-4-sentence description of an activity. See examples on cougar Courses for what your sections should look like.

Depending on the number of standards for the grade level, you might have fewer or more sections depending on the number of standards. For grades 6-8 use the Earth and Space Science (ESS) standards for 6th grade, Life Science (LS) standards for 7th grade and Physical Science (PS) standards for 8th grade. For 5th grade choose one standard from the Physical Science (PS) standards, one from the Life Science (LS) Standards and one from the earth and space science standards (ESS).

NOTE: These must be HANDS-ON science activities, not Internet research or writing activities!!!

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

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 3-4-sentence description of an activity that reflects both.

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

Task III: Team lesson sketch, preparation, and presentation – (in class with your team)

Get together with your team; take turns sharing the activities you chose for each standard. Look at the activities that were collectively written up for Task II A. Choose one activity. Then...

- As a team, create a PowerPoint lesson sketch/description for the activity (with a lesson title, NGSS standard and Performance Expectation, learning objectives, an assessment plan, and a detailed description of what the students will do during the lesson). Make sure you write out the standard and PE on which your lesson plan is based.
- As a team, come up with a brief overview of the NGSS Standards for your grade. Don't try to give us every single line of the standards. Summarize in such a way (use bullet points) that we see generally what students

are supposed to learn in your grade level--the Big ideas. On a PPT, list the bulleted competencies indicated in the NGSS for your grade. Post your group PPT to Cougar Courses.

- Each team member should also add to the group PPT his/her Health Content Standard/Health Content Area idea (i.e., Task II B)
 - In about 7 minutes, present your lesson plan sketch and science standards overview to the class. Be prepared to explain why your lesson activity represents good science learning for your grade level students.
 - Your presentation should include the following elements – overview of the NGSS for your grade level, a lesson description for one of the performance expectations for the standards, why the lesson activity represents good science teaching, and each member's health standard and the corresponding activity.
- Your grade for this assignment will be based on the content and quality of your presentation, and the level of collaboration with your team.

Upload the group PowerPoint to Cougar Courses. Note: One group member,

Sample Response to Assignment Tasks IIA and II B.

Grade Four: Next Generation Science Standards

Standard 4-PS3: Physical Science - Energy

Performance Expectation 4-PS3-4: Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

Activity:

Using one flashlight bulb, one insulated copper wire, and one D-battery, students will determine how to create a complete electrical circuit in order to light the bulb. Students will then use 3 insulated copper wires, one flashlight battery, a battery holder, one D-cell battery, and a brass brad inserted into a 3x5 notecard to create a switch that turns the light bulb on and off.

Standard 4-PS4: Physical Science – Waves and Their Applications in Technologies for Information Transfer

Performance Expectation 4-PS4-2: Develop a model to describe that light reflecting from objects and entering the eyes allows objects to be seen.

Activity

Using a prism and a flashlight, each student will separate the component colors of white light through refraction by shining the flashlight through the prism onto a white surface (e.g., a white wall, a whiteboard) in the classroom. Using color paddles and a flashlight, student triads will explore how to produce white light.

Standard 4-LS1: From Molecules to Organisms: Structures and Processes

Performance Expectation 4-LS1-1: Construct an argument that plants, and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Activity

Using a fresh, white carnation flower placed overnight in a vase containing food coloring and water, students will use a scalpel to dissect the stem to reveal that the colored water was transported through the xylem to the flower through capillary action occurring from the roots to stem to the flower.

Standard 4-ESS1: Earth's Place in the Universe

Performance Expectation 4-ESS1-1: Identify evidence from patterns in rock formations and fossils in rock layer to support an explanation for changes in a landscape over time.

Activity: How Do Geologists Study the Earth's Interior? The teacher will prepare 3 different colors of cake batter and layer the 3 colored batters (vary layers in each cupcake) in foil baking muffin cups. Drop in small pieces of seashells and dried plant leaves into one specific layer (vary each cupcake). Top each cupcake with frosting (after baking) to model soil. Each student will use a transparent plastic straw, a toothpick, and a piece of paper folded into 4 sections. One section is a prediction of what the inside of the cupcake might be. The remaining 3 sections are drawings of core samples using the straw cut to appropriate lengths.

Standard 4-ESS2: Earth's Systems

Performance Expectation 4-ESS2-2: Analyze and interpret data from maps to describe patterns of Earth's features.

Activity: Using a foam mountain kit, students will construct a mountain and identify the base, peak, and elevation. Using each piece, students will first construct a topographic map and identify contour lines, the contour interval, and slope steepness. Students will then construct a mountain profile using the data generated from the topographic map.

Standard 4-ESS3: Earth and Human Activity

Performance Expectation 4-ESS3-2: Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

Activity: Using 30 toothpicks and 30 mini-marshmallows, each student will construct an earthquake-resistant structure using cubes and triangles that will be tested in a rectangular pie pan with solidified Jello®. Students may cut toothpicks in half to build their structure. The teacher will shake each pie pan using horizontal motions (gentle pressure, mid-pressure, violent pressure) to simulate a horizontal movement of an earthquake.

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. 5-E Hands-on Learning Cycle Science Lesson Plan – 20 points - See class schedule for due dates

The spirit of the assignment is to develop and teach a particular kind of scientific inquiry lesson that teaches both science process skills and science content using the learning cycle instructional model. Through the development of this lesson plan you will practice identifying activities that provide opportunities for inquiry, problem solving, responding to and framing meaningful questions, and reflection to support students' critical and creative thinking and analysis. In addition, this assignment also enables you to:

- I. Apply knowledge of students, including their prior experiences, interests, and social-emotional learning needs, as well as their funds of knowledge and cultural, language, and socioeconomic backgrounds, to engage them in learning (Practice TPE 1.1).
- II. Use a variety of developmentally and ability-appropriate instructional strategies, resources, and assistive technology, including principles of Universal Design of Learning (UDL) and Multi-Tiered System of Supports (MTSS) to support access to the curriculum for a wide range of learners within the general education classroom and environment (Introduction to TPE 1.4).
- III. Provide a supportive learning environment for students' first and/or second language acquisition by using research-based instructional approaches, including focused English Language Development, Specially Designed Academic Instruction in English (SDAIE), scaffolding across content areas, and structured English immersion, and demonstrate an understanding of the difference among students whose only instructional need is to acquire Standard English proficiency, students who may have an identified disability affecting their ability to acquire Standard English proficiency, and students who may have both a need to acquire Standard English proficiency and an identified disability (Introduction to TPE 1.6).
- IV. Promote student success by providing opportunities for students to understand and advocate for strategies that meet their individual learning needs and assist students with specific learning needs to successfully participate in transition plans (Introduction to TPE 4.5).

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

The lessons should include hands-on activities that emphasize specific science process skills and specific science concepts. The Exploration and Application phases of the Learning Cycle require different hands-on science activities and manipulatives. Hands-on activities are NOT reading or completing worksheets (though they may require students to read something or complete lab observation sheets).

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

5E –Learning Cycle Lesson Procedures/ Instructional Strategies

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

5E- Learning Cycle:

Learning Cycle Part 1: Engage: the “catch”

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

Learning Cycle Part 2: Explore: the “do”

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

Learning Cycle Part 3: Explain: “the lesson”

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

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

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

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

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

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

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

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

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

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

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

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

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

Activity	Criteria/ Quality of Work	Score
<u>NGSS STANDARDS, Objectives, & Concept(s)</u> <u>10 PTS</u>	You included the California Content Standards, Lesson Objectives and statements of the Science Concepts in your lesson plan. <p style="text-align: right;">(10 points maximum)</p>	
<u>Engagement activity & ESSENTIAL QUESTIONS</u> <u>10 PTS</u>	Your engagement activity questions, or challenge is engaging exciting and likely to get students wondering and wanting to find out more. You included at least one essential question in your lesson, focusing on the “big ideas” in your lesson plan. This is not simple a knowledge or application question, but questions that require analytical thinking. <p style="text-align: right;">(10 points maximum)</p>	
<u>Exploration Activity</u> <u>10 pts</u>	<ol style="list-style-type: none"> 1) Do all students participate in a developmentally appropriate hands-on science activity (sometimes problem solving, challenge) prior to introducing the main science concept of the lesson? 2) Does the exploration activity elicit students’ ideas relative to the concept? 3) Does the exploration activity(ies) lead to the introduction of the main concept? 4) Does the exploration activity provide the experiences need to meaningfully grasp the new idea when that new idea is presented? 5) Is there a likelihood that the students will come up with the key idea as a consequence of the exploration activities? 6) Do they make predictions at the beginning of the exploration phase? <p style="text-align: right;">(2 points for each, 10 points maximum)</p>	
<u>Explaining</u> <u>10 pts</u>	<ol style="list-style-type: none"> 1) Do students share their observations, data and explanations? 2) Does the teacher attempt to elicit the key idea from the students before presenting that idea? 3) When the new idea or skill is introduced, does the teacher directly relate the presentation to what students have experienced in the exploration activity? 4) Does the teacher provide further explanations and terminology and tie it all together? 5) Is there an attempt by the teacher to check on students’ understanding of the newly presented concept or skill? 6) Is there an attempt by the teacher to correct students’ misconceptions? <p style="text-align: right;">(2 points for each, 10 points maximum)</p>	

<u>Elaboration</u> 10 pts	1) Is a hands-on activity used in the elaboration phase? 2) Is the hands-on activity related to the exploration phase and concept introduced in the explanation phase? 3) Is any new element (refinement) added in this phase to broaden and deepen students' understanding or skills? 4) Are there explicit attempts to offer students corrective and confirmatory feedback in this phase? 5) Can the concept application activity also serve as an exploration activity for a new idea? 6) Can the elaboration activities serve as exploration activities for a new idea? (2.5 points for each of the above, 10 pts max)	
<u>Evaluation /Assessment Plan</u> 10 points	1) Are there explicit attempts to offer students corrective and confirmatory feedback in this phase? 2) Is there an attempt by the teacher to check on children's understanding of the newly presented concept or skill? 3) Is there an attempt by the teacher to scaffold students learning to sustain participation throughout the learning cycle? 4) Does the lesson provide a strong description of a summative assessment activity and reflection on the science concept? (10 points maximum)	
<u>Science Content Background</u> 10 pts	You provided a complete science content background relating to the lesson in your lesson plan - 7 pts. You provided a short explanation of the science content background in your lesson plan- 2 pts. You provided an incomplete explanation of the science content background in your lesson plan - 1 pt. You provided a poor explanation of the science content background - 0 pts. (10 points maximum)	
<u>Strategies for English Learners</u> 4 points	Strategies for teaching English Learners are included and explained.	
<u>Strategies for Students with Special Needs</u> 3 points	Adaptations/accommodations for students with special needs are included and explained (separate from other strategies).	
<u>Strategies for GATE Students</u> 3 points	Adaptations/accommodations to meet the needs of GATE students are included and explained.	
<u>Relevant Web Sites</u> 10 pts	You included 3 interactive web sites with descriptions and links to the sites and directly support student understanding of the concept.	
Format, Spelling and Mechanics – 10 points	The document is error-free, in the correct format, and exceptionally professional. Minor spelling, grammar or format errors appear in the document, but it is reasonably professional. The document contains numerous spelling, grammar and format errors and/or it is otherwise unprofessional.	
TOTAL POSSIBLE PTS = 100	TOTAL TEAM POINTS	/100

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

The purpose of this assignment is to develop a lesson plan that demonstrates your ability to develop activities that provide opportunities for inquiry, problem solving, responding to and framing meaningful questions, and reflection to support students' critical and creative thinking and analysis and to:

1. Monitor student learning and adjust instruction while teaching so that students continue to be actively engaged in learning. (Assessing TPE 1.8)
2. Maintain high expectations for learning with appropriate support for the full range of students in the classroom (Assessing TPE 2.5)
3. Plan, design, implement, and monitor instruction consistent with current subject-specific pedagogy in the content area(s) of instruction, and design and implement disciplinary and cross-disciplinary learning sequences, including integrating the visual and performing arts as applicable to the discipline (Assessing TPE 3.3)
4. Access resources for planning and instruction, including the expertise of community and school colleagues through in-person or virtual collaboration, co-teaching, coaching, and/or networking (Practicing TPE 4.6)

Each team will be allocated a maximum of 30 minutes of class time to teach their lesson. Prepare and use a PowerPoint Presentation to present your lesson. The PowerPoint should include all elements of the lesson plan so that peers can see explicitly the flow of the lesson from standards, objectives, and assessment plan, what you did for each segment of the 5E learning cycle. The presentation should also include a detailed explanation of the science content, as well as a list and definitions of science concepts important to the lesson. Include a list of websites (with short descriptions) that address the science topic and concepts through simulations, graphics, and videos. You should have links to these web sites and show examples during the lesson.

Begin Exploration with students making predictions or answering essential questions or completing a challenge. You should take the activities “off the paper” and require students to use the science process skills with science manipulatives. You need to know and demonstrate the stages of the Learning Cycle, or you will not be given credit for your lesson. Be sure you understand the concepts you are emphasizing, and that you can explain them. The lessons should be developmentally appropriate for K-8 grade students and should follow the NSTA Safety Guidelines.

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

5E Learning Cycle Lesson Presentation Rubric

	0 Does Not Meet Standard	1 Meets Standard	2 Exceeds Standard	Your Score
A. Timeliness and Completeness of Submission	The instructor reserves the right to remove points for late or incomplete work.		Work is turned in complete and on time.	
B. Descriptive Title, grade level, content area, subject matter, time period) NGSS PE plus DCI, S&E Practices, Specific Lesson Objective	The lesson plan is missing many of the required curriculum or logistical elements (Standard Course of Study, Statement of Purpose, Background for Teacher, Materials List, Curricular Integration, Sources).	The lesson plan includes all the required curriculum and logistical elements (Standard Course of Study, Statement of Purpose, Background for Teacher, Materials List, Curricular Integration, Sources); these elements are detailed enough to be meaningful for a knowledgeable substitute, administrator, or other teacher.	Especially thoughtful and detailed information is included for all the required curriculum and logistical elements (Standard Course of Study, Statement of Purpose, Background for Teacher, Materials List, Curricular Integration, Sources). These sections would be especially useful to anyone looking at this lesson plan.	

C. Developmental Level (Described, Appropriateness of Lesson)	The developmental level of the students is not described and/or the lesson is entirely inappropriate for the target audience.	The developmental level of the students is described, and the lesson is generally appropriate for the target audience.	The statement of the developmental level of the students is detailed and specific, noting both the physical and conceptual skills expected and how these relate to the activity. The lesson is an excellent match for the students for whom it was designed.	
D. Engagement is creative and arouses interests of diverse students	Creativity not evident or it is very weak. Lacks ability to arouse interest or generate excitement for a class with a diversity of students.	Some creativity is evident. May arouse interest of diverse and special needs students.	Exceptional creativity. Will arouse interest and generate excitement in a diverse variety of students.	
E. Engagement provides reason for Exploration and transitions seamlessly to the Exploration	Engagement is disconnected from Exploration. No obvious transition, or transition is awkward.	Engagement leads to acceptable transition into Exploration phase.	Engagement leads to an obvious and purposeful connection to exploration in a seamless manner.	
F. Exploration provides opportunities for students to engage in inquiry through active, hands-on exploration.	Exploration provides minimal and/or inappropriate opportunities for students to engage in inquiry through active, hands-on exploration.	Exploration provides adequate and appropriately constructed opportunities for students to engage in inquiry through active, hands-on exploration.	Exploration provides varied and carefully constructed opportunities for students to engage in inquiry through active, hands-on exploration.	
G. Exploration requires student use of a variety of Science Process Skills.	Student use of Science Process Skills is minimal or not evident in the Exploration section of the lesson plan.	The Exploration section of the lesson plan requires students to use several different Science Process Skills	Numerous and varied Science Process Skills are woven throughout the Explanation phase of the lesson.	
H. Exploration requires students to gather data (qualitative and/or quantitative).	Little or no opportunity is provided for students to gather qualitative and/or quantitative data during the Exploration phase.	Students are provided with adequate opportunities to gather qualitative and/or quantitative data during the Exploration phase.	Special consideration has been given as to how qualitative and/or quantitative data collected can be used to maximize student learning during the Exploration phase. The data collected stimulates students to make discoveries.	
I. Throughout Exploration students are encouraged to generate questions.	Little or no specific opportunities for student generated questions are evident as students explore.	The lesson plan provides adequate opportunities for students to generate their own questions as they explore.	The lesson plan purposefully addresses opportunities for student generated questions as they explore. This is accomplished by intentionally providing time and the means by which students will develop and pursue answers to their own questions.	
J. Explanation-through interaction students are given opportunities to share their discoveries.	Little to no opportunity is provided in the lesson plan for students to share their discoveries.	Some opportunity provided in the lesson plan for students to share their discoveries.	Multiple opportunities provided in the lesson plan for students to share their discoveries using a variety of formats including verbal discussion.	
K. Higher-level questioning leads to the construction of concepts and meanings sensible to students.	A minimal number of lower order thinking questions (according to Bloom's taxonomy) are used to stimulate student understandings.	Some questions from several levels of Bloom's taxonomy are incorporated in the lesson.	Well-formulated questions from several levels of Bloom's taxonomy, including higher order, are incorporated throughout the lesson. These questions facilitate construction of students' understandings of science concepts.	

L. Teachers associate meaningful vocabulary to students' conceptual understandings	No specific attention is paid to the relationship of vocabulary and concepts in this lesson plan.	The lesson plan integrates meaningful vocabulary, and this terminology is connected appropriately to the development of science concepts.	Appropriate and meaningful vocabulary is integrated throughout the lesson. Conceptual understanding and terminology are connected to one another every step of the way. It is clear when, how and why new terms will be introduced, connected to one another, and reinforced.	
M. Expansion continues to expand student understanding by applying learning to new, but RELATED exploration.	The Expansion phase is missing, is a repeat of the initial Exploration, or is unrelated to the rest of the lesson.	The Expansion phase provides an opportunity for students to build on what they have learned earlier in the learning cycle. The Expansion activity is related to the initial Exploration.	The Expansion phases provides an excellent opportunity for students to apply and expand their understanding by exploring a new but related phenomenon. The connection between the initial Exploration activity and the Expansion activity is explicit and the sense of flow is evident.	
N. Expansion requires students to use a variety of Science Process Skills.	Student use of Science Process Skills is minimal or not evident in the Expansion section of the lesson plan.	The Expansion section of the lesson plan requires students to use several different Science Process Skills	Numerous and varied Science Process Skills are woven throughout the Expansion phase of the lesson.	
O. A variety of formative assessments are evident throughout the lesson	Formative assessments are vague and provide minimal evidence of an appropriate assessment process to monitor student understanding of concepts and skills.	Formative assessments are clear and provide adequate evidence of an appropriate assessment process to monitor student understanding of concepts and skills.	Formative assessments are varied and carefully planned to provide extensive evidence of an appropriate assessment process to monitor student understanding of concepts and skills.	
P. Lesson ends with an appropriate summative assessment.	The summative assessment is vague and provides minimal evidence of an appropriate assessment process to measure student understanding of concepts and skills.	The summative assessment is clear and provides adequate evidence of an appropriate assessment process to measure student understanding of concepts and skills.	The summative assessment is carefully planned and provides extensive evidence of an appropriate assessment process to measure student understanding of concepts and skills.	
Q. Collaborative teamwork.	Your team accomplished few of the items listed	Your team accomplished most of the items listed	Your team was ready to present on time, had all activity materials provided so that all students could easily participate, provided data sheets, stayed within the time allocated, kept students on-task, and did not waste time	

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

After teaching the lesson in class, you should individually complete a lesson reflection. The purpose of this assignment is to provide an analysis of the of the decision making process that go in the lesson development and delivery and your ability to use assessment data, including information from students' IEP, IFSP, ITP, and 504 plans, to establish learning goals and to plan, differentiate, make accommodations and/or modify instruction (Introduction to TPE 5.8). The reflection should describe how the activities and assessment plan addresses the learning goals of the lesson and the strengths, weaknesses, and recommendations for improvement. The reflection should describe any opportunities that in involve students in self-assessment and opportunities for students to revise or reframe their work based on assessment feedback (Practice TPE 5.3). This should be done by responding to the following prompts:

- Describe the learning goals and the activities that you chose to help students make progress towards achieving these goals.
- Explain why you chose these activities for addressing the stated learning goals/needs.

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

***No longer than 2 pages**

Hands-on Science Lesson Reflection Rubric

A	<p>Exemplary performance on this assignment will demonstrate ALL the following 4 aspects of the assignment</p> <ol style="list-style-type: none"> 1. Description of the learning goals and the activities help students make progress towards achieving these goals. 2. Explanation of why you chose these activities for addressing the stated learning goals/needs. 3. Discussion of how effective the activities are in helping students make progress towards achieving the learning goals. 4. An analysis of the effectiveness of the assessment tools in collecting and providing information about student progress on the learning goals. Explanation of the strengths and weaknesses of your assessment in relation to the learning goals/objectives and the evidence it provided on student learning.
B	<p>Competent Level of Performance Includes THREE of the following aspects:</p> <ol style="list-style-type: none"> 1. Description of the learning goals and the activities help students make progress towards achieving these goals. 2. Explanation of why you chose these activities for addressing the stated learning goals/needs. 3. Discussion of how effective the activities are in helping students make progress towards achieving the learning goals. 4. An analysis of the effectiveness of the assessment tools in collecting and providing information about student progress on the learning goals. Explanation of the strengths and weaknesses of your assessment in relation to the learning goals/objectives and the evidence it provided on student learning.
C	<p>Developing Level of Performance include TWO of the following aspects:</p> <ol style="list-style-type: none"> 1. Description of the learning goals and the activities help students make progress towards achieving these goals. 2. Explanation of why you chose these activities for addressing the stated learning goals/needs. 3. Discussion of how effective the activities are in helping students make progress towards achieving the learning goals. 4. An analysis of the effectiveness of the assessment tools in collecting and providing information about student progress on the learning goals. Explanation of the strengths and weaknesses of your assessment in relation to the learning goals/objectives and the evidence it provided on student learning.
D	<p>Emerging Level of Performance includes just ONE of the aspects of the assignment.</p> <ol style="list-style-type: none"> 1. Description of the learning goals and the activities help students make progress towards achieving these goals. 2. Explanation of why you chose these activities for addressing the stated learning goals/needs. 3. Discussion of how effective the activities are in helping students make progress towards achieving the learning goals. 4. An analysis of the effectiveness of the assessment tools in collecting and providing

information about student progress on the learning goals. Explanation of the strengths and weaknesses of your assessment in relation to the learning goals/objectives and the evidence it provided on student learning.

7. Science Exploratorium Lesson Presentation to Middle School Students: 20 points

The goal of this activity is to demonstrate inquiry teaching and using student ideas to guide instruction through the use of a discrepant event or video appropriate for a specific middle school science standard and appropriate for the grade level students. You will work in groups as assigned in class.

You will prepare and lead a science lesson based on a discrepant event or video that leads to a science concept. You will present the lesson to a group of middle school students at a Science Exploratorium. 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.

8. Informal Science Learning Field Trip Planning, Exploration & Presentation – 10 points

The purpose of this assignment is to:

1. Identify the diversity of informal learning sites and resources available in our locality
2. Plan for effective student learning activities at an informal science site and/or field trip
3. Evaluate the effectiveness of resources at an informal science sites for supporting NGSS standards

To complete this assignment: 1) Identify one informal science site or event in your community appropriate for supporting students learning for a specific grade level and specific NGSS standards. 2) Develop a student activity sheet appropriate for recording student learning experiences at the site for students to use during the exploration of the informal science site. This will include student learning goals and the NGSS standards covered by the informal science site learning activity. 3). Visit the science-related informal site or event or presentation. Participate in the site for at least one hour and learn some new scientific knowledge and ways in which the activity can be used to teach science. Document through pictures and videos or artifact collection where possible and use the student worksheet to record learning similar to how your students would use it. 4) Prepare a presentation summary of your visit documenting what you did for the time you were at the site, what science ideas and concepts you learned from the visit or presentation and how the visit or presentation can be applied to teaching in K-12 environments; 5) Make a 5-minute PowerPoint presentation to the class during class one of the classes addressing what you did, what you learned, how it can be applied, highlighting resources from the site. You will also submit your presentation and the Completed Student Activity Sheet through Cougar Courses.

Informal Science Site Resources and Field Trip Rubric

A	<p>Exemplary performance on this assignment will demonstrate ALL the following 4 Aspects of the assignment</p> <ol style="list-style-type: none"> 1) Identifies one informal science site or event in the local community appropriate for supporting students learning for a specific grade level and specific NGSS standards. 2) Presents a student activity sheet appropriate for recording student learning experiences at the site for students to use during the exploration of the informal science site. This will include student learning goals and the NGSS standards covered by the informal science site learning activity. 3). Evidence of the visit to and participation at the science-related informal site or event or presentation documented through pictures and videos or artifact collection where possible and using the student worksheet to record learning similar to how your students would use it. 4) A presentation summary of the visit documenting what was done for the time at the site, what science ideas and concepts were learned from the visit or presentation and how the visit or presentation can be applied to teaching in K-12 environments.
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B	<p>Competent Level of Performance Includes THREE of the following aspects:</p> <ol style="list-style-type: none"> 1) Identifies one informal science site or event in the local community appropriate for supporting students learning for a specific grade level and specific NGSS standards. 2) Presents a student activity sheet appropriate for recording student learning experiences at the site for students to use during the exploration of the informal science site. This will include student learning goals and the NGSS standards covered by the informal science site learning activity. 3). Evidence of the visit to and participation at the science-related informal site or event or presentation documented through pictures and videos or artifact collection where possible and using the student worksheet to record learning similar to how your students would use it. 4) A presentation summary of the visit documenting what was done for the time at the site, what science ideas and concepts were learned from the visit or presentation and how the visit or presentation can be applied to teaching in K-12 environments.
C	<p>Developing Level of Performance Includes only TWO of the following aspects:</p> <ol style="list-style-type: none"> 1) Identifies one informal science site or event in the local community appropriate for supporting students learning for a specific grade level and specific NGSS standards. 2) Presents a student activity sheet appropriate for recording student learning experiences at the site for students to use during the exploration of the informal science site. This will include student learning goals and the NGSS standards covered by the informal science site learning activity. 3). Evidence of the visit to and participation at the science-related informal site or event or presentation documented through pictures and videos or artifact collection where possible and using the student worksheet to record learning similar to how your students would use it. 4) A presentation summary of the visit documenting what was done for the time at the site, what science ideas and concepts were learned from the visit or presentation and how the visit or presentation can be applied to teaching in K-12 environments.
D	<p>Emerging Level of Performance includes just ONE of the aspects of the assignment.</p> <ol style="list-style-type: none"> 1) Identifies one informal science site or event in the local community appropriate for supporting students learning for a specific grade level and specific NGSS standards. 2) Presents a student activity sheet appropriate for recording student learning experiences at the site for students to use during the exploration of the informal science site. This will include student learning goals and the NGSS standards covered by the informal science site learning activity. 3). Evidence of the visit to and participation at the science-related informal site or event or presentation documented through pictures and videos or artifact collection where possible and using the student worksheet to record learning similar to how your students would use it. 4) A presentation summary of the visit documenting what was done for the time at the site, what science ideas and concepts were learned from the visit or presentation and how the visit or presentation can be applied to teaching in K-12 environments.

9. Integrated Science & Social Studies Unit, Webquest and Presentation–10 Points

This assignment is tied to the Unit Plan Project from other classes. The goal of this assignment is for the teacher candidate to demonstrate ability to:

- i) use digital tools and learning technologies across learning environments as appropriate to create new content and provide personalized and integrated technology-rich lessons to engage students in learning, and to promote digital literacy **(Assessing TPE 4.8)**

For this assignment, you will plan a unit of instruction for an appropriate grade for an interdisciplinary team that includes science and other subject areas as desired. This unit will be appropriate for approximately two-three

weeks of instruction for a heterogeneous elementary classroom as described in EDMI 544. For the science lesson of the unit, you will create a WebQuest that demonstrates your understanding of organizing web-based resources to specific science lessons. Your task is to think about how you can invite 5-8 grade students to participate in some aspects of your resource project through the use of a WebQuest.

Procedures to follow for the WebQuest:

a. Read Chapter 3 in the Friedl Text.

b. You will integrate technology into your unit plan by creating a WebQuest that provides opportunities for 5-8 students to use technology to explore or access the content and/or skills associated with your unit plan theme. Use zunal (www.zunal.com) or a similar WebQuest creation template. Your WebQuest must include but not limited to the following:

Introduction – Should identify a need that students can relate to and the learning objectives that will be achieved by meeting the need it achieve?

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

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

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

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

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

Technology Integration Assignment Rubric

Evaluation Item	Beginning 1	Developing 2	Accomplished 3	Exemplary 4	Score
Technology description and appropriateness	Selection and description of technology is inappropriate (or nonexistent) for learning environment and outcomes.	Selection and description of technology is beginning to be appropriate for learning environment and outcomes. Technology applied does not affect learning.	Selection and description of technology is basically appropriate for learning environment and outcomes. Some technology applied enhances learning.	Selection and description of technology is appropriate for learning environment and outcomes. Technology applied to enhance learning.	
Instruction Goals and Objectives	Instructional goals and objectives relative to the science content are not stated. Learners cannot determine what they should know and be able to do as a result of learning and technology use.	Instructional goals and objectives relative to science content are stated but are not easy to understand. Learners are not given enough information to determine what they should know and be able to do as a result of learning and technology use.	Instructional goals and objectives relative to science content are stated. Learners can determine what they should know and be able to do as a result of learning and technology use.	Instructional goals and objectives relative to science content are clearly stated. Learners can determine what they should know and be able to do as a result of learning and technology use.	
Task Description	The task is described such that Learners cannot tell what is expected of them. Resource list is missing.	The task is described such that learners are given some information regarding what is expected of them. Some resources necessary for student to complete lesson are listed, but list is incomplete.	The task is described such that Learners have an understanding of what is expected of them. Most resources necessary for student to complete lesson are listed.	The task is described such that learners have a clear understanding of what is expected of them. All resources necessary for student to complete lesson clearly listed.	

Outcomes: Description of student work & products	The description of student products is such that learners cannot determine what they should produce and submit as a result of learning and technology use.	The description of student products is such that learners are not given enough information to determine what they should be able to produce and submit as a result of learning and technology use.	The description of student products is such that learners can determine what they should be able to produce and submit as a result of learning and technology use.	The description of student products explicitly and clearly states what learners should be able to produce and submit as a result of learning and technology use.	
Assessment	Method for assessing student learning and evaluating technology use is missing.	Method for assessing student learning and evaluating technology use is vaguely stated. Assessment is teacher dependent.	Method for assessing student learning and evaluating technology use is present. Can be readily used for expert, peer, and/or self-evaluation.	Method for assessing student learning and evaluating technology use is clearly delineated and authentic. Can be readily used for expert, peer, and/or self-evaluation.	
Total Points					

TENTATIVE CLASS SCHEDULE

DATE	COURSE TOPICS & ASSIGNMENTS	Readings and Assignments Due
Week 1		
1/27/2021 A.M. Class Session 1	Elements of the Course and Introduction to Science Education <ul style="list-style-type: none"> • Course Overview: Syllabus and Text • Science Content Standards/Framework Overview 	Bring Syllabus to class
1/27/2021 P.M. Class Session 2	What are the overarching themes that we want our students to learn in science? <ul style="list-style-type: none"> • NGSS and CA Science Education Framework • Focus on NGSS standards • Focus on sequencing instruction for NGSS • Writing Concept Graphic organizers 	- Read the Science Framework sections outline in assignment 3 - Submit your response to Cougar Courses Forum - DUE before class: Framework and Standards Task IIA & IB (individual)
Week 2		
2/03/2021 A.M. Class Session 3	How shall we sequence the learning activities so that students can learn the intended themes? <ul style="list-style-type: none"> - NGSS Lesson Activities 	- Due after class: Framework and Standards Task III Presentations (team). - Due after class: Framework and Standards Task III Presentation (team). - Read Learning Cycle Handout and bring a copy to class.
2/03/2021 P.M. Class Session 4	<i>Sequencing Instruction via the Learning Cycle</i> Using the Learning Cycle to teach science as inquiry <ul style="list-style-type: none"> - English Language Learners in Science - Teaching Science to Gifted and Students with Special Needs - Instructor-Led Learning Cycle Lesson - Concept map Writing Assignment Description 	- Reading the Learning Cycle handout - Complete the Learning Cycle reading response forum activity
Week 3		
2/10/2021 A.M. Class Session 5	<i>Assessment in Science Learning Cycle Lessons</i> What shall we use as the best indicators that students have learned and understand the intended outcomes? <ul style="list-style-type: none"> - LC Vignettes - 5E- Lesson Planning - Focus on Assessments (performance assessments, developing criteria for assessing learning and using rubrics) 	- Read Chapter 4 or 5 or 6 of Teaching Science to Children. - DUE: Concept Graphic Organizer #1 on one of Ch. 4, 5, 6.
2/10/2021 P.M. Class Session 6	What Activities of Teaching shall we use to make the content accessible to ALL students? <ul style="list-style-type: none"> - Concept Graphic organizer Sharing #1 - Introduction to the 5E Lesson Plan - Instructor-Led Learning Cycle Lesson 	
Week 4		
2/17/2021 A.M.	<i>Safety Guidelines for Science Classrooms</i>	- Read Chapter 7 or 8 or 9 of Teaching

Class Session 7	- Share Concept Graphic organizers #2	Science to Children. - DUE: Concept Graphic Organizer #2 on one of Ch. 7, 8, 9.
2/17/2021 P.M. Class Session 8	What Activities of Teaching shall we use to make the content accessible to ALL students? <i>Writing Learning Cycle Science Lesson Plans</i> Team time for 5E Lesson Plan/Presentation (time permitting)	- DUE: hands-on Lesson Plans Due by midnight
Week 5		
2/24/2021 A.M. Class Session 9	<i>Hands-on Learning Cycle Lesson Presentations</i> What Activities of Teaching shall we use to make the content accessible to ALL students? The 5E Science Lesson Presentations Writing Lesson reflections	- Read Chapter 10 or 11 or 12 - DUE: Concept Graphic Organizer #3 on one of Ch. 10, 11, 12 due - Read Chapter 3 of Teaching Science to Children - Hands-on lesson Presentations x3
2/24/2021 P.M. Class Session 10	- Share Concept Graphic organizers #3 - Adapting Science curriculum for children with Special Needs	- Hands-on lesson Presentations x3
Week 6		
3/03/2021 A.M. Class Session 11	<i>Hands-on Learning Cycle Lesson Presentations</i> What Activities of Teaching shall we use to make the content accessible to ALL students? - The 5E Science Lesson Presentations	- DUE 2/25: Hands-on Lesson Reflection - Read Chapter 13 or 14 or 15 - Concept Graphic Organizer #4 on one of Ch. 13, 14, 15 due by class time.
3/03/2021 P.M. Class Session 12	<i>Project-Based Learning</i> - Design Thinking and Unit plan lesson development - Informal Science Site Resources - Share Concept Graphic organizers #4	- Due: Lesson Presentation Lesson Reflection
Week 7		
3/10/2021 A.M. Class Session 13	- Media resources for Science Teaching	- Read Chapter 16 or 17 or 18 - DUE: Concept Graphic organizer #5 on one of Ch. 16, 17, 18
3/10/2021 P.M. Class Session 14	- Developing and Using WebQuest for science teaching - Informal Science Field Trip presentations - Share Concept Graphic organizers #5	- Due: Media Resources Exploration Activity - Due: Informal Science resource presentations
Week 8		
3/17/2021 A.M. Class Session 15	Current Issues in Science Education & Scientific Community Science Education Professional Development - Share Concept Graphic organizers #6	- Read Chapter 19 or 20 or 21 - DUE: Concept Graphic organizer #6 on one of Ch. 19, 20, 21

3/17/2021 P.M. Class Session 15	Course Review and Reflection	- DUE: Unit Plan Due
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FINAL EXAM STATEMENT

The is no final exam for this class.