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Course Title	Elementary Science Methods
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Time	4-6:50
Course Location	Virtual
Semester / Year	Spring 2021
Instructor	Sean Nank, PhD
Phone	760-458-3178
E-Mail	snank@cougars.csusm.edu; snank@csusm.edu
Office	It's COVID – our homes are our offices!!!!
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

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COURSE DESCRIPTION

Focuses on inquiry teaching to include: the Learning Cycle model, science process skills, science themes, scientific attitudes and habits of mind, and methods to involve all children in hands-on lessons. Emphasis is placed on instructional strategies, authentic assessments, exemplary science kits and curricula, as well as on the use of technology in science teaching. Methods of cross-cultural language and academic development are integrated into the course. Requires participation in the public schools.

<http://www.csusm.edu/catalog/documents/2016-2018/CSUSM-2016-2018-Catalog.pdf>

Course Prerequisites

Admission to the Multiple Subject Credential Program

Course Objectives

The course objectives are fourfold:

- To develop an understanding of theory, methodology, and assessment of science in integrated and inclusive elementary classrooms and align this understanding with the Next Generation Science Standards for California Public Schools
- To provide a comprehensive overview of the objectives, skills, concepts, experiments, materials, methods, technology, and dispositions necessary to teach science to elementary school children
- To focus on instructional methods, techniques, lesson planning, curriculum development, organization and assessment in science.
- To learn to teach science through a student-centered, inquiry-based approach to learning with attention to meeting the academic needs of all students.

Unique Course Requirements

Access to elementary students for science teaching practice and for observations

Credit Hour Policy Statement

In all credential course work, it is expected that for every one hour of contact time, you will complete approximately two to three hours of work outside of class.

REQUIRED TEXTS, MATERIALS AND ACCOUNTS

Bold texts you will need to purchase – all other texts are free online.

A Framework for K-12 Science Education: Practices, Cross-Cutting Concepts, and Core Ideas. Available at:
<http://www.nextgenscience.org/framework-k%E2%80%9312-science-education>

California Department of Education. (2016) California Framework for Science. Retrieved from
<https://www.cde.ca.gov/ci/sc/cf/cascienceframework2016.asp>

Dept. of Education. Available at: <http://www.cde.ca.gov/be/st/ss/documents/healthstandmar08.pdf>

Friedl, A.E. & Koontz, T.Y. (2005). *Teaching Science to Children: An Inquiry Approach*, 6th Ed. NY: McGraw Hill. ISBN: 0-07-256395-8
*****Do NOT buy this book new!!!! Go to Amazon and you can get it used for 15-30 dollars, do not pay 150 bucks for this book.**

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

Health Education Content Standards for California Public Schools K-12. (2008). Sacramento: California

Next Generation Science Standards (Achieve, 2013). Available at: <http://www.nextgenscience.org/>

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

Recommended Texts Selections may be included in electronic readings.

Lave, J., & Wenger, E. (1991). *Situated Learning: Legitimate peripheral participation*. New York, NY: Cambridge University Press.

Nank, S. D. (Interviewee), Paula Phillips (Interviewer). (2018) The beauty of math. Retrieved from:
<https://www.voiceamerica.com/episode/104795/the-beauty-of-math>

Nank, S. D. (Interviewee), Vicki Davis (Interviewer). (2018). iPad for masterful math: Randomizing formative math assessment. Episode 228. Retrieved from:
<http://www.coolcatteacher.com/ipads-masterful-math-randomizing-formative-math-assessment/>

Nank, S. D. (2017). Seven steps for adapting technology to the classroom. Southeast Education Network (SEEN) (19, 1). Retrieved from:
<http://www.seenmagazine.us/Articles/Article-Detail/ArticleId/6500/Seven-Steps-for-Adapting-Technology-to-the-Classroom>

Nank, S. D. (Interviewee), Goode, R. W. (Author). (2017). You need math awareness – here's why: Collaboration, Decomposing numbers, and pattern recognition are key to developing numeracy skills. Black Enterprise. Retrieved from:
<http://www.blackenterprise.com/education/you-need-math-awareness-heres-why/>

Nank, S. D. (2017). Balancing math education: Interview with Sean Nank, PhD. Kindergarten Kiosk. Retrieved from:
<https://www.kindergartenkiosk.com/podcast/4/27/balancing-math-education-interview-with-sean-nank-phd>

Nank, S. D. (Interviewee), Will, M. (Author). (2017). Math 'makes the world more beautiful': A professor's advice on teaching math. Education Week. Retrieved from:
http://blogs.edweek.org/teachers/teaching_now/2017/04/math_teacher_qa.html?cmp=soc-edit-tw

Nank, S. D. (Interviewee), Schaffhauser, D. (Author). (2017). What's out in 2017: 5 ed tech trends on the way out in 2017. THE Journal: Transforming Education Through Technology (44, 2). pp. 14 – 17. Retrieved from:
https://digital.1105media.com/THEJournal/2017/THE_1703/TJ_1703Q1.html#p=1

Nank, S. D. (Interviewee), Harrington, T. (Author) (2017). Q&A: Tips and insights from a common core math expert. EdSource. Retrieved from:
<https://edsources.org/2017/qa-tips-and-insights-from-a-common-core-math-expert/577388>

Nank, S. D. (Interviewee), Schaffhauser, D. (Author). (2017). What's hot: 9 major ed tech trends for 2017. THE Journal: Transforming Education Through Technology. Retrieved from:

Nank, S. D. (2011). The making of a presidential mathematics and science educator. Volume 1. Chicago, IL: Discovery Association Publishing House.

Nank, S. D. (2011). *Testing over teaching: Mathematics education in the 21st century*. Chicago, IL: Discovery Association Publishing House.

Wong, Harry K, The First Days of School, ISBN 978-0-9764233-1-7, 4th ed; hard copy or e-book; Effective Teaching.com

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

Journals

Science	Science Scope	Physics Teacher
Science and Children	The Science Teacher	Journal of Chemical Education
Science Education	American Biology Teacher	Innovations in Science & Technology Education
Science News	School Science and Mathematics	Journal of Research in Science Teaching

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*)

Course Material Available

Cougar Courses (CC)

Your assignments, syllabus, supplemental materials, current grades, and folders for turning in assignments are all accessible via your Cougar Courses portal. There will also be videos and links to supplement your activities during the course.

CREENTIAL PROGRAM STUDENT LEARNING OUTCOMES (PSLO)

Teacher Candidates will be required to complete a Teaching Performance Assessment, show proof of Teacher Performance Expectations and complete critical assessment tasks- specific assignments for this course. It is the teacher candidates responsibility to understand expectations and complete assignments by stated due dates.

Teacher Performance Expectation (TPE) Competencies

The course objectives, assignments, and assessments have been aligned with the CTC standards for the Multiple Subject Credential. This course is designed to help teachers seeking a California teaching credential to develop the skills, knowledge, and attitudes necessary to assist schools and 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:

TPE1. Engaging and Supporting All Students in Learning. Beginning teachers:

- 1.3 Connect subject matter to real-life contexts and provide active learning experiences to engage student interest, support student motivation, and allow students to extend their learning.
- 1.5 Promote students' critical and creative thinking and analysis through activities that provide opportunities for inquiry, problem solving, responding to and framing meaningful questions, and reflection.
- 1.6 Provide a supportive learning environment for students' first and/or second language acquisition by using research-based instructional approaches, including focused English Language Development, Specially Designed Academic Instruction in English (SDAIE), scaffolding across content areas, and structured

English immersion, and demonstrate an understanding of the difference among students whose only instructional need is to acquire Standard English proficiency, students who may have an identified disability affecting their ability to acquire Standard English proficiency, and students who may have both a need to acquire Standard English proficiency and an identified disability.

1.8 Monitor student learning and adjust instruction while teaching so that students continue to be actively engaged in learning

TPE 2: Creating and Maintaining Effective Environments for Student Learning. Beginning teachers:

2.5 Maintain high expectations for learning with appropriate support for the full range of students in the classroom.

2.6 Establish and maintain clear expectations for positive classroom behavior and for student-to-student and student-to-teacher interactions by communicating classroom behavior and for student-to-student and student-to-teacher interactions by communicating classroom routines, procedures, and norms to students and families.

TPE 3: Understanding and Organizing Subject Matter for Student Learning. Beginning teachers:

3.1 Demonstrate knowledge of subject matter, including the adopted California State Standards and curriculum frameworks.

3.2 Use knowledge about students and learning goals to organize the curriculum to facilitate student understanding of subject matter, and make accommodations and/or modifications as needed to promote student access to the curriculum

3.3 Plan, design, implement, and monitor instruction consistent with current subject-specific pedagogy in the content area(s) of instruction, and design and implement disciplinary and cross-disciplinary learning sequences, including integrating the visual and performing arts as applicable to the discipline. (See Subject- Specific Pedagogical Skills in Section 2 for reference)

3.4 Individually and through consultation and collaboration with other educators and members of the larger school community, plan for effective subject matter instruction and use multiple means of representing, expressing, and engaging students to demonstrate their knowledge.

3.5 Adapt subject matter curriculum, organization, and planning to support the acquisition and use of academic language within learning activities to promote the subject matter knowledge of all students, including the full range of English learners, Standard English learners, students with disabilities, and students with other learning needs in the least restrictive environment.

3.6 Use and adapt resources, standards-aligned instructional materials, and a range of technology, including assistive technology, to facilitate students' equitable access to the curriculum.

3.7 Model and develop digital literacy by using technology to engage students and support their learning, and promote digital citizenship, including respecting copyright law, understanding fair use guidelines and the use of Creative Commons license, and maintaining Internet Security

3.8 Demonstrate knowledge of effective teaching strategies aligned with the internationally recognized educational technology standards.

TPE 4: Planning Instruction and Designing Learning Experiences for All Students. Beginning teachers:

4.1 Locate and apply information about students' current academic status, content- and standards-related learning needs and goals, assessment data, language proficiency status, and cultural background for both short-term and long-term instructional planning purposes.

4.3 Design and implement instruction and assessment that reflects the interconnectedness of academic content areas and related student skills development in literacy, mathematics, science, and other disciplines across the curriculum, as applicable to the subject area of instruction.

4.4 Plan, design, implement and monitor instruction, making effective use of instructional time to maximize learning opportunities and provide access to the curriculum for all students by removing barriers and providing access through instructional strategies that include:

- appropriate use of instructional technology, including assistive technology;
- applying principles of UDL and MTSS;
- use of developmentally, linguistically, and culturally appropriate learning activities, instructional materials, and resources for all students, including the full range of English learners;
- * appropriate modifications for students with disabilities in the general education classroom;
- opportunities for students to support each other in learning; and

- use of community resources and services as applicable
- 4.5 Promote student success by providing opportunities for students to understand and advocate for strategies that meet their individual learning needs and assist students with specific learning needs to successfully participate in transition plans (e.g., IEP, IFSP, ITP, and 504 plans.)
 - 4.6 Access resources for planning and instruction, including the expertise of community and school colleagues through in-person or virtual collaboration, co-teaching, coaching, and/or networking.
 - 4.8 Use digital tools and learning technologies across learning environments as appropriate to create new content and provide personalized and integrated technology-rich lessons to engage students in learning, promote digital literacy, and offer students multiple means to Preliminary Multiple and Single Subject Credential Program Standards – Adopted December 2015 11 Teaching Performance Expectations (TPEs) – Adopted June 2016 demonstrate their learning.

TPE 5: Assessing Student Learning. Beginning teachers:

- 5.1 Apply knowledge of the purposes, characteristics, and appropriate uses of different types of assessments (e.g., diagnostic, informal, formal, progress-monitoring, formative, summative, and performance) to design and administer classroom assessments, including use of scoring rubrics.
- 5.2 Collect and analyze assessment data from multiple measures and sources to plan and modify instruction and document students' learning over time.
- 5.3 Involve all students in self-assessment and reflection on their learning goals and progress and provide students with opportunities to revise or reframe their work based on assessment feedback.
- 5.5 Use assessment information in a timely manner to assist students and families in understanding student progress in meeting learning goals.

TPE 6: Developing as a Professional Educator. Beginning teachers:

- 6.1 Reflect on their own teaching practice and level of subject matter and pedagogical knowledge to plan and implement instruction that can improve student learning.
- 6.2 Recognize their own values and implicit and explicit biases, the ways in which these values and implicit and explicit biases may positively and negatively affect teaching and learning, and work to mitigate any negative impact on the teaching and learning of students. They exhibit positive dispositions of caring, support, acceptance, and fairness toward all students and families, as well as toward their colleagues.
- 6.3 Establish professional learning goals and make progress to improve their practice by routinely engaging in communication and inquiry with colleagues.
- 6.5 Demonstrate professional responsibility for all aspects of student learning and classroom management, including responsibility for the learning outcomes of all students, along with appropriate concerns and policies regarding the privacy, health, and safety of students and families. Beginning teachers conduct themselves with integrity and model ethical conduct for themselves and others.

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 2018-19 academic year the CSUSM credential programs will use the CalTPA (California Teacher Performance Assessment)

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 this website: <http://www.ctcpa.nesinc.com/Home.aspx>

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

Expected Dispositions for the Education Profession

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

The assessment is designed to provide candidates with ongoing feedback for their growth in professional dispositions and includes a self-assessment by the candidate. The dispositions and rubric are presented, explained and assessed in one or more designated courses in each program as well as in clinical practice. Based 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.

GRADING STANDARDS

Grades will be based on the following grading scale:

A	.....	90	–	100
B	.....	80	–	89
C	.....	70	–	79
D	.....	60	–	69
F	.....	Below 60		

FINAL EXAM STATEMENT

There is no final exam for this course.

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*).

Course-Specific Attendance and Participation Policy:

This course approaches content in a variety of ways. Structured interactions, group processes, oral presentations, guided discussion of readings, and self-disclosure exercises are the norm. Students are expected to have read assigned materials by the date indicated in the syllabus, and should be prepared to discuss readings individually or in variously structured groups. The degree of your engagement in these processes forms the basis for points assigned. Due to the fast paced and highly interactive nature of the course, regular attendance and full participation are expected: teaching and learning is difficult (if not impossible) if one is not present for and engaged in the process. Therefore, the above COE Attendance Policy is amplified as follows:

- *Missing more than one class meeting will result in the reduction of one letter grade.*

- *Arriving late or leaving early on more than two occasions will result in the reduction of one letter grade.*

POLICY ON LATE/MISSING WORK

Late work will not be accepted. The instructor (University Supervisor) should be contacted by the candidate to discuss unusual or special circumstances.

GENERAL CONSIDERATIONS

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 seek approval for services by providing appropriate and recent documentation to the Office of Disability Support Services (DSS). This office is in Craven Hall 4200, contact 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

The writing requirement 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.

Course Format

This course is held entirely off site at an assigned school site campus. Workshops for candidates are also held in conjunction with the core courses required each Monday.

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 ASSIGNMENTS

The following assignments contribute to the final, overall course grade. 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.

Course Assignments

Assignment structure:

Discussions (Blogs)	20 pts
Discrepant Event	20 pts
Invention Convention	25 pts
Passion Project	25 pts
NGSS Science and Health Standards Task and Presentation	10 pts
Total:	100 pts

DESCRIPTIONS OF ASSIGNMENTS

(20 points): Discussions

Students are responsible for completing the assigned readings for each week. Most class reading will be assigned well in advance of when they are expected to be completed. Additionally, students are expected to actively engage in critical dialogue in online environments.

(20 points): Discrepant Event

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 a partner 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 the course Moodle. The DE Graphic Organizer template and the Discrepant Event Presentation and Lesson Rubric are located on the Moodle course.**

For your discrepant event, fill in the graphic organizer with the appropriate information in strong detail. One team member: Please upload the team's DE to the Moodle session corresponding to the date that you present your DE in our class.

You will turn in a hard copy of your completed Discrepant Event Lesson Template/Organizer and data sheets (if applicable) to me in the Cougar Courses Platform.

You must also include at the end of 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 all resources consulted for lesson plan concepts/ideas/activities.
- c. **Discrepant Event Reflection Paper** –Based on working with Children (Individual)
 - After you have done your discrepant event with a student or students AND videotaped the event, 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) 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.
 - Note: Do NOT turn in a DE Reflection if you did not videotape the DE teaching event. The video substantiates that you did, in fact, teach your team DE to a student or students. Please consider that this assignment is 5% of your course grade.

(25 points): Invention Convention

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, 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. Current science education reform per the Next Generation Science Standards requires that students engage in the act of design thinking. You will engage in these practices through class activities and through the Invention Convention Assignment. To help you with this and other assignments, read Appendix F of the NGSS (provided on your Cougar Course site) to learn how engaging in the practices of science helps students understand how scientific knowledge develops and how such direct involvement gives them an appreciation of the wide range of approaches that are used to investigate, model, and explain the natural world. Also read the Engineering Design pages in NGSS. The template for the lesson sketch is located at the end of this syllabus. More details for this assignment will be given in class.

(25 points): Passion Project

You will complete this project as a student in this course in hope that you will then take and use, modify, or otherwise adapt the concept to your classroom. The premise of the project is that it is paramount to ensure students have a safe environment in your classroom in order to 1) transition the mindset to “our” classroom, 2) provide an avenue for authentic cultural proficiency while valuing diverse experiences, and 3) using students’ passion to uncover the underlying subject matter specific themes and influence threaded throughout their passion. This will facilitate students making their own authentic meaning of the subject matter instead of adopting our meaning of the subject matter, thus facilitating engagement, learning, and understanding.

The complete Passion Project including the rubric for grading is available in the Cougar Courses portal. Remember, you will engage in this project by identifying your top three passions and then use a Science Standard to explain and investigate how the subject matter is woven throughout your passion. **The storyboard for the project is worth 5 points, the final project is worth 20 points.**

(10 pts): NGSS Science and Health Standards Task and Presentation

Purpose of the assignment: To provide an in-depth introduction to the NGSS as a framework and foundation for you to begin to create science curriculum in other course assignments. Task IA and IB are worth 5 pts together. Task II is worth 5 pts.

Task I A: Grade level Next Generation Science Standards Response: (Individual).

Using the NGSS for your chosen grade level, pick ONE Performance Expectation (PE) from EACH Standard Disciplinary Core Idea including the Engineering Design DCI. For each PE, come up with a brief description of an activity that children in that grade can do. You should end up with a standard, a PE, and a 3-4 sentence description of an activity. See examples below for what your sections should look like. Depending on the grade level, you might have fewer or more sections. **NOTE: These must be HANDS-ON science activities, not Internet research or writing Activities!!!**

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

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

For the same grade level assigned to you for Task I A, you will select one Health Content Standard under one of the Health Content Areas and write an activity that students in that grade level can do. You should end up with one section for Health Education, which includes one Health Content area, one Health Content Standard, and a 3-4 sentence description of an activity that reflects both. Upload your Task IA to Moodle session 2. Task 1B will be uploaded at a later date.

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

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

- As a team, word process a lesson sketch/description for the activity (with a lesson title, NGSS standard and Performance Expectation, learning objectives, an assessment plan, and a detailed description of the activity). Make sure you write out the standard and PE on which your lesson plan is based. Add the **group lesson sketch** to your PPT (or Prezi or...).
- As a team, come up with a brief overview of the NGSS Standards for your grade. Don't try to give us every single line of the standards. Summarize in such a way (use bullet points) that we see generally what students are supposed to learn in your grade level--the Big ideas. On a PPT (or Prezi or...), list the bulleted competencies indicated in the NGSS for your grade. You will upload this to Cougar Courses.
- Each team member should also add to the group PPT his/her Health Content Standard/Health Content Area idea (i.e., Task I B)

- In about 5 minutes, present your lesson plan sketch and science standards overview to the class. Be prepared to explain why your lesson activity represents really good science for kids.

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

Hard Copy of Lesson Sketch: Upload the group lesson sketch done for Task II and the group PPT to Moodle session 2.
Note: Although the group assignment will look the same, everyone will upload in Cougar Courses in their individual portal.

Sample Response to Assignment Tasks I A and I B: Grade Four: Next Generation Science Standards

Standard 4-PS3: Physical Science - Energy

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

Activity:

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

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

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

Activity

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

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

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

Activity

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

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

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

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

Standard 4-ESS2: Earth's Systems

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

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

Standard 4-ESS3: Earth and Human Activity

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

processes on humans.

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

Standard 3-5-ETS1 Engineering Design

Performance Expectation: 3-5 ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

Activity: Using 20 sticks of dry spaghetti, one yard of string, one yard of tape, and one large marshmallow, students will build the tallest tower possible in 18 minutes that will support the marshmallow for at least 30 secs.

Health Content Area: Nutrition and Physical Activity

Health Content Standard 1.8.N - Identify ways to increase and monitor physical activity.

Activity

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

**COURSE CALENDAR, ASSIGNMENTS AND RUBRICS
SCHEDULE/COURSE OUTLINE**

Due to the dynamic nature of the Single-Subject Program schedule, there is a possibility that the schedule will be changed based on the needs of the class. A link to the online-collaborative schedule will be given on the first day of class.

Professor(s) will update the expectation of the class weekly in Moodle (Cougar Courses). Students are required to check the course Moodle weekly to ensure the topic and assignment for each week is clearly understood and to maintain an active presence in the online Community.

Date	Topic	Assignment
Session 1 January 27 Synchronous	Getting to know you Course Overview NGSS Explained Assignments Explained	<ul style="list-style-type: none"> ● Complete the "getting to know you survey" ● Start reading Teaching Science to Children (TSC) Ch. 1-3 ● Group Sign-ups: <ul style="list-style-type: none"> ○ Discrepant Events ○ Invention ○ Health Presentation ○ Passion Project
Session 2 February 3 Synchronous	Sequencing Instruction to Support Learning Outcomes: What teaching strategies ensure participation of ALL students? <ul style="list-style-type: none"> ● Hint - it's all about Instructional and Language Routines Lesson Planning in Science Inquiry <ul style="list-style-type: none"> ● Discrepant Events: Why teach this way? ● The Learning Cycle: Using the 5-E model Discuss Assignments <ul style="list-style-type: none"> ● Invention Convention <ul style="list-style-type: none"> ○ DT and HCD ● Discrepant Events <ul style="list-style-type: none"> ○ What's the hook? ● Passion Project <ul style="list-style-type: none"> ○ Choose your passion! 	<ul style="list-style-type: none"> ● Read: Finish reading TSC, Ch. 1-3 ● View: <ul style="list-style-type: none"> ○ Synchronous Sessions ○ It's All About Relationships ● Do: <ul style="list-style-type: none"> ○ Blog reflection (3 pts) ○ Health Task IA and IB (5 pts) <p>All assignments are due on this day before class time. In other words, if you see something here for the week of February 1, do not start it this week, finish it and turn it in this week. For every BLOG, the original post is due four days before class starts and the peer responses are due the day before class starts. When in doubt, look to Cougar Courses (CC)!!</p>

<p>Session 3 February 10 Synchronous</p>	<p>Writing Essential Questions</p> <ul style="list-style-type: none"> What a question should (and should NOT) do. <p>Writing Learning Objectives to support formative and summative assessment in science.</p> <p>Learning Cycles (Spirals that curriculum)</p> <p>Design Thinking and Human-Centered Design</p> <p>Intro to Concept Mapping and Science Content</p> <ul style="list-style-type: none"> The big ideas in Science Teaching and Learning 	<ul style="list-style-type: none"> Read: Start TSC, Ch. 4-6 View: <ul style="list-style-type: none"> NANK WHITE PAPER_DT and HCD Questioning Are any of these discrepant events? Do: <ul style="list-style-type: none"> Health Task II (5 pts) All presentations due in CC. Some will present now, some will present next week, all will be ready!
<p>Session 4 February 17 Synchronous</p>	<p>Focus on Assessment</p> <ul style="list-style-type: none"> What are the best indicators to assess that students have learned and understood intended outcomes? Standards Based Grading (SBG) <p>Project Check-In</p> <ul style="list-style-type: none"> Invention Convention Discrepant Events Passion Project 	<ul style="list-style-type: none"> Read: Finish TSC, Ch. 4-6 View: Single Story Do: Blog reflection (3 pts)
<p>Session 5 February 24 Synchronous</p>	<p>Priority Students (Words matter)</p> <ul style="list-style-type: none"> Teaching Science - ELL and SPED <p>Inquiry Processes in Science</p> <ul style="list-style-type: none"> Science process skills and attitudes Safety guidelines for the science classroom <p>Project Check-In</p> <ul style="list-style-type: none"> Invention Convention Discrepant Events Passion Project 	<ul style="list-style-type: none"> Read: Start TSC, Ch. 7-9 View: <ul style="list-style-type: none"> Plant the Seed http://www.csun.edu/science/ref/language/teaching-ell.html https://www.washington.edu/doiit/videos/index.php?vid=28 Do: Make sure you signed up for all projects!!
<p>Session 6 March 3 Synchronous</p>	<p>Technology in Science T&L</p> <ul style="list-style-type: none"> Science Web resources and tools to enhance science teaching and learning (See CC for links) <p>Project Check-In</p> <ul style="list-style-type: none"> Invention Convention Passion Project <ul style="list-style-type: none"> Have your alignment to your subject matter completed 	<ul style="list-style-type: none"> Read: Finish TSC, Ch. 7-9 View: <ul style="list-style-type: none"> iPad interview What's Hot What's Out Do: <ul style="list-style-type: none"> Blog reflection (3 pts) Discrepant Events (20 points) All presentations due in CC. Some will present now, some will present next week, all will be ready!
<p>Session 7 March 10 Synchronous</p>	<p>Technology in Science T&L</p> <ul style="list-style-type: none"> Technology is not our savior, use it purposefully <p>Project Check-In</p> <ul style="list-style-type: none"> Invention Convention Passion Project 	<ul style="list-style-type: none"> Read: Start TSC, Ch. 10-12 View: Simulations and General Science Do: Continue Discrepant Events Presentations.

<p>Session 8 March 17 Synchronous</p>	<p>Technology in Science T&L</p> <ul style="list-style-type: none"> Virtual Fieldtrips (link in CC) LABSTER-Virtual Labs (Link in CC) 	<ul style="list-style-type: none"> Read: Finish TSC, Ch. 10-12 View: Concept Map Do: Blog reflection (3 pts)
<p>Week of March 22</p>	<p>SPRING BREAK</p>	
<p>Session 9 March 31 Asynchronous</p>	<p>Examining learning cycle science lesson plans</p> <p>Integrating writing into science activities</p> <ul style="list-style-type: none"> How can Instructional and Language Routines help? <p>In lieu of this class time, schedule group time to complete your projects</p>	<ul style="list-style-type: none"> Read: Start TSC, Ch. 13-15 View: The Scientific Method Do: Passion Project Storyboard (5 pts)
<p>Session 10 April 7 Asynchronous</p>	<p>Begin Finalizing Invention Convention Project</p> <ul style="list-style-type: none"> Final report, model/prototype/blueprint/mock up, and final project. <p>Project Check-In</p> <ul style="list-style-type: none"> Passion Project <ul style="list-style-type: none"> Continue working on it <p>In lieu of this class time, schedule group time to complete your projects</p>	<ul style="list-style-type: none"> Read: Finish TSC, Ch. 13-15 View: Physical Science "stuff" Do: Blog reflection (3 pts)
<p>Session 11 April 14 Synchronous</p>	<p>Project Check-In</p> <ul style="list-style-type: none"> Passion Project <ul style="list-style-type: none"> Start recording if you haven't yet!! 	<ul style="list-style-type: none"> Read: Start TSC, Ch. 16-18 View: <ul style="list-style-type: none"> Flawed Studies The Problem with Lab Mice Science is ALWAYS partly wrong Do: Invention Convention (25 pts) <ul style="list-style-type: none"> Remember there are no presentations but we will informally share out!!
<p>Session 12 April 21 Asynchronous</p>	<p>How can we make and keep science fun?</p>	<ul style="list-style-type: none"> Read: Finish TSC, Ch. 16-18 View: Make Science Fun Do: Blog reflection (3 pts)
<p>Session 13 April 28 Asynchronous</p>	<p>Science Exploratoriums</p> <p>Exploratorium Activities</p>	<ul style="list-style-type: none"> Read: Start TSC, Ch. 19-21 View: Nothing - concentrate on your project Do: Optional Blog
<p>Session 14 May 5 Synchronous</p>	<p>Scientific Connections</p> <ul style="list-style-type: none"> Math and Science and Fruit Oh My!! The Pineapple Problem BUY A PINEAPPLE AND BRING IT TO CLASS 	<ul style="list-style-type: none"> Read: Finish TSC, Ch. 19-21 View: Science Project, Pineapple Enzyme Do: Blog reflection (3 pts)
<p>Session 15 May 12 Synchronous</p>	<p>Top Ten Talk</p>	<ul style="list-style-type: none"> Read: Teach Engineering View: Elementary Engineering Do: Passion Project (20 pts)
<p>Session 16 May 19</p>	<p>No Finals – Don't come to class!!!!</p>	

