Lesson 1: Soil and Sand
Define the problem of erosion.

Students use evidence to make a claim about the similarities and differences between soil and sand.

Lesson 2: Wind and Water
Wind and Water can change the land.

Students develop a model for representing land and how it is affected by wind and water. They carry out an investigation to provide evidence for how wind and water can change the shape of the soil and sand.

Lesson 3: Earth Events
Some events happen quickly; others happen slowly.

Students analyze and interpret data about soil loss on a construction site to provide evidence for a claim about its cause.

Lesson 4: Model Materials
Making observations is helpful in thinking about problems.

Students analyze the effectiveness of models for four materials that could be used to prevent or slow down erosion based on the structure and function of each model and the material it represents.

Lesson 5: Built to Last
Designs are useful in communicating ideas for a solution.

Students carry out an investigation into how different materials might slow down erosions using models to represent the real materials. They analyze and interpret data from four tests to determine if and how each material could slow down erosion.

Lesson 6: Creative Solutions
There is always more than one possible solution to a problem.

Students develop a measurement scale to determine how much sand is washed away by water during tests. They use understanding of all components in the system and their relation to each other to design and test two solutions to the erosion problem.

Lesson 7: Lessons Learned
Problems are situations people want to change and can be solved through engineering.

Students obtain and evaluate information from text to compare multiple solutions designed to reduce the ways wind and water have changed the shape of the land.

Lesson 8: Castle on the Edge
Before beginning to design a solution, it is important to understand the problem.

Students analyze and interpret data to construct an explanation for what caused a castle to end up right on the edge of a river. They develop two possible solutions to the problem of preventing the castle from eventually toppling and communicate ideas through a sketch.

Design Challenge

Lesson 9: Save the Sand Towers Part 1
Designs are useful in communicating ideas for a solution to the erosion problem.

Students define the problem of saving the sand towers from destruction caused by water. They design a solution that is based on understanding of all the components of the system the sand towers are a part of and that works within set limits and is based on evidence from prior tests.

Lesson 10: Save the Sand Towers Part 2
It is useful to compare and test designs for the erosion problem.

Students use evidence to optimize their original design to save the sand towers by considering the effect of changing one component. They communicate how the final design attempted to solve the problem of saving the sand towers by keeping them stable.

Source: Smithsonian Science Education Center, How Can We Stop Soil From Washing Away*?* in Smithsonian Science for the Classroom. Carolina Biological, Burlington, NC, 2019.