



Southmoreland School District Elementary (K - 5) STEM Curriculum Overview

Elementary (K - 5) STEM Overview:

The elementary STEM curriculum for grades K - 5 is divided into four modules: (1) Science, (2) Technology, (3) Engineering, and (4) Mathematics. This inquiry based STEM course integrates fundamental concepts of science, technology, engineering, and math. Students develop knowledge and skills from year to year as the STEM curriculum is designed to build on concepts corresponding to the development and maturation of students in grades K - 5. Students use the engineering design process to guide their thinking to solve STEM challenges. The engineering design process is a series of steps that guides engineering teams to loop through the steps as many times as needed, making improvements along the way to learn from failure and uncover new design possibilities to arrive at practical solutions. Students ask questions, research the problem, imagine possible solutions, plan an idea, create and test a prototype, and improve their design. In addition, the overarching themes of the engineering design process are teamwork and design. The students are divided into teams or two with a maximum of four students per group. Students review the challenge, criteria, and constraints. Students brainstorm possible solutions and choose the best solution to build a prototype. They test then redesign until the solution is optimized. Finally, students reflect as a team and debrief as a class.

Module Titles:

Module 1: Science

Module 2: Technology

Module 3: Engineering

Module 4: Mathematics

Module Overviews:

Module 1: Science

The goal of this module is to support the teaching and learning of science by connecting and integrating technology, engineering, and mathematics with science, through STEM activities and science classes. Students develop scientific habits of mind to uncover scientific content. Students learn the skills of persistence, perseverance, creativity, and innovation by fostering their curiosity through inquiry based learning experiences that require critical problem solving processes and analytical thinking skills to solve real world challenges. Students recognize the steps of both the engineering design and scientific method guide the learner through a process with similar goals and intended outcomes. Through STEM challenges that focus on concepts of force and motion



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(bungee jumps and zip lines) and electricity and simple circuits (Makey Makey), students explore scientific principles of physical science.

Module 2: Technology

The goal of this module is to support the teaching and learning of technology by connecting and integrating science, engineering, and mathematics with technology, through STEM activities and computer classes. Students use technology to facilitate the exploration of STEM subjects and provide support for students to connect different disciplinary ideas. Technology encourages students to reorganize scientific and mathematical ideas in a new way (robots, coding, and Makey Makey). Simulation tools (robots, coding, and Makey Makey,) support STEM learning by providing opportunities to manipulate both virtual and actual environments. Through the use of technology, students develop their understanding of STEM subjects and improve the skills that are fundamental to the discipline. In addition, teachers can leverage technology to achieve new levels of productivity, implement useful digital tools to expand learning opportunities for students, and increase student support and engagement. Finally, technology enables teachers to improve their instructional practice through universal design for learning and personalized learning.

Module 3: Engineering

The goal of this module is to support the teaching and learning of engineering by connecting and integrating science, technology, and mathematics with engineering, through STEM activities. Students develop engineering habits of mind and actively experience the engineering design process (ask, research, imagine, plan, create, and improve). The students are introduced to different types of engineers (civil, architectural, and environmental) and how they are creative problem solvers and innovators who work to make the world a better place. Through stem challenges that involve building structures (bridges and towers) students explore engineering skills. They make structures stronger by choosing materials (tensile strength and flexibility), using shapes (rectangle, square, and triangle), selecting construction techniques (trusses and cross braces), and applying fasteners (joints, bolts, screws, nuts, grommets, rivets, and studs). By engaging students in STEM challenges that involve simple machines (wheel and axle, pulley, inclined plane, screw, wedge, and lever), students acquire an understanding of kinetic and potential energy (bungee jumps) and gravity, friction, and force (zip lines).



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Module 4: Mathematics

The goal of this module is to support the teaching and learning of mathematics by connecting and integrating science, technology, and engineering with mathematics, through STEM activities and mathematics classes. Math is the foundation to developing logical thinking and reasoning that is required in the four disciplines of STEM. The problem solving and investigative approach of the Common Core mathematical practice standards fosters and develops mathematical habits of mind and complements the engineering design process. The engineering design process reinforces and extends how students think about problems and offers strategies that expand their thinking about solving STEM challenges.