

## Science Instruction & Applied Technology Syllabus

Fall 2024

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### Instructor Information

**Instructor Name:**  
**Department:**  
**Email / Telephone:**  
**Office:**  
**Student Support Hours:** (days/times)

### Course Information

**Course Modality:** In person.  
**Course ID:**  
**Units:** 3  
**Class Meeting Location & Time:** (zoom link if applicable)  
**Canvas:** [fresnostate.instructure.com](https://fresnostate.instructure.com)  
**Prerequisites:** Admission to the Multiple Subject Credential program.  
**Course description:** This course is designed to help teacher candidates be prepared to engage all students in Science. Teacher candidates will learn contemporary pedagogies, tools, and resources that support K-8 students in not only learning core ideas, concepts, and practices highlighted in the Next Generation Science Standards, but also taking informed action, as agents of

change, to make differences in their everyday lives or their local and global communities.

Through contemporary theories of learning and teaching and research-based practices in science, teacher candidates will construct their own answers to three key questions below over this semester:

What does science teaching and learning look like for/with all students?

What are the benefits and challenges to an inquiry-orientation to science teaching and learning?

How is science teaching and learning aligned with the Next Generation Science Standards?

It is usually expected that students will spend approximately 2 hours of study time outside of class for every one hour in class. Since this is a 3-unit class, you should expect to study an average of 6 hours outside of class each week.

## Required Course Materials

A list of selected readings is used to replace textbooks in this course (see below). All readings and additional materials will be available online (see Google Classroom) at no cost. Readings will reflect current research and will support an understanding of STEM Education and its implications for teaching. The understanding of assigned readings should be reflected in course assignments and discussions.

California Department of Education. (2016). Science framework for California public schools: Kindergarten through grade twelve.

<https://www.cde.ca.gov/ci/sc/cf/cascienceframework2016.asp>

California Next Generation Science Standards:

<https://www.cde.ca.gov/pd/ca/sc/ngsstandards.asp>

California Common Core State Standards: <https://www.cde.ca.gov/re/cc/>

International Society for Technology in Education Standards:

<https://www.iste.org/standards>

National Research Council. (2012). A framework for K-12 science education: Practices, core ideas, and crosscutting concepts. Washington, DC: National Academy Press.

<https://www.nap.edu/catalog/13165/a-framework-for-k-12-science-education-practices-crosscutting-concepts>

NGSS Lead States. (2013). Next generation science standards: For states, by states. <http://www.nextgenscience.org/>

## Course Specifics

**Course goals:** The learning outcomes are aligned with the Teaching Performance Expectations (TPE) within the California Standards for the Teaching Profession approved by the California Commission on Teacher Credentialing.

<b>Key Course Goals and Learning Outcomes</b>	<b>TPEs</b>	<b>Assignment where Assessed</b>
Teacher candidates will learn to engage ALL students in science learning and activities based on their unique learning, development, and cultural knowledge. Candidates will be able to define the “who” in ALL students utilizing a culturally responsive and equitable framework.	1.1, 1.3, 1.8, 2.1, 2.2, 2.3, 2.4	Inquiry Lesson Reflection
Teacher candidates will construct their own answers to science problems of practice through inquiry, investigation, and reflection. Candidates will understand how science teaching and learning is afforded through the demonstration of knowledge and assessment.	1.5, 1.7, 1.8, 5.1, 5.2, 5.3, 5.4, 6.1, 6.2, 6.3, 6.4,	Weekly Assignments
Teacher candidates will become familiar with modern science pedagogies, tools, and resources that will support optimal science learning and experiences in K-8 classrooms.	2.4, 2.5, 3.6, 3.7, 4.4, 4.6, 4.8	5E Inquiry Lesson Plan
Teacher candidates will integrate components of literacy for the learning of science content. These components include the development of critical reading, speaking and listening, and writing, based on purposeful evaluation of various information sources.	7.6, 7.8, 7.9	NGSS Literacy Lesson Plan
Teacher candidates will develop an understanding of the Next Generation Science Standards and how these standards align with other curricular influences such as the Common Core State Standards in Math and English Language Arts.	3.1, 3.2, 3.3, 3.4, 3.5, 3.8, 4.3	Weekly Assignments
Teacher candidates will work with K-8 students to take informed action as agents of change in their local and global communities.	1.3, 6.4, 6.5, 6.6	Environmental Science Activities

### **Course Requirements/Assignments:**

#### **Weekly Participation and Assignments**

Teacher candidates will actively engage in weekly class investigations and complete various assignments, including reflections, surveys, and other deliverables.

*Weekly participation and ongoing assignments will be evaluated based on completion.*

#### **NGSS Literacy Lesson**

Teacher candidates will collaborate in small groups to design a lesson that engages learners in multiple interactions with text to develop understandings of specific

Disciplinary Core Ideas and Crosscutting Concepts from the Next Generation Science Standards.

See [Appendix A](#) for details.

*The community of learners will determine the criteria for evaluating this assignment.*

### **Environmental Science Activities**

Teacher candidates will participate in Environmental Science learning activities on a scheduled Friday at Scout Island Outdoor Education Center in Fresno.

*This assignment will be evaluated based on completion.*

### **5E Inquiry Lesson Plan**

Teacher candidates will collaborate to design a 5E (Engage, Explore, Explain, Elaborate, Evaluate) Learning Cycle lesson plan, aligned to the Next Generation Science Standards, that engages learners in classroom scientific inquiry. Candidates will individually analyze decisions made about the design of the lesson.

*This assignment will be evaluated using a rubric.*

### **Inquiry Lesson Reflection**

Teacher candidates will deliver the engagement and exploration sections of the 5E Inquiry Lesson in either their clinical placement classrooms or to their classmates. Candidates will prepare a reflection on the delivered lesson.

*The community of learners will determine the criteria for evaluating this assignment. Criteria will include peer and self-evaluation.*

*Table 1 Assignment and Point Distribution*

<b>Assignment</b>	<b>Points/Percent</b>
Weekly Participation	20
NGSS Literacy Lesson	20
Environmental Science Activities	15
5E Inquiry Lesson Plan	30
Inquiry Lesson Reflection	15

## Study Expectations

It is usually expected that students will spend approximately 2 hours of study time outside of class for every one hour in class. Since this is a 3-unit class, you should expect to study an average of 6 hours outside of class each week. Some students may need more outside study time and some less.

For free tutoring on campus, contact the [Learning Center](#) ([www.csufresno.edu/learningcenter](http://www.csufresno.edu/learningcenter)) in the Collection Level (basement level) of the University Library. You can reach them by phone at 278-3052.

If you are absent from class or any portion of a class, it is your responsibility to check on announcements made while you were away.

## Grading Policy

*Table 2 Distribution of Letter Grade to Percent and Points*

Letter Grade	Percent	Points
A	90-100%	90-100
B	80-89%	80-90
C	70-79%	70-80
D	60-69%	60-70
F	<60%	<60

## Course Policies & Safety Issues

### Attendance

As can be seen from the assignment descriptions, learning in this course takes place through the development of a community of learners during our sessions together. For that reason, your attendance is critical to your success and the success of other learners. If you cannot be in attendance, please notify me immediately prior to the beginning of class.

Please see [APM 232: Policy on Student Absences](#). As a future teacher who will be expected to be on time for teaching assignments and professional duties, you must be punctual.

Do your best to be on time for synchronous class sessions, with your materials, ready to work, and with a positive, cooperative attitude. Please understand that if for some reason you are late to class or must miss a synchronous class session, the experiences missed cannot be duplicated. If you must miss a synchronous class session you are responsible for getting notes and any materials from another class member. It is highly recommended that you arrange with another (or others) to be “class buddies” so you

can contact him or her in case of absence or questions.. Any missed posts, assignments, and/or exams remain the responsibility of the student (See “Student Affairs” section of the California State University, Fresno General Catalog.)

### **Late Work**

All classwork due dates will be agreed upon by consensus of the community of learners. Please notify the instructor if your submission of any assignment will occur after the due date. Submission of assignments after the due date may be considered in determination of grades.

### **Zoom Etiquette**

Please observe appropriate guidelines adopted by the community of learners during synchronous Zoom sessions, including

- Muting your microphone when not speaking
- Raising your hand for recognition to speak
- Propriety and professionalism when sharing screens
- Respect for the choice of using video or not

### **Google Classroom & Electronic Communication**

The Google Classroom is the central meeting place for the course. Announcements will be shared in the Stream of the Classroom. Assignments will be posted in the Classwork section with a #00n where 00 is the class session number and n is the assignment number. All assignments are submitted in the Classroom, and each student needs to submit every assignment, even for team assignments.

Submit assignments using this example for filename format: #002 firstname lastname

Please use Google Docs, Slides, and such for assignment submissions.

Please observe professional etiquette in electronic communications. Here are some guidelines for “netiquette:”

NO SHOUTING, PLEASE--in most situations typing in all caps is inappropriate. Use bold or italic font for emphasis.

Sarcasm can (and will) backfire--it is best to avoid sarcasm altogether in online communications, as it does not communicate in text only. Instead, be polite and direct.

Don't abuse the chat box--it's not a place for commentary but instead a question and answer forum. Also it's better to share resources in the Google Classroom Stream, as chats can get lost easily.

It's in the Classroom!--before you email the instructor with a question about where to find something, review all of the resources in the Google Classroom. Chances are it's in there already.

Grammar time!—electronic communications in the class should be professional, not casual. Do not compose email messages the way you would a text. Check your spelling and grammar.

Submit files the recommended way—it looks like you aren't paying attention if you don't follow the file naming protocol—#002 firstname lastname. Using this convention really helps to stay organized.

Think before you hit SEND—electronic communication is forever, not like a mumbled comment that can be quickly forgotten. Don't reply to emails in the flush of emotion, and avoid the use of REPLY ALL!

Be kind and professional—there is anonymity that comes with electronic communication. You may never meet that person you have just emailed. Or you may. Be kind and respectful in your comments in emails and discussion forums, even if you disagree strongly.

***The following sections regarding COVID are subject to change given changing circumstances on-campus and in the community. Please check the [COVID website](#) for the most up-to-date information***

**Vaccination:** The California State University system strongly recommends the COVID-19 vaccination and booster for all students, faculty, and staff. As a reminder, you are eligible for a booster five (5) months after receiving a final dose of the Pfizer or Moderna vaccine; or two (2) months after receiving a Johnson & Johnson vaccine.

**Face Coverings:** Fresno State no longer requires masks to be worn indoors, but based on updated guidance from public health experts, the University highly recommends that all students, faculty, and staff, regardless of vaccination status, wear a surgical grade or KN95 mask indoors. Faculty will continue to have the discretion to require face coverings for their in-person classes as they evaluate the health and safety needs of their individual classroom environments.

**Testing:** The campus was fortunate to receive the Higher Education Emergency Relief (HEERF) Funds during the pandemic and through June 2023 but funds are no longer available. Students will still be able to obtain free kits from the Student Health and Counseling Center. Additionally, free [COVID-19 test](#) options are offered by the Fresno County Department of Public Health.

Please remember that the same student conduct rules that are used for in-person classroom instruction also apply for virtual/online classrooms. Students are prohibited from any unauthorized recording, dissemination, or publication of any academic presentation, including any online classroom instruction, for any commercial purpose. In addition, students may not record or use virtual/online instruction in any manner that would violate copyright law. Students are to use all online/virtual instruction exclusively for the educational purpose of the online class in which the instruction is being provided. Students may not re-record any online recordings or post any online recordings in any

other format (e.g., electronic, video, social media, audio recording, web page, internet, hard paper copy, etc.) for any purpose without the explicit written permission of the faculty member providing the instruction. Exceptions for disability-related accommodations will be addressed by Student Disability Services working in conjunction with the student and faculty member.

**Dispute Resolution:** If there are questions or concerns that you have about this course that you and I are not able to resolve, please feel free to contact the Chair of the department to discuss the matter.

Chair's name: Dr. Selena Van Horn

Department name: Liberal Studies

Chair's email: [svanhorn@csufresno.edu](mailto:svanhorn@csufresno.edu)

Department phone number: 559.278.0379

**Intellectual Property:** All course materials, including but not limited to the syllabus, readings, quiz questions, exam questions, and assignments prepared by the instructor are property of the instructor and University. Students are prohibited from posting course materials online (e.g., Course Hero) and from selling course materials to or being paid for providing materials to any person or commercial firm without the express written permission of the professor teaching this course. Doing so will constitute both an academic integrity violation and a copyright violation. Audio and video recordings of class lectures as well as images of chat or messages shared during course sessions are prohibited unless I give you explicit permission in advance. Students with an official letter from the Services for Students with Disabilities office may record the class if SSD has approved that service. Otherwise, recordings of lectures are included in the intellectual property notice described above. These provisions exist regardless of the modality of the course. That is they apply to in-person, hybrid and online courses.

**Student Ratings of Instruction:** In the final weeks of the semester, you will be asked to complete a short survey to provide feedback about this class. The primary goal of student ratings is to help your instructor improve the class. Feedback will also be reviewed by the department chair and the college dean. You will be given 15 minutes of class time to complete student ratings. Please offer feedback honestly and thoughtfully. Your participation is appreciated. You can access your student rating surveys and get more information at [Fresno State Student Ratings for Instruction \(SRI\)](#)

## University Policies

**Students with Disabilities:** Upon identifying themselves to the instructor and the university, students with disabilities will receive reasonable accommodation for learning and evaluation. For more information, contact Services to Students with Disabilities in the University Library, Room 1202 (278-2811).

**Financial Aid Satisfactory Academic Progress Standards and Appeals Process:**  
<https://studentaffairs.fresnostate.edu/financialaid/policies/sap/index.html>

**The following University policies can be found on the web at:**

- [Adding and Dropping Classes](#)
- [Cheating and Plagiarism](#)
- [Computers](#)
- [Copyright Policy](#)
- [Disruptive Classroom Behavior](#)
- [Honor Code](#)
- [Title IX](#)

Fresno State is committed to fostering a safe, productive learning environment for all students. Title IX and CSU policy prohibit discrimination on the basis of sex, which includes sexual harassment, domestic and dating violence, sexual assault, sexual exploitation, and stalking. We understand that sexual violence can impact a students' **ability to be successful** in the learning environment. We encourage students who have experienced sexual misconduct **to seek information on where to report from any member of our faculty or staff in order to ensure that the university can provide students with the necessary resources and supportive measures.**

As an instructor, I have a mandatory reporting responsibility as a part of my role. It is my goal that you feel comfortable sharing information related to your life experiences in classroom discussions, in your written work, and in our one-on-one meetings. I will seek to keep the information you share private to the extent possible. However, I am required to report any information I receive regarding sexual misconduct or information about a crime that may have occurred during your time at Fresno State.

**Students can report incidents of alleged sexual misconduct to either or both of the following resources:**

Office of Compliance and Civil Rights | [occr.fresnostate.edu](http://occr.fresnostate.edu) | 559.278.5003  
Fresno State Police Department | [fresnostate.edu/police](http://fresnostate.edu/police) | 559.278.8400

**Students can also report other incidents of discrimination or harassment to:**

Office of Compliance and Civil Rights | [occr.fresnostate.edu](http://occr.fresnostate.edu) | 559.278.5003

**Students can access *confidential support* from two separate resources on campus:**

Counseling Services | [studentaffairs.fresnostate.edu/health/counseling](http://studentaffairs.fresnostate.edu/health/counseling) | 559.278.2734  
Survivor Advocacy Services | [fresnostate.edu/survivoradvocate](http://fresnostate.edu/survivoradvocate) | 559.278.6796

**Pregnancy or Related Conditions:**

**[Pregnant Students](#) or those with related conditions should contact the Title IX Coordinator in the Office of Compliance and Civil Rights for assistance. The Title IX Coordinator can coordinate specific actions to prevent sex discrimination and ensure the student's equal access to educational programs or activities.**

**Office of Compliance and Civil Rights | [occr.fresnostate.edu](http://occr.fresnostate.edu) | 559.278.5003**

[Parent scholars](#) provides information on priority registration and other support for parenting students.

[Services for Students with Disabilities](#) can also provide assistance with accommodations.

If you have concerns and you are unsure who to contact, please visit the [Concern & Action Guide](#).

**Emergency Information:** In the event of an emergency, everyone in the campus community becomes a partner in the response. To ensure you are prepared and remain calm you must make yourself familiar with campus protocols. To contact the Fresno State Police Department call 559.278.8400 from your cell phone or 911 from a campus phone. Prior to an emergency, assess your environment for options depending on the emergency. Identify all possible exit routes, in an emergency always use the closest most safe exit. Once you exit the building go to the predetermined evacuation assembly point, if that is unavailable then go to an open safe space away from the emergency. Identify where and how you can secure yourself inside if you need to shelter in place or hide from a threat. Be prepared to help guide those around you and assist individuals who may be in need. Additional information can be found at [www.fresnostate.edu/emergency](http://www.fresnostate.edu/emergency)

## University Services

The following University services can be found on the web at:

- [Associated Students, Inc.](#)
- [Students with Disabilities](#)
- [Dream Success Center](#)
- [Library](#)
- [Learning Center Information](#)
- [Student Health and Counseling Center](#)
- [Academic Success Coaching](#)
- [Survivor Advocacy](#)
- [Writing Center](#)

## Subject to Change Statement

THIS SYLLABUS AND SCHEDULE ARE SUBJECT TO CHANGE IN THE EVENT OF EXTENUATING CIRCUMSTANCES.

## Course Calendar

The calendar should include projected dates, topics covered, deadlines, and/or periods of time for readings, field trips, projects, exam dates (including the date and time of the final exam) and assignment due dates. The following statement is suggested to footnote the calendar: "The course schedule is subject to change in the event of extenuating circumstances."

If you plan to give your exam online or not to meet in class on the final exam day, please explicitly inform students in your syllabus. You also need to address a memo to that effect to your department chair and dean.

## Tentative Course Schedule

Class Session	Date	Topic	Major Assignments DUE Reading
1	1/19	Welcome and Introductions A physical phenomenon	
2	1/26	Class does not meet–Faculty on Strike	
3	2/2	<b>VIRTUAL Asynchronous Class</b> Science and Engineering Practice 1: Asking Questions Introduction to Inquiry	NGSS Appendix F
4	2/9	NGSS Literacy Lesson Part 1 Science and Engineering Practice 8: Obtaining, Evaluating, and Communicating Information	
5	2/16	NGSS Literacy Lesson Part 2 NGSS Crosscutting Concepts	NGSS Appendix G
6	2/23	Using AI in Science lesson planning NGSS Disciplinary Core Ideas	NGSS Appendix E <b>NGSS Literacy Lesson DUE</b>
7	3/1	<b>VIRTUAL Asynchronous Class</b> Navigating NGSS Mapping our NGSS--where do we start and where do we go? Science for all students	NGSS Appendix D
8	3/8	The 5E Learning Cycle--once you learn to ride this cycle you will never forget!	Learning cycle stuff in the Classroom
9	3/15	Environmental Science Day	
10	3/22	Teacher Resource Center	
11	3/29	<b>SPRING BREAK</b>	
12	4/5	<b>VIRTUAL Asynchronous Class</b> Assessment of learning in science	
13	4/12	Assessment of learning in science	

14	4/19	5E Lesson Plan Example Electronic Data Collection	
15	4/26	Lesson Plan Workshop	
16	5/3	<b>VIRTUAL Asynchronous Class</b> Science Teaching and learning ideas	<b>5E Inquiry Lesson Plan &amp; Analysis</b>
17	5/9 & 5/10	Consultation Days	<b>Science Teaching and Learning Reflection</b>

# Appendix A: NGSS Literacy Lesson Plan

The Next Generation Science Standards (NGSS) include the dimension of Science and Engineering Practices (SEPs), a set of skills and methods that scientists and engineers employ to address real world questions and problems. An important SEP relevant to Teacher Performance Expectation 7.6 & 7.8 engages learners in *Obtaining, Evaluating, and Communicating Information*.

To demonstrate this practice, learners

1. Read, summarize, and/or compare grade-appropriate scientific texts and/or other reliable media;
2. Describe and/or integrate information within and across multiple written texts, media, and/or formats (e.g., diagrams, tables, charts);
3. Synthesize and evaluate scientific information from appropriate sources.

To complete the assessment, teacher candidates develop a lesson plan where learners construct an explanation about a natural phenomenon after interaction with a variety of different text sources, including multimedia resources such as images, video, or even in-person conversations.

These criteria are applied by teacher candidates to provide peer feedback prior to submission, and also used to assess candidates' final lesson plans.

<p><u>Phenomenon:</u> Identified phenomenon is relevant, interesting, and illustrates connection to learners' lives.</p>
<p><u>NGSS Connections:</u> Appropriate Disciplinary Core Ideas and Crosscutting Concepts are identified; SEP8 is featured in the lesson.</p>
<p><u>Text Selections:</u> At least 5 different texts are provided for learners to question. At least 3 different text modes (written, video, audio, image, and so on) are selected.</p>
<p><u>Presentation:</u> The lesson is ready to be shared with learners and requires minimal revision. The lesson is delivered in an engaging presentation application such as Slides, Canva, Prezi, and so on.</p>