



Curriculum & Instruction

SUMMIT PUBLIC SCHOOLS

Content Area: STEAM

Course: STEAM

Grade(s): Grade 1

Course Overview

This STEAM course is designed to foster curiosity, collaboration, and creativity through hands-on inquiry based learning experiences. In the first unit, students are introduced to foundational STEAM concepts and the Engineering Design Process while developing teamwork skills through engaging robotics challenges using Indi Cars. The second unit explores sound and lights as forms of energy, where students investigate wave behaviors through real world phenomena, hands-on experiments, and creative applications such as designing instruments and communication tools. In the third unit, students deepen their understanding of living things by studying how plants and animals survive and adapt, using scientific thinking to draw evidence based conclusions and exploring biomimicry to connect nature to human innovation. The final unit emphasizes design, communication, and collaboration as students build cardboard structures inspired by *Boxitects*, using tools and teamwork to solve problems creatively. Across all units, students are encouraged to ask questions, make predictions, and reflect on their learning. This course aims to build a strong foundation in STEAM while promoting a growth mindset, critical thinking, and a passion for innovation.

New Jersey State Learning Standards

Summit Public Schools curriculum aligns with the [New Jersey Student Learning Standards](#).

Content Area Standards:

K-2-ETS1-1 Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) 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-PS4-1 Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.

1-PS4-2 Make observations to construct an evidence-based account that objects can be seen only when illuminated.

- 1-PS4-3 Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.
- 1-PS4-4 Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.
- 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.
- 1-LS1-2 Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.
- 1-LS3-1 Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

Interdisciplinary Standards:

- MP.5 Use appropriate tools strategically. (1-PS4-4)
- W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-LS3-1)
- SL.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.
- RL.1.10 With prompting and support, read and comprehend stories and poetry at grade level text complexity or above.

Career Readiness, Life Literacies and Key Skills Standards:

- 9.4.2.CI.1: Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).
- 9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
- 9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
- 9.4.2.TL.3: Enter information into a spreadsheet and sort the information.
- 9.4.2.TL.7: Describe the benefits of collaborating with others to complete digital tasks or develop digital artifacts (e.g., W.2.6., 8.2.2.ED.2).

Computer Science and Design Thinking Standards:

- 8.1.2.DA.3: Identify and describe patterns in data visualizations.
- 8.1.2.DA.4: Make predictions based on data using charts or graphs.
- 8.1.2.AP.3: Create programs with sequences and simple loops to accomplish tasks.
- 8.1.2.AP.4: Break down a task into a sequence of steps.
- 8.1.2.AP.5: Describe a program's sequence of events, goals, and expected outcomes.
- 8.2.2.ED.2: Collaborate to solve a simple problem, or to illustrate how to build a product using the design process.
- 8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process.
- 8.2.2.ED.4: Identify constraints and their role in the engineering design process.
- 8.2.2.NT.2: Brainstorm how to build a product, improve a designed product, fix a product that has stopped working, or solve a simple problem.

Career Ready Practices

- CRP 1. Act as a responsible and contributing citizen and employee.
- CRP 2. Apply appropriate academic and technical skills.

Date Revised: August 2025

- CRP 3. Attend to personal health and financial well-being.
- CRP 4. Communicate clearly and effectively and with reason.
- CRP 5. Consider the environmental, social and economic impacts of decisions.
- CRP 6. Demonstrate creativity and innovation.
- CRP 7. Employ valid and reliable research strategies.
- CRP 8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP 9. Model integrity, ethical leadership and effective management.
- CRP 10. Plan education and career paths aligned to personal goals.
- CRP 11. Use technology to enhance productivity.
- CRP 12. Work productively in teams while using cultural global competence.

New Jersey Curriculum Mandates:

This curriculum integrates lessons that address the following interdisciplinary New Jersey Curriculum Mandates:

- [Diversity and Inclusion](#) (Grades K - 12)
- [Climate Change Education](#) (Grades K - 12)

Learning Objectives

- Students will be able to identify and explain the components of STEAM and describe the steps of the Engineering Design Process.
- Students will apply collaboration and growth mindset principles to work effectively in teams and analyze their problem-solving strategies during hands-on challenges.
- Students will design, test, and improve a solution to the “Save the Bears” engineering challenge, evaluating the effectiveness of their designs and presenting their findings to their peers.
- Students will analyze and interpret real-world scientific phenomena of sound vibrations and light behavior by constructing labeled models and written explanations that demonstrate how external stimuli enable animals and humans to sense and respond to their environment.
- Students will design and implement an original solution that applies understanding of light and sound waves to solve a communication challenge, using appropriate scientific vocabulary and labeled diagrams.
- Students will evaluate and revise scientific claims and student-created models by comparing observed data with peer findings, identifying patterns and drawing conclusions about how sound and light waves travel through different materials.
- Students will analyze observable patterns in animal behavior and physical structures by recording detailed observations and generating evidence-based explanations of how animals depend on their environment for survival.
- Students will evaluate the effectiveness of different animal structures by comparing them to tools in hands-on experiments, then justify how specific structures support survival using data collected during investigations.
- Students will design and construct a biomimicry-inspired tool or structure that solves a real-world problem, and reflect on the design process by proposing improvements based on testing outcomes and group collaboration.
- Students will be able to collaborate creatively with their peers to design and construct a unique cardboard project, using problem-solving strategies to overcome challenges throughout the process.
- Students will be able to apply the engineering design process to collaboratively design and build a cardboard structure.

- Students will be able to evaluate their group's design by testing its function, reflecting on their collaboration, and identifying specific ways they improved their project.

Units of Study

Unit 1: Introduction to Engineering Design Process and Coding/ Robotics (10 days)

- What does STEAM stand for, and how do these subjects work together to solve real world problems?
- How can having a growth mindset and collaborating with others help us overcome challenges and improve our solutions?
- What are the steps to the Engineering Design Process and how can we use them to design, test and improve our ideas?

Unit 2: Sound and Light Waves (15 days)

- How can we use observations and models to explain how sound and light help us understand and interact with the world around us?
- In what ways do vibrations and light waves allow humans and animals to communicate, sense danger, or survive in their environments?
- How can we design tools or systems that use sound or light to solve problems or send messages, just like scientists and engineers do?

Unit 3: Animal Powers (15 days)

- How do animals and plants use their body parts and behaviors to survive in their environments?
- What can we learn from nature's structures and patterns to help us solve human problems?
- Why is collaboration important in science, and how does sharing our observations and questions help us understand the world more deeply?

Unit 4: Collaboration through Engineering: Boxitects (10- 15 days)

- How can working together help us solve problems and create better ideas rather than working alone?
- What makes cardboard a useful material for building and designing?
- How do engineers use creativity and testing to improve their designs?

Instructional Resources and Materials

Instructional resources are the information sources teachers utilize to guide their teaching and assessing. Instructional materials are the texts students read or review. The instructional resources and materials may vary in order to meet the learning needs of students.

- **Technology:** Indi Cars, Chromebooks
- **Online Tools:** Mystery Science, Generation Genius
- **Building Materials:** Masking and duct tape, cups, craft sticks, pipe cleaners, paper plates, cardboard, cardboard tubes, string, cotton balls, make do tools
- **Experiment materials:** flashlights, tuning forks, aluminum foil, marshmallows, plastic utensils, ping pong balls
- **Texts:** *Boxitects*

Assessment Strategies

Assessment measures a student's mastery of a course standard and learning objective. Assessment can be used for both instructional purposes and for evaluative purposes. Teachers may choose one or more of the following ideas to assess learners. They may also modify these ideas to make the assessment more responsive to students' interests and needs.

Formative:

- Observation of teamwork and communication during group activities
- Science journals: entries including annotated diagrams, observations, and questions
- Peer feedback and self assessment on group collaboration

Summative:

- Engineering Challenge Products in all units
- Indi Car Challenge

Benchmark:

- Rubric based self reflection of the engineering design process in each unit challenge

Suggested Strategies for Modification & Differentiation

[Modifications Chart](#)