



## Course Overview

In this course, elementary school teachers (grades 3-5) will investigate the disciplinary core idea of ETS1.C: Optimizing the Design Solution through the Performance Expectation 3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

The new standards present several conceptual shifts. One of these ideas is the elevation of Engineering, Technology, and Applications of Science (ETS) as a disciplinary core idea - placing it on the same level as Physical Science, Life Science, and Earth and Space Science. By integrating technology and engineering into the science curriculum, students can be encouraged to apply their developing scientific knowledge to solve practical problems. This course is focused on the topic of ETS1.C: Optimizing the Design Solution through the Performance Expectation **3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.**

You will experience information through a variety of media formats targeted to meet the following objectives:

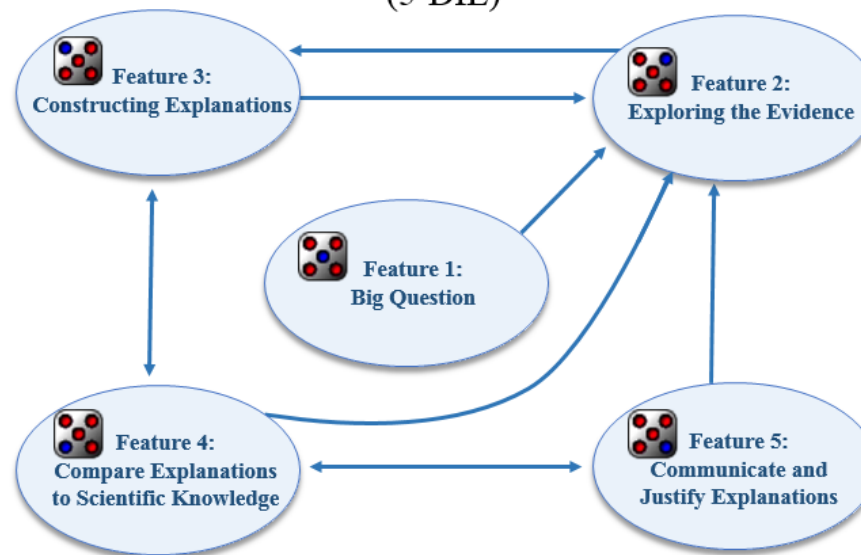
- Describe the three dimensions of learning ([Science and Engineering Practices](#), the [Disciplinary Core Ideas](#), and the [Crosscutting Concepts](#)) within the Performance Expectation.
- Present an argument for the types of lessons that you will need to implement in your classroom to help students reach a level of understanding needed to master a Performance Expectation of the Engineering Design page for 3-5.
- Articulate what is expected from a scientifically literate student at this grade level.
- Generate a general lesson description to target the three dimensions represented in the Performance Expectation.
- Translate your general lesson description into an instructional design model.
- Explain how the Science and Engineering Practices and Crosscutting Concepts support students in deepening their understanding of the Science Disciplinary Core Idea.

**Goals & Purpose:** This course is focused on a Question (Big Question). The activities are divided into five features and use the 5-DIE model.

### Feature 1

Formulate initial ideas related to the Big Question: ***What do I need to know to help students understand engineering design?*** In additional Features, you will have the opportunity to provide further thoughts or questions that arise as you investigate the main ideas and concepts behind the Performance Expectation of the Next Generation Science Standards Topic: ETS1.C: Optimizing the Design Solution.

## 5-Featured Dynamic Inquiry Enterprise (5-DIE)



### Feature 3

Analyze your evidence and develop an argument for what type of lesson you would need to develop to explicitly target the three dimensions represented in the Performance Expectation.

### Feature 4

Understand the research associated with teaching and learning science and compare your argument with instructional design models as a mechanism to help you think about three-dimensional learning.

### Feature 2

Investigate and collect evidence from readings and video clips related to the three dimensions; Science and Engineering Practice, Disciplinary Core Idea, and the Crosscutting Concept of the Performance Expectation.

### Feature 5

Synthesize, communicate, and discuss your understanding, explanations, and lesson design ideas with your peers and colleagues. Critically evaluate comparisons made by participants to strengthen your understanding of three-dimensional learning.

Throughout the course, we provide you with opportunities to 1) connect your learning experiences across sessions, and 2) explicitly apply these to your classroom practice. You will also be able to revisit your work and reflections by viewing your individual Course Portfolios.

This course focuses on the Performance Expectation 3-5-ETS1-3 Optimizing the Design Solution

### What's Next?

The following courses are recommended to complete the engineering design cycle for grades 3-5:  
3-5-ETS1-1 Defining and Delimiting Engineering Problems and 3-5-ETS1-2 Developing Possible Solutions