Course Overview

Elementary School | STEM | 4th grade - *Last Updated on September 8, 2025*

DESCRIPTION

K-12 Content Area | Mission & Philosophy Statement

Mission Statement

Our mission is to cultivate young innovators by engaging them in meaningful engineering and computer science projects that address real-world challenges. Through hands-on collaboration and the **Engineering Design Process**, we empower students to develop creativity, empathy, and technical skills necessary to design solutions that enhance everyday life and promote community safety and well-being.

Philosophy Statement

We believe that children learn best when they actively explore problems and develop solutions that matter to themselves and others. By encouraging teamwork, persistence, and iterative thinking, we help students build confidence in their ability to innovate and adapt.

Units such as **Designing Computer Games**, **Engineering Sock Assistive Devices**, and **Engineering Safety Vests** provide students with opportunities to connect scientific concepts to practical applications. We emphasize the importance of empathy and accessibility, inspiring students to consider diverse needs as they engineer thoughtful, user-centered designs.

Our approach nurtures not only technical proficiency but also social and emotional growth, preparing students to be compassionate problem-solvers who positively impact their communities and beyond.

Course Description

STEM Engineering & Design

This interactive course introduces students to core engineering and computer science principles through three hands-on units: **Designing Computer Games**, **Engineering Sock Assistive Devices**, and **Engineering Safety Vests**. Each unit encourages creativity, collaboration, and problem-solving using the **Engineering Design Process**.

Designing Computer Games

Students explore game design fundamentals through activities and discussions that make computer science concepts accessible and relevant. They use the Engineering Design Process to create a game that educates players about the environmental impacts of energy resource choices.

Engineering Sock Assistive Devices

In teams, students design assistive devices that help individuals with limited mobility put on socks. They investigate how assistive technology solves everyday challenges and apply their knowledge to imagine, plan, build, and test effective solutions.

Engineering Safety Vests

Students collaborate to design safety vests for pedestrians, cyclists, and skateboarders navigating busy

intersections. The vests incorporate electrical signals to communicate important information, teaching students about communication systems and circuits. Students plan, create, test, and refine their designs before sharing their work.

Course Benefits

Across all units, students:

- Apply the **Engineering Design Process** to take ideas from concept to completion.
- Develop critical thinking, creativity, and teamwork skills.
- Build foundational knowledge in engineering, computer science, and assistive technology.

By course completion, students become confident innovators capable of designing solutions that improve lives and communities.

STANDARDS

Pennsylvania - Grade 3-5 - Computer Science

1B.CS.01 | 1B.CS.02 | 1B.CS.03 | 1B.NI.04 | 1B.AP.08 | 1B.AP.09 | 1B.AP.10 | 1B.AP.11 | 1B.AP.12 | 1B.AP.13 | 1B.AP.15 | 1B.AP.16 | 1B.IC.21

Pennsylvania - Grade 4 - Science, Technology & Engineering, And Environmental Literacy & Sustainability Standards (STEELS) (2023)

3.5.3-5.B | 3.5.3-5.C | 3.5.3-5.D | 3.5.3-5.F | 3.5.3-5.I | 3.5.3-5.J | 3.5.3-5.K | 3.5.3-5.L | 3.5.3-5.M | 3.5.3-5.N | 3.5.3-5.O | 3.5.3-5.P | 3.5.3-5.Q | 3.5.3-5.R | 3.5.3-5.S | 3.5.3-5.T | 3.5.3-5.U | 3.5.3-5.V | 3.5.3-5.W | 3.5.3-5.Z | 3.5.3-5.BB | 3.5.3-5.EE | 3.2.4.D | 3.5.3-5.A | 3.5.3-5.G

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.

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ASSESSMENT TYPES

- Journal check
- 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

RESOURCES

District Approved Program Resources	District Approved Supplemental Resources	District Approved Technology Resources
• Youth Engineering Solutions. (2023). *Engineering Safety Vests.* Boston Museum of Science. https://yes.mos.org/unit/engineering-safety-vests/ • Youth Engineering Solutions. (2023). *Engineering Sock Assistive Devices.* Boston Museum of Science. https://yes.mos.org/unit/engineering-sock-assistive-devices/ • Youth Engineering Solutions. (2023). *Designing Computer Games.* Boston Museum of Science. https://yes.mos.org/unit/computer-science-essentials-designing-computer-games/		