**STEAM Scope and Sequence 2023- 2024- Ms. Katrina**

Welcome to the 23-24 school year! I am so excited to bring a unique co-taught STEAM experience to our students. Ms. Jill and I will be integrating the concepts of Science, Technology, Engineering, Arts, and Math into our creative, hands-on thematic units exploring The Design Process, Energy, Sound, Light, Space, Natural Disasters, Weather and Communication. Please do not hesitate to reach out with questions or concerns by e-mail, or at after school pick-up. Please check the program newsletter each Monday for class updates. I am looking forward to a great year!

Katrina Trujillo

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STEAM/ 6th/7th Enrichment teacher

**Schedule**

Students will be assigned a group that they will rotate with each day. These groups may flex throughout the year based on student and class needs. Students will participate in both the Arts rotation and the STEM rotation each day. The general schedule is below:

**Stem and Arts Daily Schedule (2023-2024)**

**8:15 Arrival**

**8:30-11:30 Rotation #1 (Arts A or Stem A)**

\*(10:00-10:30) Recess

**11:30-12:00 \*Lunch**

**12:00-3:00 Rotation #2 (Arts B or Stem B)**

\*(2:30-3:00) Recess

**3:00-3:15 Clean Up/Check In**

**3:15 Dismissal**

\*groups are combined for recess and lunch \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**STEM Specific Schedule (2023-2024)**

**Rotation #1 (Group A)**

8:30-8:50 Morning Meeting

8:50-9:30 STEM Topic study

9:30-10:00 Technology and Computer skills (“Tech Time”)

10:00-10:30 Recess

10:30-11:00 STEM Building Challenge

11:30-12:00 Lunch

**Rotation #2 (Group B)**

12:00-12:20 Afternoon Meeting

12:20-1:00 STEM Topic study

1:00-1:30 Technology and Computer skills (“Tech Time”)

1:30- 2:30 STEM Building Challenge

2:30-3:00 Recess

3:00-3:15 Jobs/Clean up/Check in

**STEAM Scope and Sequence 2023- 2024**

**STEM Exploration**

**(Year-long topics, skills and integrated concepts)**

*Topics: Engineering Design Process, Types of Engineering, Careers in STEM, Building Challenges, Technology in our lives, Coding, Robotics*

Year-round Skills and Topics

1. **Engineering Design process**
2. **STEAM career exploration and team challenges**
* Team Engineering challenges, career exploration and projects in:
	+ Biomedical Engineering
	+ Civil Engineering
	+ Environmental Engineering
	+ Chemical and Biological Engineering
	+ Mechanical Engineering
	+ Agricultural Engineering
	+ Electrical Engineering
1. **Technology in our Lives**

Overview: Students will use technology to acquire and demonstrate basic skills in computer usage, vocabulary, word processing, document and project creation, and the use of technology to communicate. Students will also use approved coding software, to create programs with different kinds of loops, events, functions, and conditionals. They will also investigate different problem-solving techniques and discuss societal impacts of computing and the internet. We will address the basics of Digital Citizenship. Skills/Objectives:

1. Demonstrate responsible use of technology and ability to use log-ins, passwords, and various applications to communicate with an audience.
2. Decompose (break down) problems into smaller, manageable subproblems to facilitate the program development process.
3. Modify, remix or incorporate portions of an existing program into one's own work, to develop something new or add more advanced features.
4. Organize and present collected data visually to highlight relationships and support a claim.
5. Use data to highlight or propose cause-and-effect relationships, predict outcomes, or communicate an idea.

**Special Topic Study**

**Special Topic Study #1-** **Fundamentals of Energy- Kinetic, Potential, Light, Sound, Radiation**

Students are introduced to a range of energy types — Kinetic, potential, light, sound and radiation. Through numerous hands-on activities, students explore a wide range of scientific topics related to the fundamentals of energy: kinetic and potential energy, light waves, reflection, refraction, sound waves, volume, pitch, frequency, and radiation. These concepts are presented in the context of engineering applications pertinent to our everyday lives.

Skills/Objectives:

1. Define energy and identify the different types that exist.
2. Students will be able to use strategies to read with understanding, contribute to discussions, interpret content, and work collaboratively in small groups.
3. Define potential and kinetic energy.
4. Relate specific energy types to different engineering projects.
5. Explain that light is a form of energy and that it can be characterized as a wave.
6. Explain that different colors of the spectrum represent light waves vibrating at different frequencies.
7. Describe reflection and refraction of light waves.
8. Explain how engineers use light waves.
9. Give several examples of engineering products that involve sound.
10. Describe sound as a form of energy.
11. Define volume, pitch and frequency as they relate to sound energy.
12. Describe sound energy as traveling in waves.
13. Create and build a musical instrument using household and recycled materials.

**Special Topic Study #2- Space- Travel, Living in space**

**Overview:** Students acquire a basic understanding of the science and engineering of space travel as well as a brief history of space exploration. Students are also introduced to the space environment and learn the major differences between the environment on Earth and that of outer space. Students will research the environment and characteristics of different planets in our solar system. Students will study the International Space Station (ISS) with information about its structure, operation and key experiments. The ISS itself is an experiment in international cooperation to explore the potential for humans to live in space. The space station features state-of-the-art science and engineering laboratories to conduct research in medicine, materials and fundamental science to benefit people on Earth as well as people who will live in space in the future.

Skills/Objectives:

Students will be able to:

1. Describe the major differences between the environment of Earth and outer space.
2. Describe major events in space travel and space exploration.
3. Describe some of the engineering challenges associated with spaceflight and exploring space.
4. Research and describe the environment and characteristics of planets in our solar system.
5. Explain how engineers, scientists, and astronauts work to resolve the challenges of living in outer space through experiments on the ISS.
6. Explain why communication is important for engineers and astronauts.

**Special Topic Study #2**- **Natural Disasters Knowledge and Solutions Planning**

Overview: Students are introduced to our planet's structure and its dynamic system of natural forces through an examination of the natural hazards of volcanoes, landslides, floods, as fires, and thunderstorms. They see how these natural events become disasters when they impact people, and how engineers help to make people safe from them. Students begin by learning about the structure of the Earth; Students learn about the causes, composition and types of volcanoes, and watch and measure a class mock eruption demo, observing the phases that change a mountain's shape. Students learn that the different types of landslides are all the result of gravity, friction and the materials involved. Using a small-scale model of a debris chute, they explore how landslides start in response to variables in material, slope and water content. Students learn about the causes of floods, their benefits and potential for disaster. Using riverbed models made of clay in baking pans, students simulate the impact of different river volumes, floodplain terrain and levee designs in experimental trials. Skills/Objectives:

1. Differentiate between a natural disaster and a natural hazard.
2. Explain why engineers care about natural disasters.
3. Know and understand the processes and interactions of Earth's systems and the structure and dynamics of Earth.
4. Understand why engineers need to learn about the Earth's structure.
5. Know and understand interrelationships among science, technology and human activity and how they can affect the world.
6. Describe several parts of a volcano.
7. List the three main types of volcanoes.
8. Explain that engineers build devices used to predict volcanic eruptions.
9. Describe the basic characteristics of a landslide and relate that gravity and friction are major factors in landslides.
10. Explain several contributors to landslides: heavy rain, runoff water, earthquakes, human activities, forest fires, etc.
11. List several ways that engineers reduce the danger and destruction of landslides.
12. Define flooding as involving heavy rainfall or snowmelt.
13. List three types of flooding.
14. Identify reasons why humans tend to settle in floodplains.
15. Explain that engineers design dams, dikes and levees to control flooding.
16. Explain the factors that create conditions for forest fire.
17. Explain the dangers associated with thunderstorms, and how they are predicted and monitored.