



Leading with Science and Engineering Practices

Course Syllabus

Course Description

The 3-Dimensional Framework of science instruction adopted by the Next Generation Science Standards places Science and Engineering Practices (SEPs) and Crosscutting Concepts (CCCs) on equal footing with Disciplinary Core Ideas (DCIs), though many teachers still teach using a disciplinary focus to examine science phenomena. This course uses Science and Engineering Practices to orient curriculum creation for K-12 science educators, ensuring teachers provide students ample opportunities to practice the range of skills science professionals find most effective in creating verifiable answers to scientific questions. By the end of the course, teachers will have found effective means for providing students practice in: 1) Asking Questions and Defining Problems, 2) Developing and Using Models, 3) Planning and Carrying out Investigations, 4) Analyzing and Interpreting Data, 5) Using Mathematics and Computational Thinking, 6) Constructing Explanations and Designing Solutions, 7) Engaging in Argument from Evidence, 8) Obtaining, Evaluating, and Communicating Information.

This course enhances classroom teaching effectiveness and supports improved student outcomes by introducing new knowledge in integrating NGSS Science and Engineering Practices into K–12 instruction through strategies like inquiry, modeling, data analysis, and phenomena-based learning.

Course Objectives

At the end of this course you should be able to:

1. Understand the structure of the Three Dimensions within the Next Generation Science Standards.
2. Identify instructional strategies to support SEP learning in science critiquing.
3. Identify instructional strategies to support SEP learning in science sensemaking.
4. Identify instructional strategies to support SEP learning in science critiquing.
5. Develop awareness surrounding baseline requirements for 3D science learning.
6. Connect the use of Science and Engineering Practices to give all students a better understanding of natural phenomena.
7. Observe several strategies for integrating the Science and Engineering Practices in unit planning.
8. Consider methods for assessing the Science and Engineering Practices.

Modules

- Module 1: The Three Dimensions of the NGSS, Quiz 1
- Module 2: Investigative Science Practices, Quiz 2



- Module 3: Sensemaking Science Practices, Quiz 3
- Module 4: Critiquing Science Practices, Quiz 4
- Module 5: Argumentation and Information, Quiz 5
- Module 6: Phenomena-Based Learning Using the SEPs, Quiz 6
- Module 7: SEP-Driven Unit Planning, Quiz 7
- Module 8: Assessing the SEPs, Quiz 8

Grading:

Each quiz must be passed at an 80% or higher (three attempts allowed).

Format

This is a self-paced, asynchronous (no required live meetings) course. Throughout the PD course, you will find it helpful to take notes along the way to assist with the quizzes. Within each module, you will find reflection assessments that are not graded but will help in your journey through the course. There is an interactive forum in the course to help you connect with peers and instructors, share ideas, and collaborate on best practices throughout your learning journey.