



Lesson 4

The Power and Potential of MRI | NGSS Standards

The final lesson will conclude the basics of MRI and open up to the broader context of healthcare and biomedical engineering. Students will learn about recent advancements and the future of imaging devices while reflecting on their expanded knowledge of MRI.

Recommended Grade Levels: 6-8

NGSS Standards in Lesson: MS ETS 1-1, MS ETS 1-2, MS ETS 1-3, MS ETS 1-4

In this lesson centered on the forefront of MRI technology, students will delve into the ways in which MRI advancements can revolutionize healthcare across multiple domains. By illuminating key healthcare frontiers like personalized medicine, precise interventions, and early disease detection, this lesson equips students to precisely delineate both the limitations and the possibilities inherent in MRI technology's progress (aligned with ETS1-1). Furthermore by engaging students with several interactive activities and case studies students are able to evaluate various designs (ETS1-2) and analyze how these designs effectively solve problems in healthcare (ETS1-3). Finally this lesson challenges students to follow the engineering design process to develop a design using MR technology to address a problem in healthcare enabling students to iteratively test and develop an optimal design (ETS1-4).

Lesson Performance Expectation:

- Students should be able to describe a variety of frontier challenges in healthcare
- Students should be able to explain how MRI technology is enabling new solutions to healthcare challenges
- Students should be able to engage with the design process to develop ideas for novel solutions using principles from MR technology



NGSS Standard	NGSS Performance Expectation	Lesson Alignment Criteria
<u>MS ETS 1-1</u>	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions <u>MS-ETS1-1</u>	<ul style="list-style-type: none">- The discussion of MRI technology and innovations in MRI enable students to critically analyze the constraints of MRI and the impact that advancements in this technology can have on healthcare.
<u>MS ETS 1-2</u>	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. <u>MS-ETS1-2</u>	<ul style="list-style-type: none">- The interactive exercises within this lesson empower students to engage directly with a diverse range of MRI technological advancements, fostering a systematic analysis of these innovations.
<u>MS ETS 1-3</u>	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. <u>MS ETS 1-3</u>	<ul style="list-style-type: none">- The assessment involves evaluating group presentations and class discussions, where students analyze data (ideas and solutions) to determine the best characteristics of future MR applications to address healthcare and environmental challenges effectively
<u>MS ETS 1-4</u>	Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved. <u>MS ETS 1-4</u>	<ul style="list-style-type: none">- Within the interactive activities, students are presented with a challenge: to harness the engineering design process and conceive future designs and ideas for MR technology. This iterative cycle of design, testing, and presentation serves as an engaging platform for student participation.