SUPERHUMAN BODY Educator Guide
Next Generation Science Standards (NGSS)

Bring the science and engineering in *Superhuman Body* to life in your classroom with lesson plans aligned with Next Generation Science Standards (NGSS). The educator guide includes interdisciplinary connections, differentiation opportunities, and hands-on learning for students K-12.

Educator Guide NGSS Standards Connections				
	Activity	**Life Science**	**Physical Science**	**Technology and Engineering**
K-2nd	Bird Biomimicry	1-LS1-1		K-2-ETS1-1, K-2-ETS1-2, K-2-ETS1-3
	Rhythm of the Heart	K-LS1-1, 1-LS1-2		
	AI Emotions			K-2-ETS1-1, K-2-ETS1-2
3rd-5th	T-Cell Receptor Puzzle	4-LS1-1		
	Heart Stations	4-LS1-1		
	Prosthetic Possibilities			3-5-ETS1-1, 3-5-ETS1-2
6th-8th	Building Immunity	MS-LS1-3		
	Pump It Up	MS-LS1-3		
	Universal Design Challenge			MS-ETS1-1
9th-12th	Optimal Optics		HS-PS4-5	
	Clear It Out: Stent Design			HS-ETS1-3
	Accessible Engineering			HS-ETS1-3

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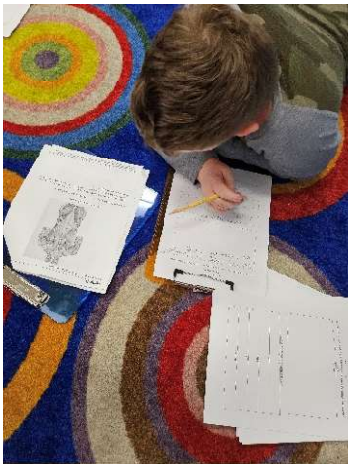
ACTIVITY DESCRIPTIONS

K-2nd Grades

Bird Biomimicry
Students explore how humans use biomimicry to create technological solutions to problems.

Rhythm of the Heart
Students explore their heartbeats and the heart rates of different animals in this lesson that integrates music and science.



AI Emotions
In this social emotional learning lesson, students explore the concepts of emotions and artificial intelligence. All humans have emotions. There are patterns in how we express emotions but also differences. Artificial intelligence functions by learning patterns.

3rd-5th Grades

T-Cell Receptor Puzzle
Students explore immune cells and how to stay healthy by playing a Germ Invaders game and creating a puzzle that shows how T-Cells lock on to infections.

Heart Stations
Students rotate through stations integrating English Language Arts, math, and physical education to as they learn about the human heart.

Prosthetic Possibilities
Using the Engineering Design Process, students explore how engineers design technology to meet specific accessibility needs.

6th-8th Grades

Building Immunity
Students explore how the body responds to infected cells, invading bacteria and cancer cells. Using communication, teamwork and engineering design principles they'll craft a killer immune cell that fits to a specific antigen on an invader cell.

Pump It Up
Using a simple model of the heart that they create, students experiment with the function of the heart chambers and valves to circulate blood.

Universal Design Challenge
Students are encouraged to see their community with new eyes as they design assistive technology or new products to help a chef with a limb difference.

9th-12th Grades

Optimal Optics
Using a pinhole camera they construct, students learn about focal length, its impact on the image created, and the brain's role in vision.

Clear It Out: Stent Design
Using design and engineering principles, students build a stent prototype to clear plaque from clogged arteries.

Accessible Engineering
Students re-design a product or design an assistive device to help an athlete with a limb difference.

Activities and the Standards

K-2nd Grades

Bird Biomimicry
Students explore how humans use biomimicry to create technological solutions to problems.
NGSS STANDARDS
K-2-ETS1-1
Ask questions, make observations, and gather information about a situation people want to change in order to define a simple problem that can be solved through the development of a new or improved object or tool.
K-2-ETS1-2
Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
K-2-ETS1-3
Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.
1-LS1-1
Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

Rhythm of the Heart
Students explore their heartbeats and the heart rates of different animals in this lesson that integrates music and science.
NGSS STANDARDS
K-LS1-1
Use observations to describe patterns of what plants and animals (including humans) need to survive.
1-LS1-2

Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.

AI Emotions
In this social emotional learning lesson, students explore the concepts of emotions and artificial intelligence. All humans have emotions. There are patterns in how we express emotions but also differences. Artificial intelligence functions by learning patterns.
NGSS STANDARDS
K-2-ETS1-1
Ask questions, make observations, and gather information about a situation people want to change in order to define a simple problem that can be solved through the development of a new or improved object or tool.
K-2-ETS1-2
Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

3rd-5th Grades

T-Cell Receptor Puzzle
Students explore immune cells and how to stay healthy by playing a Germ Invaders game and creating a puzzle that shows how T-Cells lock on to infections.
NGSS STANDARDS
4-LS1-1
Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Heart Stations
Students rotate through stations integrating English Language Arts, math, and physical education to as they learn about the human heart.
NGSS STANDARDS
4-LS1-1
Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Prosthetic Possibilities
Using the Engineering Design Process, students explore how engineers design technology to meet specific accessibility needs.
NGSS STANDARDS
3-5-ETS1-1
Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
3-5-ETS1-2
Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

6th-8th Grades

Building Immunity
Students explore how the body responds to infected cells, invading bacteria and cancer cells. Using communication, teamwork and engineering design principles they'll craft a killer immune cell that fits to a specific antigen on an invader cell.
NGSS STANDARDS
MS-LS1-3
Use arguments supported by evidence for how the body is a system of interacting subsystems composed of groups of cells, tissues, and organs working together to maintain homeostasis.

Pump It Up
Using a simple model of the heart that they create, students experiment with the function of the heart chambers and valves to circulate blood.
NGSS STANDARDS
MS-LS1-3
Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

Universal Design Challenge
Students are encouraged to see their community with new eyes as they design assistive technology or new products to help a chef with a limb difference.
NGSS STANDARDS
MS-ETS1-1
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.

9th-12th Grades

Optimal Optics
Using a pinhole camera they construct, students learn about focal length, its impact on the image created, and the brain's role in vision.
NGSS STANDARDS
HS-PS4-5
Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.

Clear It Out: Stent Design
Using design and engineering principles, students build a stent prototype to clear plaque from clogged arteries.
NGSS STANDARDS
HS-ETS1-3

Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

Accessible Engineering
Students re-design a product or design an assistive device to help an athlete with a limb difference.

NGSS STANDARDS
HS-ETS1-3
Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.