



**EDSS 545B**  
**Secondary Science Education**  
**CRN #27524**  
**Thursdays**  
**7:00 pm – 8:50 pm**  
**University Hall 439**  
**Spring 2014**

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

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

*Vision*

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

*Mission*

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

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

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

Focuses on developing an understanding of theory, methodology, and assessment of Science in integrated and inclusive secondary classrooms: Part B. *Prerequisite: EDSS 545A.*

#### Course Prerequisites

Admission to the Single Subject Program or pursuit of a single subject add-on credential (by permission) is required to enroll in this course as well as EDUC 350, EDUC 364, & EDUC 422 or equivalent.

#### Course Objectives

These **objectives will be measured by successfully completing** specific assignments. In general terms, a successful candidate should know and be able to apply the following:

- 1) The major concepts for frameworks, programs and standards in Science Education in California, the Next Generation Science Standards and a general overview of science education in international countries (TIMSS Study);
- 2) The general history and philosophy of science education;
- 3) Diverse resources, materials available for science education including texts, lab manuals, equipment as well as both informal and formal community related resources;
- 4) Strategies for safe and effective science teaching;
- 5) Strategies for integrating technology into science teaching;
- 6) Diverse methods in the use of various teaching strategies such as expository teaching; inquiry-based learning; the use of open-ended laboratory experiences; and the integration of community/ field resources;
- 7) Strategies for the integration of a variety of diverse assessments including both formative/summative that are authentic and traditional;
- 8) Enrichment activities that involve students during and after school that apply science knowledge and go beyond the standard curriculum;
- 9) Strategies for planning science curricula as well as specific strategies for the integration of other disciplines (interdisciplinary curriculum);
- 10) Inclusive science education strategies including SDAIE that enhance the science curriculum for all learners;
- 11) Application and analysis of teacher designed research (called action research) for the ongoing purpose of improving practice.

### **Required Texts**

Science Instruction in the Middle and High School (Chiappetta and Koballa) (2009 Seventh Edition) available in CSUSM bookstore for purchase or @ Amazon etc.

Use of Discrepant Events for K-12 Science Teachers (Aztec Press /University Bookstore), (Keating) available in bookstore only

California Frameworks in Science (State Dept. of Education) (see free downloads

<http://www.cde.ca.gov/ci/cr/cf/documents/scienceframework.pdf>

### **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)*

## **STUDENT LEARNING OUTCOMES**

### **Teacher Performance Expectation (TPE) Competencies**

The course objectives, assignments, and assessments have been aligned with the CTC standards for Single Subject Credential. This course is designed to help teachers seeking a California teaching credential to develop the skills, knowledge, and attitudes necessary to assist schools and district in implementing effective programs for all students. The successful candidate will be able to merge theory and practice in order to realize a comprehensive and extensive educational program for all students. You will be required to formally address the following TPEs in this course: although other TPE's are addressed in the course, the primary TPE 1B: Subject specific pedagogical skills

### **California Teacher Performance Assessment (CalTPA)**

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

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

Additionally, SoE classes use common pedagogical language, lesson plans (lesson designs), and unit plans (unit designs) in order to support and ensure your success on the TPA and more importantly in your credential program.

The CalTPA Candidate Handbook, TPA seminar schedule, and other TPA support materials can be found on the SoE website: <http://www.csusm.edu/education/CalTPA/ProgramMaterialsTPA.html>

## **GENERAL CONSIDERATIONS**

### **Assessment of Professional Dispositions**

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

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

### **School of Education Attendance Policy**

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

**Note:** Both attendance and punctuality are essential to completing all work satisfactorily. Point values are assigned for each class (5 pts per class or 10 pts for field trips). In addition, only 50% of the potential value for an assignment can be credited as makeup for an assignment that is due and reviewed in a class that was not attended by the student. Two absences in one semester can result in a minimum of one grade lower; three absences can result in a non-passing grade (unless there are extenuating circumstances). Late arrivals will be penalized at the discretion of the instructor.

### **Teacher Candidates with Disabilities Requiring Reasonable Accommodations**

Candidates with disabilities who require reasonable accommodations must be approved for services by providing appropriate and recent documentation to the Office of Disable Student Services (DSS). This office is located in Craven Hall 4300, and can be contacted by phone at (760) 750-4905, or TTY (760) 750-4909. Candidates authorized by DSS to receive reasonable accommodations should meet with their instructor during office hours or, in order to ensure confidentiality, in a more private setting.

### **All University Writing Requirement**

The writing requirements for this class will be met as described in the assignments. Every course at the university, including this one must have a writing requirement of at least 2500 words.

### **CSUSM Academic Honesty Policy**

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

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

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

### **Plagiarism:**

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

### **Use of Technology**

Candidates 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. Keep a digital copy of all assignments for use in your teaching portfolio. All assignments will be submitted online, and some will be submitted in hard copy as well. Details will be given in class.

### **Electronic Communication Protocol**

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

Things to consider:

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

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

## COURSE REQUIREMENTS

### Course Description / Goals

This course will be held both fall and spring semesters for a total of 4 credits (approximately 30 contact hours per semester, 2 credits per semester). It fulfills the requirement for a methods course for all Single Subject Science credential students. Upon completion of this course, the preservice teacher will be able to formulate a basis to teach a standards based science course in the secondary school in a manner that is exciting, creative and rigorous. To accomplish this, the candidate will formulate a personal framework of science education based on both a historical/philosophical perspective as well as from knowledge of the state and national frameworks and other reform documents. Using this knowledge as a framework, he (she) will learn to apply multiple strategies and resources for the development of unit plans, instructional delivery and assessments that utilize a student-centered, inquiry (problem-solving) and community based approach to the teaching of science for all students. **Classes will consist of formal class meetings, field trips, video conferences and independent study totaling approximately 20 seminars @ 10 seminars per semester @ 3.0 hrs. each**

### Grading Standards / Overview of Assignments

The Assignments and point value for both semesters are listed in numerical order and described in more detail in the following section "Description of all assignments" below.

The final grade for EDSS 545 A/B will be the % of total points earned that semester converted to a letter grade (93-100=A; 90-92=A-; 83-89=B; 80-82=B- etc.) Assignments are due on time and will not be accepted late unless there are extenuating circumstances.

- 1) Attendance/participation (5 pt. per class) (100 pts.)
- 2) Sci. Methods Text Readings/Questions/Prompts/Discussion/Notes (6pts each)
- 3) Jigsaw of California science frameworks and standards (10pts)
- 4) Evaluation sheets on best practices for education technology tools (I-Pads) and software (apps) (10 pts)
- 5) Evaluation of Science Internet sites (10 pts)
- 6) A/ B Inquiry---Discrepant event reflection/ presentation(s) (30 pts)
- 7) Applying Action Research by comparing SDAIE to Traditional Labs(35pts)
- 8) Development of an outline for a Personal Plan for Science Safety (10 pts)
- 9) A-B Observation of science lesson and evaluation of science safety strategies (10 + 5 pts = 15 pts.)
- 10) Enrichment and extracurriculum science programs (40 pts)
- 11) Book Report on high interest science book (10 pts.)
- 12) Open ended/independent science study both semesters (10 pts)
- 13) Strategies for implementing field trips at the high school level (Safari Park and Reuben Fleet Museum = 20 pts each)
- 14) Researching and presenting a mini-lecture on a current topic in science (25pts)
- 15) Two Case Studies one per semester: Issues in student teaching and proposed action plans =(5+5+5+ Final (20 pts)=35pts.)
- 16) Implementing Open ended vs. Closed Ended Experiments (10 pts.)

Optional/Extra credit: (maximum 10 pts)

- 1) Directorship (5 pts.)
- 2) SDSEA or CSTA or NSTA or other Conference in addition to open assignments (5 pts. one day)

### Point's summary:

**Fall Semester:** Assignments #1 (50 pts); #2 (54 pts); #3 (10 pts); #6 (30 pts); #8 (10 pts) #9 a-b (10+5); #12 (10 pts); #13 (20 pts); #15 (35 pts); #16 (10 pts.)= 234 pts.

**Spring Semester:** Assignments #1 (50 pts); #2 (36 pts.) #4 (10 pts); # 5 (10 pts.); #7 (35 pts.) #10 (40 pts.); #11 (10 pts.); #12 (10 pts.); #13 (20 pts.); #14 (25 pts.); #15 (35 pts.) = 281 pts

## Description of All Assignments (By Number): Both Semesters Included

**Assignment 1 Attendance** (each class counts 5 points) In the event of an absence any assignments due that night could receive only 50 % of the potential credit (if made up) since you were not there to interact and discuss the assignment.

**Assignment 2 Science readings in text** (6 points each chapter) Each chapter is assigned a value of six points that includes your response to a prompt or a summary of major points, reflections, questions) and or responses to specific chapter questions as well as a discussion of these with your colleagues in class (this may

**Assignment 3 – California Science Framework and Standards** (10 pts)

**Spirit of the assignment:** How to teach science to all students by overviewing the entire frameworks and applying your understanding of standards by integrating them in an inquiry based curriculum. More specifically your team will overview the entire frameworks (by using the jigsaw method), discuss your findings and then demonstrate your understanding of the specific standards for your content area (Physics, Chemistry, Earth or Life Science) by developing a mini-lesson outline. It's important that you do the reading and the write-ups BEFORE you meet with your team.

### Framework summary responses

3a **Individual Work** (3 points)

- Read the California Science Framework Chapter One introduction and Chapter Two (Nature of Science) and write a one-page summary with questions and comments from each. For the standards chapters read only the subject area standards for high school content subject area (9-12) that you are assigned i.e. Physical Science, or Life Science or Earth Science Think about the readings holistically and construct an inquiry based mini lesson for one or more content and experimental standard (see 3B below)
- Read and Write about a page for the non-standard chapter which you are assigned Ch. 4-11 as part of the jigsaw that address these questions: What do you think are **the most important** ideas addressed in the reading? Were there any ideas in the reading, which were new to you? What are your questions?

3b **Science subject standards response (only your subject area)** (2 points)

- Using the standard for your chosen subject, (assume a general course) pick one or more content and experimental standard. 1) Choose and write the standard(s); 2) come up with a brief description of an inquiry based activity those students in that subject area can do and; 3) how can it be assessed and 4) how can this lesson incorporate other ideas discussed from the other chapters that you read in the California Frameworks.

3c. **Team preparation and presentation** (5 points)

- Get together with your team by subject area (chemistry, physics, biology or earth science). Look at the activities that everyone wrote up for Assignment 3b. Choose one that your team feels is the best representation of the application of the standards/frameworks or integrate two that may work together. Elaborate and enrich the original based on input from all members.
- As a team, write up a lesson plan for the activity stating the standard(s) (with activities, assessment,). This lesson plan should also try to integrate the ideas from the individual team chapters 1-11 as discussed in 3b above. Put it on chart paper or on the computer. As a team, think about the entire set of standards for the subject area. If you only had time, as a teacher, to do half of it with your students, which half would you do, and why? Make a list to present to the class, and be prepared to give your reasons for your choices.
- In 8 minutes or less, 1) present your inquiry based lesson plan and how the other areas addressed in the frameworks might be integrated into this lesson; 2) present an overview of the major standards expected to be addressed in your subject area; 3) which ones might you team de-emphasized or eliminated if time is a factor; 4) address any questions from classmates.

## **Assignments 4 and 5 (Evaluation and Use of Technology Resources)**

### **Assignment 4 Internet Sites (10 pts);**

### **Assignment 5 Technology tool/software as utilized by the I-Pad (10 pts)**

**Spirit of the Assignment:** individually explore Internet resources (web pages, simulation games etc. and technology tool (I-Pad).

For assignment #4 explore in detail at least one Internet site that is a valuable for teachers or students for information, simulation etc. List the URL and access it on Smart classroom projector and navigate the site and explain how you would use it in your classroom.

For assignment #5 explain or demonstrate a tool or strategy for using the I-Pad. Demonstrate it in front of class and how you would apply it to the Science classroom.

## **Assignment 6: Inquiry based Discrepant Event Presentation (30 pts)**

**Spirit of the Assignment:** to develop and teach a particular kind of a science inquiry lesson that teaches both science thought processes and science content. You will practice your discrepant event with middle or high school age student(s) and reflect on the student's responses and their understanding/misunderstanding. Working by yourself you will present your discrepant event to the class and give a copy of the lesson plan to each class member (see model lesson from "Bouncing Balls" DE Presentation or Discrepant Event Textbook).

### **6a. Discrepant Event Lesson Plan and Presentation 25 points**

- Determine a discrepant event lesson that connects to the subject matter of your CP1 experience. You can get one from Discrepant Events, by Keating, or go to another available resource.
- Get together the materials needed for the discrepant event.
- Practice doing the event on your own.
- Make sure you understand the science behind the event.
- Do your discrepant event with at least one middle or high school age student prior to doing it in class and take careful notes on the student's responses. (This ties in with Assignment 6b reflections.)
- Present your DE to the class. (You may discuss your findings from the pre-event DE with your classmates as part of this presentation. You are limited to 15 minutes presentation time.)
- After presenting your event, give a copy of the DE lesson plan to each member of the class and your reflective individual journal to the instructor (see 6B)

### **6b. Discrepant event journal (Reflection on Pre-Event) 5 points**

- After you have done your pre-event discrepant event with a student, look at your notes and think about how it went. (You may realize that your event needs to be modified before you do it with the class.)
- Write a description of what happened, with special attention to what the student said and did. Analyze the student's response: what portions of the event did the student understand (not understand) what was happening? Did they understand the underlying science concept? What modifications to what you say or do might be necessary for better understanding?

## **Assignment 7: Applying Action Research to a Science Lab (SDAIE) modification (35 pts) Spring Semester (See Addendum B for Final Report Template)**

**Spirit of the Assignment:** Use an existing science lab or activity that you will use in CP 2 and rewrite it to be more appropriate for second language learners (use SDAIE/ELL techniques as discussed in this course (Ch. 12) as well as others you have had). You will use the action research model to evaluate its effectiveness by comparing outcomes of experimental lab (SDAIE) with a control (original lab or activity) using classes you teach in CP 2.

**Specifics of the assignment:** The assignment consists of four parts.

- Discuss readings and other resources related/connected to ELD Standards and related strategies as a basis for modification of existing laboratory activities.
- Display a copy of the original science lab or activity and revised SDAIE lab (5pts) explaining the adaptations you have made (5pts);
- Design an action research proposal using the action research design (see syllabus) and present this to the class for discussion (5pts).

- After you have completed the research present the findings (Final report= 20 pts) by comparing outcomes from the two lab classes one, which used original lab (control) and another who used the modified SDAIE lab (experimental).

### **Assignment 8 Development of a personal Plan for Science Safety (10 pts)**

**Spirit of the Assignment:** Use your readings from the safety manuals/documents and interview with the science teacher to propose an outline of a **Plan for Science Safety** that you will (can) use within your science discipline. More specifically this might include 1) information/resources from your MT interview assignment 9B: safety contracts, demonstrations, laboratory protocols, lesson plans they use to teach safety, as well as any general experiences in dealing with science safety and 2) the textbook (Ch. 14), California Safety Manual, Flinn Safety Manual.

### **Assignment 9A Observation of science lesson and teaching strategies and use of science safety within the curriculum (10 + 5 pts= 15 pts)**

**Spirit of the assignment:** to intelligently observe a science lesson. During your observation/participation time you will find a science teacher who may or may not be your own master teacher. You will 1) 9A: interview the teacher before and after the lesson. If possible, it's good to also talk with some of the students after the lesson (see guidelines for 9a below (10 pts); 2) 9B: address with the teacher the specifics of how she (he) approaches science safety. This might include as a minimum: lesson plans they use to teach safety, lab safety contract, general rules used, and any general experiences in dealing with science safety. Collect samples if you can and include what you would do in your classroom to address science safety (5 pts). You will put both of these responses (9A-B) together with your own observations and conclusions to write your report.

#### **General guidelines for completing 9 A (10 pts):**

GENERAL INFORMATION: grade level, district, description of the activity.

#### **BEFORE (Interview)**

- How did the teacher come to do this lesson?
- How did he/she pick the topic?
- Where did the materials come from?
- In general, how does the teacher think the students will respond to the lesson?
- Identify some students in the class who will like this lesson and do well on it.
- Identify some students who might have difficulty, either cognitive or behavioral and describe the problems they are likely to have and how the teacher might adapt for them

#### **DURING (observation)**

- Is there a written or unwritten plan for this lesson?
- What are the objectives (if this/these are unstated, you will have to figure them out)
- How does the teacher know that the objectives were met at the end of the lesson (formative or summative assessments)?
- How does the teacher know, as the lesson is going on whether the students are getting it? (Formative i.e. checking for understanding)
- Does the teacher make any adaptations to address the needs of the children who have difficulty?
- Can you clearly follow the procedures the teacher is using and the understanding of the science concept and do they relate directly to the objectives?
- What other non-instructional strategies supported or distracted from the teaching of this lesson?

#### **AFTER (interview teacher, and if possible, some students)**

- How did the lesson go?
- Did the teacher correctly predict the performance of specific students?
- Did the adaptations (if there were any) work?
- How about the class as a whole – were the students engaged?
- Did they learn the skills and or content?
- How does the teacher know whether they got it or not?
- Were there any logistical problems?

If you taught this lesson, how would you change it? (Include as many things as you can think of. Even if the lesson was wonderful, come up with at least one modification of your own.) Remember, there is no such thing as a perfect lesson.

#### **Assignment 10: Enrichment and Extracurriculum Science Programs (Spring Semester only (40 pts)**

**Spirit of the Assignment:** Students will research, overview and discuss some of the major extracurricular activities used in Science such as Science Research Projects (Science Fair/ Pure Science), Odyssey of the Mind (Problem Solving), Science Olympiad and Invention Convention (Applied Science). Two of these models will be applied by simulating the actual process used by teachers. The process includes the following: 1) Students will be assigned teams and specific problems for Odyssey of the Mind (Long Term Problem, Spontaneous Problem and Style) and the Invention Convention. 2) Using the processes recommended and timelines (and examples reviewed) teams will follow the processes and enter their formative tasks on Google Docs (instructor will provide ongoing feedback and evaluation on Google Docs for each team; 3) Teams will present their final solution to each project and be evaluated by the rubric (see syllabus) and compared to the other teams.

#### **Assignment 11 Book Report on high interest science book (10 pts.) Spring Semester only**

**Spirit of the assignment:** read a new book in fiction or non-fiction that you would like to read for general interest, deep background or for inclusion in your own class. By reading yourself you increase the likelihood that you will include science reading as part of the curriculum for your own students. Share this electronically with your classmates.

For this assignment read, summarize, rate (1-5 with justification) and make recommendations on how you might incorporate into your teaching either directly indirectly. Share this formal review electronically with instructor and classmates as well as during the general class discussion.

#### **Assignment 12 Attendance at a formal or informal science event, presentation or site (10 pts each semester 20 pts in all) Both semesters**

**Spirit of the assignment:** by attending formal or informal outside events a science teacher is more likely to encourage their own students to seek out such events and include them as part of their curriculum. After having completed assignment # 12 write up a brief report summarizing it and how you might use it in your teaching 1) do a 1-2 minute presentation in class and 2) send an electronic copy to all via email.

#### **Assignment 13 Attendance at a field trip to the Wild Animal Park (Fall 20 pts) and Reuben Fleet Science Museum (Spring 20 pts)**

**Spirit of the assignment:** by attending this field trip students will: 1) general procedures for planning an implementing a field trip in science for all students including ELL; 2) how to access and use resources provided by a site prior to going; 3) Pre, during and post lesson plans using a) prepared curricular materials at a field site; b) teacher developed and implemented curricular plans

#### **Assignment 14 Researching a current issue or topic in science and present a mini-lecture in class on that topic (25 pts). Spring Semester only**

**Spirit of the assignment:**

A) Research a current issue or topic (outside the traditional science textbook) that could be used in a class you are scheduled to teach in CP2. The instructor will model a mini-lecture prior to student presentations and a rubric will be developed through a class discussion based on information on effective lectures from Ch. 11. During this 15- minute mini-lecture you will practice applying some of the pedagogical strategies from Chapter 11 in the course text (Using Lectures in Science). The class audience and instructor will discuss your presentation and evaluate/provide feedback using the rubric for a Science Mini-Lesson (see syllabus). 15 pts

B) **Based** on this discussion, use this mini-lecture in a revised version (based on class and instructor input) as part of one of their classes in CP 2. Videotape the presentation in CP1 (with the use of Discrepant Events), and use this as a context for review by the whole class/instructor to provide more feedback in conjunction with completing TPA 4. 10 pts

**Assignment #15 Issues in Science Student Teaching (Case Study Approach-See Addendum C): both semesters (35 pts each semester)**

**Spirit of the assignment:** Share issues/ problems/solutions to various scenarios that occur during beginning and advanced student teaching related to curriculum, teaching strategies and classroom management. The Case Study Model used will be discussed in class and used as an approach to address real solutions and subsequent outcomes from these action plans. One written Case Study will be required each semester. Includes Preliminary reports #1 (5pts), #2 (5pts.) and #3 (5pts.) and Final report (20 pts.) =35 pts

**Assignment #16 Comparing The Value of Open ended (Inductive) Lab experiences to Closed Ended (Deductive) (10 pts.)**

**Spirit of the Assignment:** Teams will be presented a problem related to the "Paper Towel Experiment" and using the Scientific Method (or 5 E Inquiry Model) design an experiment using "tools" on hand. Teams share the design, data and findings of the experiment and value (challenges) to have students use this model. Ideas for implementing and integrating inductive/inquiry learning are shared.

**Summary of Spring Semester Assignments (by number)/Requirements:** (each will count as the points noted). The final grade (see grade sheet) will be the % of total points earned that semester converted to a letter grade (90-100=A etc.)

- 1) Attendance/participation (5 pt. per class) (50 pts.)
  - 2) Science Methods Text Readings/Prompts/Discussions (6 Chapters @ 6pts each for prompt plus comments to others) (36 pts)
  - 4) Presentation on Science Internet sites (10 pts)
  - 5) Presentation on technology tools (I-Pad) (10 pts)
  - 7) Applying Action Research to a SDAIE Lab study (35 pts.)
  - 10) Enrichment/ Extracurricular Activities in Science Teaching (OM/Inv.Convention) (40 pts)
  - 11) Book Report on high interest science book (10 pts.)
  - 12) Open ended science related event both semesters (independent study) (10 pts)
  - 13) Strategies for implementing field trips at the high school level: Reuben Fleet/National History Museum (20 pts).
  - 14) Presenting a mini-lecture on a current topic in science (25 pts)
  - 15) Case Study2: Issues in student teaching CP2 =(5+5+5 +20)=(35 pts)
- Total=281

**Optional/Extra credit: (maximum 10 pts)**

- 1) Directorship (5 pts.)
- 2) Attendance at a Science Conference: SDSEA or CSTA or NSTA or other Conference (5 pts. one day)

## COURSE SCHEDULE/CALENDAR AND OUTLINE:

### Spring Semester EDSS 545 B:

**\*=Assignment/Reading due**

#### **Assignments due prior to Class #1 January 30**

- 1) After Reading Ch. 11 (Lecture) respond to this prompt and send online to EDMODO: **What are the pros and cons of using lectures (expository teaching)? Which of the ideas in this chapter will you incorporate in your 15-minute mini-lecture? What questions do you have about lectures? Send online prior to first class.**
- 2) Review syllabus for second semester prior to class with special attention to the following: 1) copy spring semester grade sheet; 2) assignments required; 3) description of each assignment. **BRING ANY QUESTIONS TO CLASS**
- 3) Select an I-Pad application (or some other science/technology tool) to demonstrate on Class #2 (see assignment #5) and science web page(s) #4

#### **#1 January 30 (Thursday) Theme: The lecture/expository teaching as a strategy in Science**

- Review syllabus for second semester prior to class with special attention to the following: 1) copy spring semester grade sheet; 2) assignments required; 3) description of each assignment. **BRING ANY QUESTIONS TO CLASS**
- Overview of a graphic organizer for semester 2
- Discussion of prompt from Ch11 (set schedule of mini-lectures)
- \*Discussion of assignment regarding ratings of technology tools (I-Pad) #5 and internet web resources #4 (see description in syllabus)
- Keating mini-lecture #1 Model lecture that integrates some of the ideas from Ch. 11 "Factors that affect the success of Navajo Students in High School Science"

#### **Next time:**

- 1) Per schedule prepare a mini lecture as part of a small unit on some current topic/issue in Science as one of your classes this semester Assignment #14
- 2) Presentation/Handout of ratings of technology tools/ (I-Pad) #5 and internet resources #4 (Demo one of the top ideas for each)
- 3) Read and address prompt for Ch. 12 Science Technology and Society (Integrating Science as a Discipline) and Ch. 15 Use of Technology in Science: **Based on the content of each of these two chapters: Discuss the range of technologies you would use or have used (or seen) in the science classroom (Elaborate and Be specific). What are some technologies that you have not used but would like to have? Send online prior to next class.**

#### **#2 February 20 (Thursday) Theme: Technology resources in Science**

- Presentation of mini lesson on current topic in science (15 minute max) (aligned with Ch. 11 Lecture Strategy) Assignment #14 (1-2 presentations)
- Discussion of Best Practices in Science Teaching from both technology tools/software and Internet Resources for:
- #4 explore in detail at least one Internet sites that is a valuable for teachers or students for information, simulation etc. List the URL and access it on Smart classroom projector and navigate the site explaining how you would use it as a resource.
- #5 explain or demonstrate one use of the I-Pad or other science technology tool, that you have used or know how to use that would be valuable for a science teacher.
- Discussion of prompt responses from Ch. 12 and Ch. 15 on technology (online)
- Keating mini-lecture #2: "Classroom Management in a Science Classroom: The Compassionate Discipline Model"

#### **Review Assignments for Next class:**

- 1) Reading prompt to respond for Ch. 8 (Teaching for Diversity): **As a result of this reading as well as others from EDSS 555: What are some specific SDAIE strategies (teacher, student and curricular) you would (or have) use to adapt learning for second language learners in your science classroom (elaborate and be specific)? Specifically which ones would you utilize for lab exercises? (Send response online prior to next class)**

- 2) Prior to class explore the following websites for Science Extracurricular Activities and be prepared to discuss them in class:
  - Odyssey of the Mind= <http://www.odysseyofthemind.com/> (note video)
  - Science Olympiad (San Diego and National Websites)= <http://www.sandiegoso.org/> and <http://www.soinc.org/>
  - FIRST (Robotics)= <http://www.usfirst.org/roboticsprograms/frc>
  - Invention Convention=<http://ge.geglobalresearch.com/inventionconvention>
- 3) Issues in Science Student teaching presentation of a **question or problem** that you will address in CP 2 (development of Case Study 2 Issue(s) (#15))

### **#3/#4 March 8 (Saturday 9-3) Themes: SDAIE instruction in Science and Extra-curriculum Strategies in Science**

- Discussion of reading response to prompt from Ch. 8 Diversity in Science Instruction (online) as lead-in to Overview of SDAIE action research project assignment (#7)(see addendum B for format and process)
- Keating mini-lecture #3: “ Successful SDAIE/ELL strategies with High School Laboratory Science” (PPT)
- Student Mini-Lectures (1-2 presentations) with critique/evaluation
- Discussion of Webpage information and overview of curricular and extracurricular science activities: FIRST, Science Olympiad, Odyssey of the Mind and Invention Convention as additional models of Inquiry based learning (some modeling and practice in implementing these)
- Assign teams for presentation of “Invention Convention” and “OM” Bridging the Gap (see Model to Solve Problems time line and Invention Convention time lines). Use Google docs to share ideas (formative tasks) with colleagues and instructor. Assignment #10 Presentations due: OM (Class #5) and Invention Convention (Class #6)
- Handout of interview questions for Science teachers (to be discussed in each of the remaining classes)
- Issues in Science Student teaching presentation of **question or problem** that will be addressed in CP 2 (development of Case Study 2 Issue(s) (#15))

#### **Review assignments for next class:**

- 1) Reading log response from Chapter 13 Laboratory and Fieldwork: **Prompt (Based on the reading): Discuss a range of ways that you have or will use both laboratory and field experiences in your science classroom? More specifically discuss specific ways that you can incorporate inquiry or open-ended elements (inductive) strategies into lab or field exercises? (Send online and comment on each prior next class)**
- 2) Read text section on Authentic/Alternative Assessments from text Ch. 4 (pp. 55-58): **Prompt: Which one of these alternative assessments have you seen or would you consider using this semester in your science teaching? Why don't you see more of this type of assessment and how might you overcome these challenges? (Send online and comment on prior to next class)**
- 3) Case Study Preliminary Presentation #2: Baseline data for proposed study and potential action plans

### **#5 March 19 (NOTE: Wednesday) Theme: Using Action Research as a Science Teacher (Case Study CP 2)**

- Mini-Lecture presentations (1)
- Presentation by Amanda Wolfe on Action Research (former CSUSM Credential and Practicing Teacher)
- OM Final Presentation (Long Term, Spontaneous and Style: *Bridging the Gap*)
- Case Study Preliminary Presentation #2 Baseline data and potential action plans Assignment (#15).
- Discussion of prompts from Ch. 13 Laboratory and Field Work (Send online and comments)
- Discussion of prompts for Ch. 4 pp. 55-58 on Authentic Assessment (Send online and comments)
- Preliminary overview of SDAIE vs. Traditional lab (show draft for both) plus your Action Research Proposal for this study.
- Interview Questions Forum

#### **Review assignments for next class**

- 1) Final report on SDAIE Lab Action Research Report (#7)
- 2) Presentation of final group solutions for the Invention Convention
- 3) Preliminary discussion #3 on issues (CP2) #15: preliminary data from action plans
- 4) Book report written and oral presentation (overview and application to teaching)

### **#6 April 10 (Thursday) Theme: Applying Enrichment and Extracurricular Programs to Science Teaching**

- **Preliminary report/discussion #3** on progress of Issues in Science Student teaching CP2 (#15): Preliminary data? Questions/concerns?
- Assignment #7 SDAIE vs. Traditional Lab (Action Research) Final Report/Presentation (See addendum B for format)
- Keating mini-lecture #4: "Teaching Science to a Heterogeneous Classroom (Differentiation in Science)"
- Mini-Lecture presentations (final 1)
- Presentation of final group solutions to Invention Convention
- Book report presentations
- Interview Questions Forum

**Review assignments due for last class (May 1):**

- Complete Independent Study/Open date assignment (#12) and send report electronically to all. Discussion on class
- Continue to gather data for Issues in Science Teaching Final report #15 (See syllabus addendum C for Case Study format) due last class or later

**#7 and #8 Open date Saturday (9-3 counts as two classes): Field Trip to a Formal Museum site (Reuben Fleet/ Natural History): Theme: Use of Community Resources in the Curriculum (Assignment #13)**

- Educational Resources at both museums (based on handouts/Webpages)
- In subject matter teams: Design a pre/ during/post lesson that includes specific logistics and assessments for one or more of the demonstrations at Reuben Fleet (final team written design made available to all via email)
- In subject matter teams: Design a pre/ during/post lesson with specific logistics and assessments for one or more of the demonstrations at the Natural History Museum (final written design made available to all via email)
- After viewing one of the available movies at the site: How would connect it to the curriculum and how would you make students accountable for the material seen in movie? (Written response made available via email)

**#9 Independent Study (see description of assignment options #12) to be completed before final class)**

**#10 May 1 (Thursday) Theme: Using the Case Study Model of Action Research to assist in Solving Problems in Science Teaching**

- **Final or Preliminary Report:** Issues in Science Student Teaching CP2.
- Independent Study presentation #12
- Interview Questions Forum
- Final evaluation of course: Review/Assessment/redesign of Graphic Organizer
- Instructor evaluations

**Addendum A-1 Grade Sheet for Fall Semester (please copy for grade folder)**

**NAME:** \_\_\_\_\_

**EDSS 545B FALL  
Semester Grade Sheet**

<u>Assignment Number/Name</u>	<u>Possible Points</u>
1. Attendance (5 pts each class) indicate nights absent by date	50 pts
2. Science text reading logs and chapter questions (6 pts each)	
▪ Indicate scores on each chapter assigned below	
Ch. 1___ 2___ 3___ 4___ 5___ 6___ 7___ 10___ 14___	54 pts
3. California Frameworks / Standards (5 pts +5 pts)	10 pts
6. Inquiry based lesson (DE)	
Presentation	25 pts
Reflection (Pre-event)	05 pts
8. Personal Outline plan for Science Safety	10 pts
9. A. Observation of Science Lesson	10 pts
9. B. MT Science Safety ideas	05 pts
12. Independent Study at formal or informal science event (Report)	10 pts
13. Attendance and report on Science Field Trip	20 pts
15. Issues in Science Teaching (Action Research/Case Study)	35 pts
16. Open Ended (inductive) vs. Closed Ended (deductive) Experiments	10 pts
<b>Total Possible</b>	<b>244 points</b>
<b>Extra Credit</b>	_____
<b>Points Earned</b>	_____
<b>Average/Grade</b>	_____

**Addendum B (Action Research Design Proposal/Final Report: Use with Assignment #7 SDAIE Lab Modifications) Similar to Case Study (with a more formal approach)**

Action Research Project Design Proposal Plan

**Purpose:**

- 1) To apply the principles of action research in a teacher directed and designed project.
- 2) To model the concept of the teacher as a researcher.

**Design Plan**

**Problem:** (specifically what question(s) are you posing)

**Information:** (what are potential sources of background information related to your question(s). This literature review of your topic can assist you in more formally organizing both your questions and as a basis for formulating your research design. Although it is not part formally a part of this assignment to include this you have done a lot of informal background reading and discussion to inform you related to this topic.

**Hypothesis:** (based on background information and what do you predict will be the answer to the question). This may be stated in the form of a null hypothesis (ex. there will be no difference between method A and B in learning science concepts) or research question format (ex. students will learn science concepts better when using method A). Remember it is not so important that the data supports or refutes the hypothesis but rather that it (data) accurately justifies your conclusions.

**Experimental Design:** This section should include an overview describing **the nature of the type of research study** i.e. quantitative, qualitative (or both) as well as the general procedures which will guide you such as: any materials, instruments and techniques utilized **to gather data**; the **subjects** which will be the focus of the study; **time frame** for conducting the study; and methods used to **analyze data**. Remember to explain how you will attempt to control the critical variable of researcher effect with **triangulation techniques** (since in many cases you will be both the teacher and the researcher).

**Data/Results:** How will the data be represented? For example, will a journal be used, data tables constructed and or graphs produced? If statistical analysis, please specify.

**Conclusions:** Is the analysis of your data support, refute (or yield inconclusive results) related to your hypothesis? What inferences could you draw from the conclusions? What additional questions and research might your results suggest? What potential implications might your findings suggest (for your classroom or for learning and teaching in general)?

## Addendum C (Case Study Preliminary and Final Reports)

### Case Study (Action Research) Considerations for Assignment #15 Issues in Student Teaching

A case study is a formal but dynamic strategy of teacher led research (action research) that uses a collaborative process to problem solve some issue in education (in this case science education). Some generalized steps should include at a minimum at least the following preliminary steps leading to a final report:

- 1) **Identify a problem** (Preliminary Report #1) what factors are inhibiting your ability to teach or the students' ability to learn. *It may take many forms such as: **infrastructure**: I room is too small to have laboratory type exercises; **management**: one of my students will not do any homework; **teaching materials**: I have no lab manuals and little materials; **teaching strategies**: I do not know how to deal academically with such a wide range of abilities in my class. ETC.*
- 2) **Brainstorm possible solutions** i.e. Action Plans (treatment) and Data Collecting methods (Preliminary Report #2) based on general knowledge from classes, readings, master teachers and prior experiences. After you have discussed the issue with your colleagues and instructor get feedback and suggestions from them. *Ex. From infrastructure problem: swap rooms with another science teacher one day a week when they are not using the lab. This should be coordinated with the principal and based on state mandated requirements for safety in science laboratories. In terms of data collecting I would: observe student behavior in lab classroom compared to the regular; use a focus group of students discuss their perspective of this new space; compare results of lab/test scores pre and post this treatment.*
- 3) **Propose an action plan with specific actions and a timeline (includes collecting baseline data)**  
*Preliminary report #2*  
Observe behavior, collect test scores etc. prior to changing rooms. For three weeks with plenty of warning to the students change rooms to use the lab. Identify additional problems this may create and propose changes. Use the baseline data to compare to data after the treatment. Note limiting and delimiting factors.
- 4) **Ongoing collection of data from observations and responses to your plan Preliminary Report #3. Not you may decide to drop or add specific action plans based on preliminary findings.**  
*Students took an extra five minutes to get to this lab so I said if they were on time this would result in a bonus of 5 pts on their lab report for at least the first three weeks. Also noted: there were less behavioral issues and more time on task. Lab scores increased 10% all compared to baseline data. Will see if it is possible to use twice a week.*
- 5) **Final Report should include discussion of 1-4 above in addition to the summary of the outcomes and implications** from the findings of the Case Study. What were the successes and the challenges to the plan? What would you do in the future (steps) to improve on it? What have you learned from the study?

*I would request an adequate lab space from the principal or whoever schedules a year prior. I would make a recommendation on which room might be a good fit for my curriculum and point out the state requirement for adequate space and safety for laboratory based science classes. I will make these recommendations supported by my final report, which included less classroom management issues, and higher achievement compared to baseline data.*

## Addendum A-2 (Spring Grade Sheet)

NAME: \_\_\_\_\_

**EDSS 545B FALL  
Semester Grade Sheet**

<u>Assignment Number/Name</u>	<u>Possible Points</u>
1. Attendance (5 pts each class) indicate nights absent by date	50 pts
2. Science text reading logs and chapter questions (6 pts each)	36 pts
Indicate scores on each chapter assigned below	
Ch. 4(Assessment) ___ 8(Diversity) ___ 11(Lectures) ___	
Ch. 12(Applying Technology) ___ 13 (Lab and Field Work) ___	
Ch. 15(Applying Technology) ___	
4. Presentation of Internet site	10 pts
5. Presentation of technology tools (IPads)	10 pts
7. Action Research Study on: Effectiveness of SDAIE vs. Traditional Lab Experiences	
Preliminary Proposals	10 pts
Final Written and oral report of findings	25 pts
10. Enrichment and Extracurricular Activities in Science Teaching (OM/INV)	
Preliminary reports (5+5 for each) x2	20 pts
Final presentations (10 pts) x2	20 pts
11. Book report on high interest science book	10 pts
12. Independent Study at formal or informal science event (Report)	10 pts
13. Attendance and report on Science Field Trip	20 pts
Reuben Fleet / Natural History	
14. Mini Lecture as introduction to science topic	25 pts
15. Issues in Science Teaching (Case Study Approach)	
Preliminary (5+5+5)	15 pts
Final	20 pts
<b>Total Possible</b>	<b>281 points</b>
<b>Extra Credit</b>	_____
<b>Points Earned</b>	_____
<b>Average/Grade</b>	_____