USTEP 2023 Course Catalog

## Vroom! Vroom!: The Inner Workings of Hybrid, Gasoline, and Electric Vehicles

Have you ever been interested in how a car can work off of electricity? Gas? Or even both?! This class will show you each component that goes into a vehicle's ability to work. With electric, gasoline, and hybrid vehicles as the focus, you will learn the impacts it has on our environment and how engineers are able to establish such designs.

By the end of the course, you will understand the inner workings of these magnificent inventions, and will be more knowledgeable about the pros and cons about the vehicles you see everyday.

Harry Potter Potions Class

Calling all Harry Potter fans! Enter the magical world of Harry Potter, and learn to make some magical potions. In this class, students will learn muggle skills such as chemistry and biology. Along with classes everyone will be sorted into a Hogwarts house and play games and participate in other activities to compete for the house cup. Bring your creativity and curiosity!
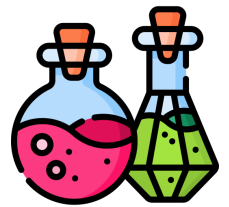
Breathing Life: An Exploration of the Respiratory System

Are you ready to learn all about the amazing ways in which your body helps you breathe? In this class, we'll explore the respiratory system and all its parts, like your nose, throat, and lungs. You'll discover how they work together to bring oxygen to your cells and remove carbon dioxide. This class is perfect for anyone who is curious and loves to learn new things. Bring your creativity and get ready for a fun and educational day all about the respiratory system!
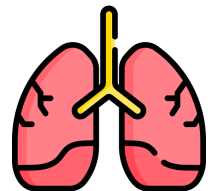
The Building Blocks of Circuits: Minecraft and Logic Gates

Come learn about the building blocks of advanced circuits! Logic gates are fundamental circuit design elements. When put together, they can create complex circuits for different applications. One place you might already have experienced the usefulness of logic gates is in Minecraft! Minecraft Redstone also uses logic gates to accomplish different tasks. In this class you will learn about basic logic gates, how they work, their Minecraft equivalent, and get to experiment with different logic simulators to make your very own circuit.
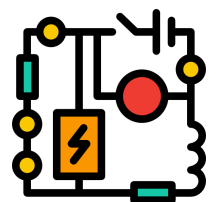
This class requires participants to bring their own computer.

Stressed and Strained: Intro to Biomechanics of Ankle Sprains

Have you ever sprained your ankle running or playing volleyball? Are you curious about how ankle ligaments deform when a certain stress is applied to them? Have you ever wondered what the maximum strain our ligaments can withstand?

This class will focus on a hands-on activity that explores how different designs of stretchy beams handle stress and affect beam strength. Students will learn how to calculate the stress on a tendon given the force and area, read the stress-strain diagram, and determine the grade of ankle sprain through biomechanical analysis. The students will also learn about different preventative measures for these ankle injuries.

Risk and Contamination: Saving Space Exploration!

You can wipe away spilled milk, but how do you save a rapidly corroding spacecraft in space? Why is it that paper rockets don't fly astronauts to the Moon?

The answers can be found after a quick study of risks and contamination. Before any mission to space, scientists spend days studying the technology and systems they will soon send off, and they work diligently to anticipate any kind of material contamination, preparing methods to solve anticipated future issues. In this course, you will learn how to develop a Risk Matrix and will become familiar with contaminative costs and problems associated with space travel and the spatial environment. We will explore contamination budget calculations, molecular v. particulate contamination, cleanliness levels, likelihood v. consequence ratings, and methods of mitigation.
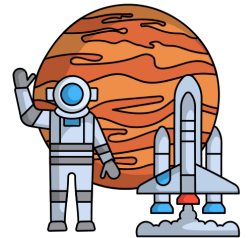
Computer Programming: Independent Projects with Python

Interested in computer science and creating a science fair project? Independent research projects are a great way to gain knowledge and experience outside of the classroom! Computer science projects are especially powerful: from detecting obesity in cats to outliers in heart rate data, with the right tools you can answer complex questions. If you are interested in conducting a computer science project, this is a class to get you thinking about possible topics. You will learn about how to choose appropriate data and how to use Python libraries to make sense of data.

This class requires participants to bring their own computer.