### Top Secret: The Mathematics of Cryptography

What do Thomas Jefferson, 7th graders, and Amazon.com have in common? They all want to send secret messages that can’t be read by nosy people. In this course, we will investigate how secret codes can hide our messages so that only the right person can read them. Then, we will break others’ codes and find out what they were hiding. On the way, we’ll learn about how different people in history (like Julius Caesar!) tried to keep their communication top secret. Finally, we will learn how we can make computers do this task for us. Topics include: modular arithmetic, simple properties of primes, greatest common denominator, frequency analysis, history of cryptography, introductory programming.

### Biological Classification and Beyond

We humans are born with the ability to recognize patterns and categories in our experiences. In this course we will put these abilities to good use by investigating systems of classification in many fields, but particularly in biology. Since ancient times, people who have studied nature have felt the urge to put living things into different categories. In modern times, scientists know about many more living things, and have come up with more sophisticated ways to classify them. To study these, we will investigate animals and plants through research and field observation and practice classifying them. We will also deepen our understanding of the purposes and methods of classification by delving into areas of psychology, mathematics, computer science, and more. *Note: This course will operate under the prevailing scientific fact that organisms have evolved over time via natural selection.

### American History Through Movies

Wish your life would come to life on the silver screen? We’ll make it happen! In this course we will investigate the way movies, advertisements, and media represent American history. Through our viewing and analysis, we will gain a new lens to apply to media and to American history. Then we will use our new skills to create our own advertisement or short film for the Summer Enrichment Program! If you’re interested in advertising, media, movies, or making history this is the class for you!

### Forensics in Chemistry: The Mysterious Case of Hazel Lancaster

How did the body wind up at the bottom of the lake? Can we figure out who did it based on wedding cake ingredients, soil samples, bone age, bloodstains, and drug lab evidence? Forensics is, in large part, founded in the principles of Chemistry. In this class, we will attempt to solve this mysterious case with strategies founded in Chemistry. We will explore acid-base titrations, gas laws, thin layer chromatography, and many other techniques in order to figure out who did it. Get your investigation skills ready and be prepared to look at the world through a lens of Chemistry!
Be the Engineering Physicist

What do roller coasters, bridges and cars have in common? They are all built by teams of engineers working together as they apply their craft. You will learn through contest styled challenges focused on completing a challenge as a team and then testing out your team’s devices in head to head competitions. The challenges are authentic to the real world and the contexts are exciting. You will go through the engineering process of solving problems as a team while you explore vector addition, forces, torques, motion and energy through hands-on activities that include building bridges, roller coasters and remote controlled vehicles.

Architecture, Art, Soccer, and Flight, Courtesy of the Common Circle

In this course, students will explore the secrets of circles, using them to produce an astonishing number of shapes and designs. We will start in the footsteps of the Ancient Greeks, traveling far past them to Alexander Graham Bell, MC Escher, and Buckminster Fuller. In addition to creating beautiful art, you will invent and build strong structures that serve a variety of purposes, including sport, shelter, and flight.

Secrets, Spies, and Telling Lies: Introduction to Codebreaking and Spyology

*Secrets, Spies, and Telling Lies* will inspire spies-in-training to use pictures, symbols, and mathematics to learn cryptography, or the making and breaking of secret messages. The codes and ciphers we will explore include classic ciphers that have existed for centuries, such as the Caesar and Vigenere ciphers, and the modern RSA system, which provides websites with security. This class definitely isn’t all math, though—we’ll also be learning how secret codes have been used throughout history to win wars, save lives, and catch terrifying criminals. (Also, did you know that famous artists have been known to paint secret messages in their paintings?) Finally, we’ll also be heading to the computer lab to explore the use of cryptography in the digital world of smartphones and the internet (just how do all those website passwords work, anyway?). After this class, passing a note to your best friend in the school hallway will never be the same...

The Gettysburg Address: Then and Now

In November 1863, President Abraham Lincoln was invited to deliver remarks, which later became known as the Gettysburg Address, at the official dedication ceremony for the National Cemetery of Gettysburg in Pennsylvania, on the site of one of the bloodiest and most decisive battles of the Civil War. Though he was not the featured orator that day, Lincoln’s 273-word address would be remembered as one of the most important speeches in American history. In it, he invoked the principles of human equality and self-government. This hands-on, inquiry-based course will allow students to use their knowledge and higher-level thinking skills to discover the historical significance of the Gettysburg Address. This journey will lead us to explore primary documents as well as visit a Civil War cemetery at the University of Virginia to create your own dedication ceremony. We will also relate the speech to current events and create a visual, digital photo story of what the Gettysburg Address means to us today.