



Professional Development Institute

Flex Course Syllabus

The Next Generation Science Standards (K-12)

PDI Course Number: 36T02

UCSD Course Number: EDUC40102

If you would like information about receiving post-baccalaureate (graduate) credit for completing this course, [please click here](#).

Course Timeline

Participants have one year to complete the course. Participants must spend a minimum of three weeks in this course.

Course Description

Have you tried to make sense of the Next Generation Science Standards without feeling successful? Are you overwhelmed because your district has adopted these standards and you are not sure where to begin? This online course is designed for teachers in grades K-12 who want to unpack the complexity of the Next Generation Science Standards. This course takes teachers through a step-by-step explanation of the standards, including a thorough description of the conceptual framework leading into how to interpret the science and engineering practices, crosscutting concepts, and disciplinary core ideas at each respective grade band. Performance expectations for the standards are also addressed. The role of curricula is discussed, as well as how Universal Design for Learning plays an important role in the assessment of the standards. Teachers will be introduced to an overview of assessment and how it applies to the Next Generation Science standards, as well as a brief overview of how to bundle some of the core ideas contained within the standards. Suggestions for integrating technology into science instruction are also shared. By the end of this course, teachers will have a thorough understanding of the Next Generation Science Standards and have gained the ability to put them into practice in the classroom.

Educational Outcomes

1. Teachers will understand the history behind why the Next Generation Science Standards (“NGSS”) were developed.
2. Teachers will understand that the NGSS create a new conceptual framework for STEM education.
3. Teachers will learn about constructivist learning theory and the theory of multiple intelligences.
4. Teachers will learn about the Framework for K-12 Science Education (“Framework”) and how it forms the basis for the NGSS.
5. Teachers will learn about the Framework’s three guiding principles, as well as its six basic “truths.”
6. Teachers will learn about the design of both the Framework and the NGSS, which encourage three-dimensional thinking between the science and engineering practices (“SEPs”), crosscutting concepts (“CCCs”), and disciplinary core ideas (“DCIs”).
7. Teachers will understand what the shift to the NGSS entails.
8. Teachers will learn how to explore the layout of a standard.
9. Teachers will discover some important considerations contained within the NGSS.
10. Teachers will learn some specific strategies for coping with increased student diversity in the science classroom.
11. Teachers will learn how the NGSS performance expectations are organized and how to “read” a standard.
12. Teachers will gain a deep understanding of the science and engineering practices, and what is required at each of the grade levels/bands.
13. Teachers will gain a deep understanding of the crosscutting concepts, and what is required at each of the grade levels/bands.
14. Teachers will gain a deep understanding of the disciplinary core idea of physical science, and what is required at each of the grade levels/bands.
15. Teachers will gain a deep understanding of the disciplinary core idea of life science, and what is required at each of the grade levels/bands.
16. Teachers will gain a deep understanding of the disciplinary core idea of earth and space science, and what is required at each of the grade levels/bands.
17. Teachers will gain a deep understanding of the disciplinary core idea of engineering, technology, and applications of science, and what is required at each of the grade levels/bands.
18. Teachers will understand that the NGSS is not meant to be the science curriculum, but that curriculum plays an important role in the teaching and learning of science.
19. Teachers will learn about the different types of technology and how they are interconnected to science and engineering.
20. Teachers will have a basic understanding of how to incorporate such technological science tools such as virtual field trips, WebQuests, apps, and websites into their teaching.
21. Teachers will be introduced to the guiding principles of Universal Design for Learning, and how this instructional framework is a perfect segue into teaching the NGSS.
22. Teachers will learn appropriate methods for assessing science understanding.

23. Teachers will learn how to overcome the different challenges teachers face as they try to assess the various performance expectations of the NGSS.
24. Teachers will learn how the evidence statements contained within the NGSS provide teachers with additional information of what students should know and be able to do in terms of science.
25. Teachers will understand the importance of using science standards to drive instruction.

Instructional Media

- Online Discussions
- Online Engagement
- Online Collaboration
- Instructor Feedback
- Instructor Interaction
- Online Resources and Websites
- Supplemental Instructional Materials
- Printable Classroom Resources

Evaluation

- Test #1 (5% of final grade)
- Test #2 (5% of final grade)
- Test #3 (5% of final grade)
- Test #4 (5% of final grade)
- Test #5 (5% of final grade)
- Autobiography and Goals for the Course (10% of final grade)
- Article/Video Reflection (15% of final grade)
- Course Collaboration/Share Ideas with the Class (10% of final grade)
- Cumulative Assignment/Project: Create STEM Activities (20% of final grade)
- Culminating Practicum (20% of final grade)

Topical Outline

Unit One

- Developing the NGSS: A Brief History
- A New Conceptual Framework
- The Guiding Principles of the Framework
- **Assignment #1**
Write an autobiography including information about yourself, your grade level and what you specifically hope to learn about implementing the Next Generation Science Standards. Your autobiography should be a minimum of three paragraphs.
- **Test #1**

Unit Two

- The Shift to the Next Generation Science Standards
- The Anatomy of a Standard
- Important Considerations
- All Standards, All Students
- **Assignment #2**

As an educator, it is important to be aware of the research, studies, and professional work done in the field. In the course, you will find an article and video that are relevant to the specific course content. Read the article and then write an essay with your thoughts.

- **Test #2**

Unit Three

- Performance Expectations
- Dimension 1: Science and Engineering Practices
- Dimension 2: Crosscutting Concepts
- **Assignment #3**

Online Discussion Board Participation/Engagement: Please post a tip, strategy, or idea that specifically relates to effectively implementing the Next Generation Science Standards. Your assignment should be a minimum of three paragraphs and detailed enough for another teacher to easily follow. This is a great opportunity to share and collaborate with other teachers at your grade level around the country. Take time to review and respond to other postings that are relevant to your classroom population in order to gain effective ideas to use immediately in your classroom

- **Test #3**

Unit Four

- Dimension 3: Disciplinary Core Ideas — Physical Sciences
- Dimension 3: Disciplinary Core Ideas — Life Sciences
- **Test #4**

Unit Five

- Dimension 3: Disciplinary Core Ideas — Earth and Space Sciences
- Dimension 3: Disciplinary Core Ideas — Engineering, Technology, and Applications of Science
- **Test #5**

Unit Six

- The Role of Curriculum
- Integrating Technology into Science Instruction

- Universal Design for Learning
- The Future of Science Assessment

- **Assignment #4**

Choose one of the performance expectations for each of the four science and engineering disciplines and create a detailed STEM activity to accompany each one. Be sure to include the standard to which each activity applies. Each activity should be described with enough detail so that another teacher can easily use it. When you are finished, you will have created four separate STEM activities, one each for physical science, life science, earth and space science, and engineering, technology, and applications of science. Follow the example provided in the assignment. Keep in mind that this assignment is a cumulative project and therefore, you are expected to demonstrate the knowledge you gained from the course and your ability to apply what you have learned in a practical setting.

- **Assignment #5**

The culminating practicum is a three-step process. (1) In the first assignment, you were asked what goals you had and what you hoped to learn from the course. Think back to your original goals for this course. Write a minimum two-paragraph reflection specifically describing how what you learned can be used to help you reach those goal(s). (2) Next, write a minimum three-paragraph plan that specifically describes the ways in which you intend to implement a particular strategy you learned in this course into your own teaching situation. (3) Last, write a minimum two-paragraph reflection describing a student you have or have had in the past. Then, discuss how the strategies you learned in this course will specifically benefit that student as you put your plan into action.

Bibliography

The Professional Development Institute wishes to thank the Lead States, Partners, and Achieve for all of their hard work that went into creating the Next Generation Science Standards. The Next Generation Science Standards is a registered trademark of Achieve. Neither Achieve nor the lead states and partners that developed the Next Generation Science Standards were involved in the production of this product, and do not endorse it.

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