



EDSS 545 B (2.0 Credits)
Secondary Science Methods
CRN #48866
Course Meeting Days: Wednesdays/Thursdays/Some Saturdays
Time Frame of course: Ten class meetings
Room UH TBA
Fall 2014

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

Professor:	Joseph Keating, Ph.D.
Phone:	760-5189613 (cell)
E-Mail:	jkeating@csusm.edu
Hours:	By arrangement

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

Table of Contents

COURSE DETAILS.....	2
Course Prerequisites	2
Course Description/Goals.....	2
Course Objectives	3
Required Texts	3
Authorization to Teach English Learners	4
TEACHER CANDIDATE LEARNING OUTCOMES.....	4
Teacher Performance Expectation (TPE) Competencies	4
California Teacher Performance Assessment (CalTPA).....	4
GENERAL CONSIDERATIONS	4
Assessment of Professional Dispositions.....	4
School of Education Attendance Policy.....	5
Teacher Candidates with Disabilities Requiring Reasonable Accommodations	5
All University Writing Requirement.....	5
CSUSM Academic Honesty Policy.....	5
Plagiarism	5
Electronic Communication Protocol	6
GRADING STANDARDS /OVERVIEW OF ASSIGNMENTS	6
Point's Summary	6
Description of all Assignments (by number): both semesters included	7
Framework Summary Responses	7
COURSE SCHEDULE/CALENDAR AND OUTLINE	12

COURSE DETAILS**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 Description/Goals

Focuses on developing and understanding of theory, methodology, and assessment of Science in integrated and inclusive secondary classrooms: Part A.

KEATING: 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 (Secondary) Science credential students. Upon completion of this course, the preservice teacher will be able to formulate a basis to teach 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. This should be in evidence during Clinical Practice 1 and 2 as part of the required Teacher Performance Assessments (TPA). **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**

Course Objectives

These objectives will be measured (by utilizing rubrics) through the successful application of the concepts by completion of specific assignments (see descriptions). Prior to completing the assignments, students will be presented with opportunities to discuss effective models and examples, texts and other readings and through discussions both in-class and blogs. The expectation is that they will successfully and seamlessly be able to integrate these applications in clinical practice 1 and 2 (as measured by supervisor's observation as indicated in the teacher performance applications (TPA)).

- 1) The teacher candidate will be able to apply **the major concepts of frameworks and standards in Science Education** to their curriculum based on the California Frameworks in Science, the Next Generation Science Standards (NGSS) as well as the general recommendations for science education indicated by international studies such as Tests of International Science and Math Study (TIMSS);
- 2) The teacher candidate will be able to understand what is learned from the **general history and philosophy of science education** in the United States and how it might apply to current educational practice;
- 3) The teacher candidate will understand and be able to **integrate a variety of diverse resources** appropriate for science education including texts, lab manuals, equipment, technologies and both informal and formal community related resources;
- 4) The teacher candidate will be able to apply to the curriculum and their students the **major concepts of safe and effective science teaching and learning** to laboratory and general classroom practices;
- 5) The teacher candidate will be able to effectively **implement the major teacher strategies considered best practices in Science education** such as interactive expository teaching; inquiry-based learning; open-ended laboratory experiences; and the integration of community/field resources (internships, service-learning and school to career);
- 6) The teacher candidate will be able to appropriately integrate a range of strategies for the integration of a variety of **diverse assessments** including both formative/summative that can be authentic or traditional;
- 7) The teacher candidate will be able to apply the protocols and learning strategies required in **science inquiry-based enrichment activities** such as Science Olympiad, Odyssey of the Mind, Invention Convention, FIRST and Science Fair that extend beyond the standard curriculum;
- 8) The teacher candidate will be able to demonstrate their ability to **integrate the sciences as well as other disciplines** into the standard science curriculum (interdisciplinary curriculum);
- 9) The teacher candidate will be able to **include all students in the curriculum** by applying the major strategies for teaching multicultural, multilingual students (SDAIE/ELL);
- 10) The teacher candidate will be able to identify issues involved in the teaching and learning of science and apply **teacher-designed research designs (action research)** for the ongoing purpose of improving practice.

Required Texts

- Science Instruction in the Middle and High School* (Chiappetta and Koballa) (2014 8th Edition)
Use of Discrepant Events for K-12 Science Teachers (Aztec Press /University Bookstore),
(Keating Customized text)
California Science Safety Manual for K-12 Schools (2012)
<http://www.cde.ca.gov/pd/ca/sc/documents/scisafebk2012.pdf>
California Frameworks in Science (State Dept. of Education) (see free downloads)
<http://www.cde.ca.gov/ci/cr/cf/documents/scienceframework.pdf>
Next Generation Science Standards (NGSS) Overview and Conceptual Shifts
<http://www.nextgenscience.org/sites/ngss/files/Appendix%20A%20-%204.11.13%20Conceptual%20Shifts%20in%20the%20Next%20Generation%20Science%20Standards.pdf>
<http://www.nextgenscience.org/next-generation-science-standards>

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. Teacher 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 CANDIDATE 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 a recognition that teaching and working with learners of all ages requires not only specific content knowledge and pedagogical skills, but also 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 teacher candidates are expected to attend all classes and participate actively. At a minimum, teacher 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 teacher candidate have extenuating circumstances, s/he should contact the instructor as soon as possible. *(Adopted by the College of Education 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

Teacher 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. Teacher 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.

Teacher candidates 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 teacher 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.

Electronic Communication Protocol

Electronic correspondence is a part of your professional interactions. If you need to contact instructor or other teacher candidates, 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 with all upper case letters, major typos, or slang, often communicates more than the sender originally intended. With that said, please be mindful of all electronic 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 e-mail specifically says?
- How could this e-mail be misconstrued?
- Does this e-mail represent my highest self?
- Am I sending this e-mail to avoid a face-to-face conversation?

In addition, if there is ever a concern with an email I send to you, let's talk in person so we can correct any confusion.

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".

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) (50 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 per semester)

- 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.)= 244 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.

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. In the 10-minute presentation you must demonstrate the following: 1) Present an overview of your inquiry based mini- lesson (and how the other areas addressed in the NGSS and CA frameworks might be integrated into this lesson; 2) Present an overview of all the major standards expected to be addressed in your subject area; 3) Give a rationale for which ones might be de-emphasized or eliminated if time is a factor; 4) Address questions from other subject level teams. 5) Apply these ideas in other work in the course as well as during Clinical Practice
1/2

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 the 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)

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 at least one experimental standard. 1) Choose and write the standard(s); 2) come up with a brief description of an **inquiry based activity** that students in that subject area can do and; 3) explain how can it be assessed and 4) how can this lesson incorporate other ideas discussed from the NGSS standards (example cross discipline ideas/engineering concepts) as well as other ideas suggested in Chapters one and two 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 final lesson plan for the activity stating the standard(s) (with activities, assessment,). This lesson plan should integrate the ideas from the NGSS Standards as well as from Chapter one and two as discussed in 3b above. Compose a visual representation of it. 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 tools and apps (such as the 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

- Select a discrepant event lesson that connects to the subject matter of your CP1 experience. As a model for your lesson plan you can get one from Discrepant Events, by Keating, or go to another available resource. Be sure to include an appropriate standard (s).
- 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 of which used the original lab (control) and another which 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 (Flinn and CA)/documents (text etc.) and interview with a 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: 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.

Assignment 9A+B Observation of science lesson and teaching strategies (9A) and strategies to apply science safety within the curriculum (9B) (10 + 5 pts= 15 pts)

Spirit of the assignment: To objectively and formally observe and critically analyze a science lesson. During your observation/participation time you will find a science teacher who may or may not be your own master teacher. For 9A you will 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 some general guidelines and questions you may use for 9A below. For 9B, as part of a separate interview with the CT or other science teacher ask them the specifics of how she (he) approaches science safety. This might include: lesson plans they use to teach safety, lab safety contract, general rules used, and any general experiences in dealing with science safety. Incorporate the ideas you think are valuable to your own science safety practices as part of assignment #8 (see above).

Some suggestions/ guidelines for completing 9 A (10 pts):

GENERAL INFORMATION: grade level, subject area, description of the activity/standards applied.

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 in consideration of this

DURING (Observation)

- Is there a written or unwritten plan for this lesson?
- Does it include some elements of inquiry (in the discourse, in the activity, in the assessments)
- 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 (your analysis, interview with teacher, and if possible, some students)

- How successful (unsuccessful) was the lesson?
- 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 did you know?
- 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.

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 Independent Study: 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 create assignments that 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 of the site in a variety of ways prior to the field trip; 3) Pre, during and post lesson plans that apply the science standards by using a) site prepared and modified curricular materials; b) original 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 classes you are scheduled to teach in CP2. The instructor will model an inquiry-based mini-lecture. A rubric will be developed through a class discussion based on information on effective lectures from Ch. 11 and used to evaluate student mini-lecture. During this 15- minute mini-lecture you model/integrate some of the effective pedagogical strategies discussed in class (and from Chapter 11 in the course text (Using Lectures in Science). The class audience and instructor will evaluate/provide feedback using the rubric for a Science Mini-Lesson. (20 pts)

B) **Based** on this discussion, use your modified mini-lecture in a revised version as part of one of your lessons in CP 2. This can assist you in the development of a videotape lesson as part of TPA 4. (5 pts)

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

Spirit of the assignment: Learn to apply a teacher-directed research model during CP 1 and 2 (Case Study/Action Research) in a collaborative setting that 1) addresses teaching issues/ problems (baseline data); 2) create potential solutions (action plans) to the address the issue (related to content, curriculum, teaching strategy and (or) classroom management); 3) collect multiple sources of data to evaluate/analyze results; 4) report findings and suggestions/recommendations. Preliminary reports will track progress of study in collaboration with the class members #1 (Statement of issue(s)(5pts), #2 (Baseline data and action plans)(5pts.) and #3 (Preliminary Data) (5pts.). One final written and oral Case Study report will be presented at the end of each semester.(20 pts.) =35 pts. total

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

Spirit of the Assignment: Teams will be presented a problem called 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) of having students use this model. Ideas for implementing and integrating inductive/inquiry learning are shared.

COURSE SCHEDULE/CALENDAR AND OUTLINE

Fall Semester EDSS 545 A:

*=Assignment/Reading due

Note: Prior to First Class

1) Read Ch. 1 and 2 of "Science Instruction..." (Prepare an outline of the key ideas with your reflections for each Chapter and scan questions at the end of each chapter and write a response for one that you believe is valuable to discuss);

2) Read in the California State Science Frameworks: Ch. 1 (Introduction to Science Framework and Ch. 2 (The Nature of Science and Science Teaching) =

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

What are key ideas (bullet)? What questions do you have? Limit to approximately one page for each

3) Be able to respond to these questions: How would you define Science? How should it be taught in high school? What do you think is important for you to learn this year?

#1 September 18 (Thursday 7:00-9:00 UH 237)

- Class introductions
- *Read syllabus prior to class with special attention to the following: 1) copy fall semester grade sheet; 2) assignments required; 3) description of each assignment. BRING ANY QUESTIONS TO CLASS
- * **Discussion of /Reading Logs and Questions from Text Ch. 1-2**
- *Prior to class be prepared to respond to these questions: **How would you define Science? How should it be taught in high school? What do you think is important for you to learn this year?**
- **Discussion of Graphic Organizer for EDSS 545 (in class)**
- In Class: Introduction to inquiry based science through the discrepant event (DE) model with in class presentation "Bouncing Balls" (What are the basic pedagogical elements of an effective DE?)
- **Discussion of Readings from Ch. 1 and Ch. 2 of the CA Science Frameworks and overview of Assignment #3 A/B/C.**
- Discussion of MT observation assignment #9A (What was effective? What was ineffective? Recommendations for change?)

Review Assignments for Next time: (to be discussed in class)

- 1) Format procedure for Reading Logs for text reading assignments
- 2) Sign up for dates for DE (2-3 presentations) Assignment # 6;
- 3) Science Frameworks jigsaw by subject areas assignment #3a-c;
- 4) Assigned reading logs and selected question from Ch. 3 and 4

#2-#3 September 20 (Saturday 9-300 TBA)

- ***Science Frameworks and Standards Jigsaw Assignment* #3 a-c**
- ***Discrepant Events (two-three) #6 a-b**
- * **Discussion of /Reading Logs and Questions from Text Ch. 3-4**
- ***The use of Inquiry Based/Open ended/Inductive vs. Closed ended/deductive science lab experiments "Paper Towel Experiment" (in class) Assignment #16**
- **Introduction to the Compassionate Discipline Model (Keating Mini-Lecture)**

Review Assignments for Next time:

- 1) Read and prepare reading logs and selected question for Ch. 5 and Ch. 6;
- 2) Discrepant Event (2 presentations)
- 3) Formal Observation of MT (#9A) (What was effective? What was ineffective? Recommendations for change?)
- 4) Selection of a major problem or issue in Clinical Practice for Case Study 1 (this is preliminary report #1) for Assignment #15 (also see Addendum C in Syllabus for Case Study Model)

#4 September 24 (Wednesday) 5:00-8:00 in UH TBA)

- ***Discrepant event presentations (one-two)* #6 a-b**
- ***Discussion of Reading logs, questions for (Ch. 5 and Ch. 6)* #2**
- **Discussion of MT Observation #9A** (What was effective? What was ineffective? Recommendations for change?)
- **Discussion of major problem or issue in Student Teaching for Case Study 1 (this is preliminary report #1) See Case Study format model in Addendum C**

Review Assignments for Next time:

- 1) Reading logs and selected question for Ch7 and CH. 10;
- 2) Case Study 1 (preliminary report #2)
- 3) Discrepant Event (1-2 presentations)

#5 Oct 9 (Thursday 500-730 UH TBA) Video Conference

- * **Discrepant Events (two presentations) #6 a-b**
- *** Discussion of /Reading logs and Prompts in Text** (Chap 7 and 10 due)*
- Identify action plans and baseline data for identified issue(s) for Case Study 1 “Issues in Student Teaching” Preliminary Report #2

Review Assignments for Next time:

- 1) Discrepant Events (2 presentations)
- 2) Identify action plans and baseline data for identified issue(s) for Case Study 1 Issues in Student Teaching Preliminary Report #3

#6 Independent Study: No formal meeting Sometime between September and Class # 10

Assignment #12: attend a science related informal or formal event or presentation equivalent in time and effort to one class session (3 hrs). This could be a field trip, museum, lecture, conference or some other equivalent experience that will assist you either directly or indirectly in becoming a science teacher. Your choice!! To complete this requirement: 1) complete a one-page summary with potential applications to teaching; 2) send by email to all of us; 3) do a 1-2 minute presentation to the class during class . The report and oral presentation should include a summary of what you learned and implications for your own teaching.

#7 A October 30 (Thursday 5:00-630 via Video Conference

- ***Discrepant event presentations (1-2)**
- Discuss your implemented action plan and any preliminary data from Case Study Model for Assignment #15 (also see Addendum C in Syllabus for Case Study Model Final Report). This is preliminary report #3

Review Assignments for Next time: Go over assignments for next classes:

- Prepare a brief written report/outline on your proposed Personal Plan for Science Safety (Assignment #8 based on Chapter 14 (text)+ MT interview+ CA Science Safety Manual+ Flinn Scientific Safety Manual (online)
- Report on Independent Study project (Assignment #12) or due before Class #10

#7 B November 20 (Thursday 5:00-630 Video Conference)

- Presentation/Discussion of Personal Plan for Science Safety assignment #8: Flinn safety manual + MT interview+ Ch. 14 Science Safety
- Report on Independent Study project if complete (or by Class #10 (Assignment #12)
- ***Discrepant event presentations (1-2)**

Review Assignments for Next time: Go over assignments for next classes:

- 1) Safari Park Field Trip #13; Class #8-#9 (December TBA)” How to use community resources aka conduct a Field Trip”
- 2) Final Case Study Reports/Presentation (by arrangement) December (TBA)

#8-9 December (TBA) (Saturday 9-3 at Wild Animal Park) Assignment #13 How to conduct a Field Trip

- Issues in organizing a field trip
- Resources available at park for school sites
- Independent study of Safari Park Lessons/Tours/Shows
- Strategies for doing animal observation studies

Review Assignments for Next time:

Final Case Study Reports #15

10 December (TBA)

- **Issues in student teacher: *Case study report outcomes/discussion of #15 (Addendum C model)**
- Report on Independent Study project
- Instructor Evaluations

Review Assignments for Next Time: Discuss_Second semester schedule

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

**EDSS 545 A Fall
Semester Grade
Sheet**

Name

Assignment Number/Name

#1 Attendance (5pts each class) indicate nights absent by date (50 pts possible)

#2 Science text reading logs and chapter questions (6pts each) indicate scores on each chapter assigned below)

Ch. 1_2_3_4_5_6_7_10_14_
(54pts)

#3 California Frameworks/Standards (5 pts + 5pts) =10 pts
Individual reports (including mini-
lesson plan)
Group Presentation

#6 Inquiry based lesson (DE) 30 pts Presentation= 25 pts

Reflection (pre-event) 5 pts

#8 Personal Outline plan for Science Safety (10pts)

#9A/B Observation of Science Lesson/MT Science Safety ideas (10pts + 5 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 (10pts)

Total Possible=
244pts
Extra Credit
Points Earned=
Average/Grade=

Addendum B (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.

