Course Overview

Elementary School | STEM | 1st grade - *Last Updated on September 8, 2025*

DESCRIPTION

K-12 Content Area | Mission & Philosophy Statement

Mission Statement

Our mission is to spark curiosity, creativity, and problem-solving skills in young learners by engaging them in hands-on engineering and computer science experiences. Through projects that are relevant, collaborative, and rooted in the **Engineering Design Process**, we empower students to see themselves as capable designers, innovators, and critical thinkers who can tackle real-world challenges.

Philosophy Statement

We believe that students learn best when they actively explore, experiment, and create solutions to meaningful problems. Our approach blends inquiry-based learning with teamwork, encouraging students to take risks, learn from mistakes, and persist through challenges.

Through units like **Programming Robots**, **Engineering Sails**, and **Engineering Night Lights**, students discover how science and technology work together to solve practical problems—whether it's coding a robot to navigate a maze, harnessing wind energy to move objects, or designing a nightlight that communicates information.

We emphasize the value of collaboration, creativity, and iteration, helping students understand that engineering is not just about building things—it's about making life better for people and communities. By fostering curiosity and resilience, we prepare students to approach future challenges with confidence and ingenuity.

Course Description

STEM Engineering & Robotics

This dynamic course engages students in hands-on problem-solving through three interactive units—**Programming Robots**, **Engineering Sails**, and **Engineering Night Lights**—each designed to introduce core engineering and computer science concepts in an age-appropriate and exciting way.

Programming Robots

Students explore the basics of computer science by creating and coding a maze for a robot to navigate. Through activities, discussions, and readings, they connect abstract programming concepts to real-world applications. Using the **Engineering Design Process**, they design, test, and refine their mazes and programs.

Engineering Sails

In this collaborative unit, students learn how wind energy can be harnessed for transportation. They design, build, and test sails to move small objects—called "scoobles"—across a distance. Along the way, they investigate how sail materials, size, and placement influence performance, then apply their findings to

improve their designs.

Engineering Night Lights

Students work in pairs to design a nightlight that can adjust light levels for two people sharing a room and indicate whether the next day is a school day. They explore how materials interact with light and how light can be used to communicate. Using their knowledge, they plan, build, test, and refine unique solutions before presenting their final designs.

Course Benefits

Across all three units, students:

- Use the **Engineering Design Process** to guide their work from idea to finished product.
- Develop problem-solving, creativity, and collaboration skills.
- Build a foundation in engineering, computer science, and scientific thinking.

By the end of the course, students see themselves as capable innovators who can design and build solutions to real-world challenges.

STANDARDS

Pennsylvania - Grade 1 - Science, Technology & Engineering, And Environmental Literacy & Sustainability Standards (STEELS) (2023)

3.2.1.B 3.2.1.C 3.2.1.D 3.5.K-2.B 3.5.K-2.C 3.5.K-2.F 3.5.K-2.I 3.5.K-2.K

3.5.K-2.M 3.5.K-2.N 3.5.K-2.O 3.5.K-2.P 3.5.K-2.Q 3.5.K-2.R 3.5.K-2.T 3.5.K-2.U

3.5.K-2.V 3.5.K-2.X 3.5.K-2.AA 3.5.K-2.DD 3.5.K-2.G 3.5.K-2.J 3.5.K-2.L 3.5.K-2.S

Pennsylvania - Grade K-2 - Computer Science

1A.DA.05 1A.DA.06 1A.AP.08 1A.AP.10 1A.AP.11 1A.AP.12 1A.AP.14

COURSE OBJECTIVES

Specific objectives for this course are aligned to the Pennsylvania Science, Technology, & Engineering, Environmental Literacy & Sustainability (STEELS) as well as the Pennsylvania Computer Science standards.

Course Overview

Elementary School | STEM | 1st grade - *Last Updated on September 8, 2025*

ASSESSMENT TYPES

- Pre-assessment
- Post-assessment
- Exit ticket
- Peer-to-peer feedback (informal)
- Final project assessment (using a rubric)
- Informal teacher-to-student questioning
- Informal observation of student work
- Formative assessments
- Summative assessment

SUGGESTED METHODS OF INSTRUCTION

- Direct instruction
- Inquiry Based Learning
- Cooperative learning
- Story-Based Learning
- Project-Based Learning

Course Overview

Elementary School | STEM | 1st grade - *Last Updated on September 8, 2025*

RESOURCES

District Approved Program Resources	District Approved Supplemental Resources	District Approved Technology Resources
• Youth Engineering Solutions. (2023). *Engineering Night Lights.* Boston Museum of Science. https://yes.mos.org/unit/engineering-nightlights/ • Youth Engineering Solutions. (2023). Engineering Sails. Boston Museum of Science. https://yes.mos.org/unit/engineering-sails/ • Youth Engineering Solutions. (2023). Sort it Out: Programming Robots. Boston Museum of Science. https://yes.mos.org/unit/sort-it-out-programming-robots-to-recycle/		