



Curriculum & Instruction

SUMMIT PUBLIC SCHOOLS

Content Area: STEAM

Course: STEAM

Grade(s): Grade 5

Course Overview

This STEAM course encourages students to become innovative thinkers, effective collaborators, and confident problem solvers through hands-on, real world learning experiences. In the first unit, students develop teamwork and a growth mindset through collaborative design challenges and problem solving activities. They explore the Intelino smart train, learning to use color coded commands and Scratch coding to complete tasks and respond to environmental inputs, culminating in an engineering design challenge. In the second unit, students investigate the properties and states of matter by conducting experiments and exploring real world applications such as eco-friendly cleaning solutions and tools. They analyze physical and chemical changes, explore mass and conservation and apply their knowledge to solve practical problems. The third unit focuses on gravity, force, and motion both on Earth and in space. Students conduct experiments, analyze data, and use simulations to explore these concepts while also coding the Intelino train to respond to different inclines and forces. In the final unit, students apply the engineering design process to create, test, and race custom built cars, using materials from the STEAM lab and 3D printing to refine their designs. Throughout the course, students engage in inquiry based learning, apply scientific reasoning, and grow as innovative and resilient problem solvers.

New Jersey State Learning Standards

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

Content Area 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.

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.

5-PS1-1 Develop a model to describe that matter is made of particles too small to be seen.

5-PS1-2 Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.

5-PS1-4 Conduct an investigation to determine whether the mixing of two or more substances results in new substances.

Date Revised: August 2025

5-PS2-1 Support an argument that the gravitational force exerted by Earth on objects is directed down.

5-ESS1-1 Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth.

5-ESS1-2 Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.

5-ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

Interdisciplinary Standards:

RI.5.1 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (3-5-ETS1-2)

MP.5 Use appropriate tools strategically. (4-ESS2-1)

RI.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (3-5-ETS1-2)

Career Readiness, Life Literacies and Key Skills Standards:

9.4.5.CI.1: Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions (e.g., W.4.6, [3.MD.B.3.7.1.NM.IPERS.6](#)).

9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).

9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.

9.4.5.CT.4: Apply critical thinking and problem- solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).

Computer Science and Design Thinking Standards:

8.1.5.CS.2: Model how computer software and hardware work together as a system to accomplish tasks.

8.1.5.AP.2: Create programs that use clearly named variables to store and modify data.

8.1.5.AP.3: Create programs that include sequences, events, loops, and conditionals.

8.1.5.AP.6: Develop programs using an iterative process, implement the program design, and test the program to ensure it works as intended.

8.1.5.IC.1: Identify computing technologies that have impacted how individuals live and work and describe the factors that influenced the changes.

8.1.5.IC.2: Identify possible ways to improve the accessibility and usability of computing technologies to address the diverse needs and wants of users.

8.2.12.NT.1: Explain how different groups can contribute to the overall design of a product.

8.2.12.NT.2: Redesign an existing product to improve form or function.

8.2.12.ED.1: Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.

8.2.12.ED.2: Create scaled engineering drawings for a new product or system and make modification to increase optimization based on feedback.

8.2.12.ED.3: Evaluate several models of the same type of product and make recommendations for a new design based on a cost benefit analysis.

Career Ready Practices

CRP 1. Act as a responsible and contributing citizen and employee.

Date Revised: August 2025

- CRP 2. Apply appropriate academic and technical skills.
- 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 describe, analyze, and apply the qualities of effective collaboration and a growth mindset by working in teams, reflecting on feedback, and adjusting their group strategies to improve.
- Students will be able to observe and explain the functions of the Intelino smart trains, experiment with commands and track configurations, and implement learned concepts to complete challenges.
- Students will be able to identify and outline the steps of the engineering design process, create a solution to a given challenge, and test and improve their designs.
- Students will be able to understand and describe the three states of matter and how matter can change between states during physical and chemical processes.
- Students will be able to analyze experimental results to determine whether a physical or chemical change has occurred based on observable evidence (e.g., bubbles, temperature change, odor).
- Students will be able to design and construct an eco-friendly cleaning product and tool by applying knowledge of chemical reactions and the engineering design process.
- Students will be able to analyze how gravity and air resistance impact the motion of objects by conducting experiments and interpreting data.
- Students will be able to explain the characteristics and interactions of Earth's four spheres through creating labeled models and participating in discussions.
- Students will be able to evaluate the structure of the solar system and the influence of gravity on planetary motion by modeling and describing celestial movements.
- Students will be able to analyze how factors such as weight, shape and balance affect a car's speed and performance during testing.
- Students will be able to design and construct a car that meets specified requirements and constraints using the steps of the engineering design process.
- Students will be able to evaluate and revise their car design based on testing results, peer feedback, and group reflection to improve overall performance.

Units of Study

Date Revised: August 2025

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

- What makes collaboration truly effective, and how can a growth mindset help a team overcome challenges?
- How can understanding and applying robotic systems like Intelino help us solve real- world problems creatively and effectively?
- How does the engineering design process guide us from identifying a problem to creating and improving a successful solution?

Unit 2: Structure, Properties, and Interactions of Matter (15 days)

- What are the different states of matter, and how do they change in everyday life?
- How can we tell if a chemical change has occurred, and why is it important to understand these changes?
- How can we use our knowledge of matter and chemical reactions to design solutions that are safer and better for the environment?

Unit 3: Earth's Place in the Universe and Gravitational Pull (15 days)

- How does gravity influence motion on Earth, in space, and between celestial bodies?
- What can the interactions between Earth's spheres teach us about our planet and how it works?
- How do scientists use observations, experiments, and models to understand the forces that affect objects in different environments?

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

- How can we use the engineering design process to solve real world problems through building and testing?
- What factors like weight, shape, and balance affect how a car moves and how we can design for better performance?
- Why is it important to test, get feedback, and improve our designs instead of stopping after the first try or tries?

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:** Intelino Smart Train, Chromebooks, 3D printer
- **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
- **Experiment materials:** ziploc bags, salt, sugar, cornstarch, baking soda, vinegar, iodine, chocolate, yard stick, styrofoam ball, tennis ball, post its

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

Benchmark:

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

Suggested Strategies for Modification & Differentiation

[Modifications Chart](#)