California State University
SAN MARCOS

SCHOOL OF EDUCATION

Engaging diverse communities through leading and learning for social justice.

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Course Number	EDMS 545
Course Title	Elementary Science Methods
CRN Number	20860
Days	Mondays
Time	8:15-2:45
Course Location	Farr Elementary School, EUSD
Semester / Year	Spring 2016
Instructor	Christina Cambra-Adamson
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Hours	By Appointment

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 Description

Focuses on developing an understanding of theory, methodology, and assessment of second language acquisition in integrated and inclusive elementary classrooms. *Requires participation in the public schools.*

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

Course Prerequisites

Admission to the Multiple Subject Credential Program

Course Objectives

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

Credit Hour Policy Statement

This course is delivered in a face-to-face instruction model. Students are expected to spend a minimum of two hours outside of the classroom each week for each unit of credit engaged in learning. For courses with a "lecture" mode of instruction over an entire semester, each unit of credit corresponds to an 'hour' of class-time and two hours of student learning outside of class.

REQUIRED TEXTS, MATERIALS AND ACCOUNTS

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

- *Next Generation Science Standards* (Achieve, 2013). Available from: http://www.nextgenscience.org/

- *Next Generation Science Standards for California Public Schools, K-12*
  http://www.cde.ca.gov/pd/ca/sc/ngssstandards.asp

- *Health Education Content Standards for California Public Schools K-12.* (2008).Sacramento: California Dept. of Education. Available from: http://www.cde.ca.gov/be/st/ss/documents/healthstandmar08.pdf

Course Material Available

Cougar Courses

All course articles and videos will available on the Cougar Course

TaskStream Account

You will need to set one up.

COURSE LEARNING OUTCOMES

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

TPE Primary Emphases in EDMS 545:

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

- TPE 5-Student Engagement

TPE Secondary Emphases in EDMS 545:
- TPE 4-Making Content Accessible

- TPE 7-Teaching English Learners

- TPE 9-Instructional Planning

- TPE 14-Educational Technology in Teaching and Learning

Authorization to Teach English Learners

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

Teacher Performance Assessment

Beginning July 1, 2008 all California credential candidates must successfully complete a state-approved Teacher Performance Assessment (TPA), as part of the credential program of preparation. During the 2015-16 academic year the CSUSM credential programs will use either the CalTPA (California Teacher Performance Assessment) or the edTPA (Educative Teacher Performance Assessment).

Check with your program coordinator to determine which assessment is used for your credential program.

CalTPA

To assist with your successful completion of the CalTPA, 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. The CalTPA Candidate Handbook, TPA seminar schedule, and other TPA support materials may be found on the SOE website: http://www.csusm.edu/education/CalTPA/ProgramMaterialsTPA.html

edTPA

Beginning in fall 2015, for newly entering initial candidates, the CSUSM assessment system is the edTPA. To assist with your successful completion of the edTPA, a capstone class is part of your curriculum. In this class edTPA related questions and logistical concerns are addressed. Additional support materials are available on the edTPA website: http://www.edtpa.com/PageView.aspx?f=GEN_Candidates.html

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

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.

GENERAL CONSIDERATIONS

School of Education Attendance Policy

Due to the dynamic and interactive nature of courses in the School of Education, all candidates (course participants) are expected to attend all classes and participate actively. At a minimum, candidates (course participants) 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 (course participants) have extenuating circumstances, s/he should contact the instructor as soon as possible. *(Adopted by the COE Governance Community, December, 1997).*

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 assignments must be original work, clear and error-free. All ideas/material 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 accordingly.

Academic Honesty and Integrity: Students are responsible for honest completion and representation of their work. Your course catalog details the ethical standards and penalties for infractions. There will be zero 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.
Refer to the full Academic Honesty Policy at:
http://www.csusm.edu/policies/active/documents/Academic_Honesty_Policy.html

Plagiarism

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

Students with Disabilities Requiring Reasonable Accommodations

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

All University Writing Requirement

In keeping with the All-University Writing Requirement, all courses must have a writing component of at least 2,500 words (approximately 10 pages), which will be administered in a variety of ways in this course including lesson plans, assessment assignments, course text reading responses and concept maps, reflections on authentic teaching experiences with elementary children, and forum discussions.

Course Format

This course is offered in a traditional face to face format over an eight week cycle.

Use of Technology

Candidates (Course participants) 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 e-mail and on-line discussions are a very specific form of communication, with their own nuances and etiquette. For instance, electronic messages sent in all upper case (or lower case) letters, major typos, or slang, often communicate more than the sender originally intended. With that said, please be mindful of all e-mail and on-line discussion messages you send to your colleagues, to faculty members in the 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 AND GRADED COURSE COMPONENTS

The following assignments contribute to the final, overall course grade. A weighted percentage (percentage scale) is given for each assignment. Each written assignment is expected to have a clear organizational presentation and be free of grammar, punctuation and spelling errors. There will be a reduction in points for the above mentioned errors. Late assignments are not accepted. Prepare carefully for class, and be ready to discuss readings and assignments thoughtfully. Note Grading Standards and the Description of Exemplary Students on pages 15-16 of this syllabus.

1. Active Participation and Collaboration (all or nothing credit given)   40 points

2. Discrepant Event Lesson Plan, Presentation, Videotape – (In groups)   20 points

3. Invention Convention Assignment (In groups)   20 points

4. Science/STEM Lesson sequence   20 points

Descriptions of Assignments
1. **Active participation and Collaboration 40 points**
   Teacher education is a professional preparation program and students will be expected to adhere to standards of dependability, professionalism, and academic honesty (refer to rubric attached to this syllabus).
Grading will include a component of "professional demeanor." Students will conduct themselves in ways that are generally expected of those who are entering the education profession, including the following:
- On-time arrival to all class sessions and attendance for the entire class period
- Advance preparation of readings and timely submission of assignments
- A **POSITIVE** attitude at **ALL** times
- Active participation in all class discussions and activities
- Respectful interactions and courteous language with the instructor and other students in all settings
- Carefully considered, culturally aware approaches to solution-finding

Class Discussions and Participation: Students will engage in active learning each class session, and will be expected to actively participate. You may lose points for lack of participation based on the following criteria:
- Do you participate in class discussions productively, sharing your knowledge and understandings?
- Do you interact productively with your peers, taking on a variety of roles (leader, follower, etc.)?
- Do you contribute appropriately to group work—do you "do your share"?

- Are you able to accept others' opinions?
- Are you supportive of others' ideas?
- Do you support your peers during their presentations?
- Can you monitor and adjust your participation to allow for others' ideas as well as your own to be heard?

2. <u>Discrepant Event Lesson Elements and Description – 20 points Due: 3/14</u>

An attention getting, thought-provoking approach to initiate inquiry in science is through the use of **Discrepant Events (DE)**. Discrepant Events are phenomena that seem to run contrary to what we normally expect. The outcomes or results are very different from what we might think would happen or should be happening. A discrepant event puzzles the observer and leaves him/her at a loss to explain what has taken place, causing him or her to wonder why the event occurs as it did. Situations that are contrary to what a person expects cause him or her to wonder what is taking place, resulting in cognitive disequilibrium. Like a hard-boiled egg that can squeeze inside a narrow neck bottle, or observing water flowing upwards, these occurrences tend to move students from a state of cognitive equilibrium to a state of cognitive dissonance or disequilibrium.

In this assignment, you and your team will plan, implement, and videotape a discrepant event to first practice with and videotape a student or small group of students of your choice and then present the activity to your cohort peers. **The complete and detailed guidelines for this assignment are located in Cougar Courses**

On the day of your DE presentation, please <u>begin the lesson by turning in 1 hard copy of your completed</u> Discrepant Event Graphic Organizer/ Matrix <u>and data sheets (if applicable)</u> <u>to me</u>.

Note: <u>The Discrepant Event Lesson Template/Organizer and Presentation/Lesson Rubric are located on the Moodle course</u>.

You must also include at the end of and attached to your DE template/organizer:
 a. **Science Content Background:** 1 page (1.5 line spacing) summary of the **science content background** that **teachers** need to know to effectively teach the lesson (goes beyond lesson content knowledge a teacher needs to know).

 b. **References:** Title, author, publisher, year of <u>all</u> resources consulted for lesson plan concepts, ideas, and activities.
 c. After you have done your discrepant event with a student or students <u>AND videotaped the event</u>,
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 our class.
- Write a description of what happened, with special attention to what the child/children said and did. Analyze the child's/children's response: what portions of the event, and to what extent, did the child/children understand what was happening? Why or why not?
- **Be very specific and clear about what the child(ren) <u>did, said, and how he/she/they responded to the DE activity. The reflection should be thorough, thoughtfully written, and detailed to receive full credit.</u>**
- **Note: <u>Do not turn in a DE Reflection if you did not videotape the DE teaching event.</u> The video substantiates that you did, in fact, teach your team DE to a student or students**

3. <u>Invention Convention – 20 points Due:3/7</u>
Invention is a creative outgrowth of process science. Fostering the development of important science skills is an ongoing challenge. Students should be given opportunities to solve problems, think, creatively, experiment, and work with data throughout the school year. The Invention Convention is an event that gives students an opportunity to demonstrate these skills independently as they invent a new product or process. The Invention Convention can be a classroom, school, or district-wide science event. This science event is designed to encourage students to apply basic science skills in a creative and productive manner. Participants are encouraged to identify a need or to solve a problem by following the same steps and procedures that an inventor would follow in patenting an invention. Once a need or a problem has been

identified, students are directed to use problem-solving and creative-thinking skills to invent a product or process that would fill the need or overcome the problem. Communication and research skills are also greatly enhanced throughout the invention procedure.

In this assignment, you and a group of peers will collaboratively engage in the invention process to learn how to guide your own students' inventive skills. **Please access the complete assignment guidelines on the Moodle course site**.

   3.   <u>**Science Lesson unit/sequence 20 points Due: 2/29**</u>

Students will create a lesson sequence (at least 3 lessons) based on the grade level they are placed in for Clinical Practice 2. Students will utilize the NGSS standards being sure they have incorporated all three dimensions throughout their sequence. The plan will incorporate a real world problem. The activities need to be hands on and inquiry based. Each part of the sequence will state the standards being addressed.

<u>Final Exam Statement</u>

There is no final exam but rather integrated projects.

<u>Grading Standards</u>

All students are expected to participate in class activities and demonstrate reflective learning. It is important that students are well prepared for course sessions by completing the readings and assignments scheduled before the class meeting. Assignments should be typed and double-spaced. Students who wish to revise an assignment must negotiate the requirements of the revision with the instructor. It is expected that work will be turned in on time. Please discuss individual issues with the instructor. **Points will be deducted if assignments are submitted late (10% penalty per day late; no credit will be awarded if the assignment is one week late).** A minimum of a C+ is required to pass this course.

95 – 100	A	90 – 94	A-
87 - 89	B+	83 – 86	B
80 – 82	B-	77 – 79	C+ (minimal passing grade)
73 – 76	C	70 – 72	C-

<u>Policy on Late/Missed Work</u>

Should work be turned in late a student receives a 10% deduction for one week late. Any work turned in later than one week receives a 50% deduction.

SCHEDULE/COURSE OUTLINE

Date	Topic	Assignment (if any)
Session 1 1/25/16	The Nature of Science NGSS Standards exploration Presentation sign ups Assignment Explanations and placement	Purchase texts **Homework** Teaching Science to children Chapters 1 & 2, 4 & 5
Session 2 2/1/16	NGSS Inquiry **Lesson Planning in Science Inquiry:** 1. **Discrepant Events:** Why teach science this • way? 2. **The Learning Cycle:** Using the 5-E model Writing **Essential Questions** Writing **Learning Objectives** to support assessment in science	**Homework** Teaching Science to children 6 & 7, 8 & 9
Session 3 2/8/16	STEM Assessment Differentiation Project work time	**Homework** Teaching Science to children 10-12
Session 4 2/15/16	Science Notebook and Talk Moves Integrating writing into science activities Instructor-led science inquiry lesson Informal Science Institutions (ISIs): http://caise.insci.org/ http://www.crystalcovestatepark.com/ http://www.westerncentermuseum.org/ **Examining learning cycle** Project work time	**Homework** Teaching Science to children Chapters 13 & 14 Discrepant Event presentations
Session 5 2/22/16	Design thinking and PBL Design Process Engineering lesson Simple machine building Project work time	**Homework** Teaching Science to children Chapters 3 & 15 Discrepant Event presentations
Session 6 2/29/16	Technology and Computer Science Unplugged and plugged coding activity Science resources APPS Web sites Project work time	**Homework** Teaching Science to children Chapters 16 & 17 **DUE: Science Sequence/unit** Discrepant Event presentations

Date	Topic	Assignment (if any)
Session 7 3/7/16	Maker Spaces Managing maker spaces Genuis Hour Science scheduling in the classroom Project work time	**Homework** Teaching Science to children Chapters 18 & 19 Discrepant Event presentations **DUE: Invention Convention**
Session 8 3/14/16	Wrapping it up	Invention Convention Fair **DUE: Discrepant Event**