NEWTON'S ATTIC
Engineering Education

Summer Camps 2017
Academic Programs
Learn. Build. Play.

ALL CAMPS HELD WEEKLY >> TO REGISTER ONLINE, CLICK **HERE.**

▶ Boys & Girls • Ages 6-17 • Half and Full-day camps • Weekly May 22nd –August 11th

▶ All camps are only one-week long, Monday-Friday, but most are repeated multiple times throughout the summer.

▶ Flexible drop-off and pickup times (8:30 am –5:30 pm) at no extra charge; earlier and later times by request for $5 per half hour per child per day.

▶ Most camps are half-day, but two half-day camps can be combined for a full-day camp. Lunchtime supervision provided free of charge; bring your own lunch.

▶ Full-day camps: 9:00 am–5:00 pm • Half-day mornings: 9:00 am–12:30 pm • Half-day afternoons: 1:30–5:00 pm

▶ Half-day camps range in price from $195 to $325 per week and full day camps from $390 to $695 per week.

▶ Small class size and personalized instruction. Shop classes limited to 6 students per instructor. Most computer classes limited to 8 students per instructor.

▶ For your convenience, you may pay by credit card either on-line or at Newton's Attic. However, to help us reduce processing fees, you can also pay by check (or cash) on the first day of class. Thank you! Our Tax I.D. for your Flexible Spending Accounts is 52-2115824.

▶ If you find a class full, please register on the wait-list so that we can contact you if space becomes available. We do our best to accommodate wait-listed students, who will be given priority if we are able to add another section of the class. We will then be in touch to confirm our ability to register your child.

▶ If any class has not met the minimum of three students required for the class to run by one week prior to the start date, we may cancel the class to free up the instructor and class space for other classes, which may have waiting lists. Should this need to happen, we will inform affected families immediately.

▶ There are no classes on Memorial Day or July 4th. The prices have been adjusted for the four-day camp week.

▶ Newton's Attic supplies the computers for all computer based classes.

Android App Development
Grades 6th and Up • Half Day • Cost: $195

That smartphone in your pocket has more computing power than all of NASA did in the 60's and 70's. (Despite that, they managed to put a man on the moon!). So, just contemplate what your child could accomplish if he or she knew how to harness that much computing power. With the availability of android phones and the android development environment, developing your own app is easier than ever. Students who take this class will be introduced to the android development environment and be shown how to use it to deploy their first app. The class will use Java and markup language for development. The students will be able to download and take home their apps and source code and edit them from there. Young entrepreneurs who wish to publish their apps to the Google play store will be shown how, but actually publishing the app to the store requires a $25 fee paid to Google. Students will leave this class with functioning apps that could do anything from view the camera feed, to display sensor information.

Biology for Beginners
Grades 5th and Up • Half Day • Cost: $195

Designed to increase and enhance a basic understanding of life, this introductory biology course provides foundational skills for any student with an interest in exploring the natural sciences. Topics of discussion will include the properties of life, levels of organization, the scientific method, cell theory, and DNA. Students will have the opportunity to work in a laboratory setting, with microscopes, applying knowledge gained in class to preform experiments, and investigate the behavior of both plant and animal cells. Homeschoolers may also find this fulfills a lab credit for their high schoolers.

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Bow Making
Grades 5th and Up • Half Day • Cost: $235

Students will learn engineering design and tool use and even incorporate a little math and physics while they construct their bows. Once their bows are completed, students will move to the archery range to begin developing recognized archery skills and practices under close, experienced adult supervision.

3D Game Design
Grades 6th and Up • Half Day • Cost: $195

This is going to be one 'unreal' camp! There is no question that computer games have influenced the way media is consumed by children and adults alike, and games are continually becoming more powerful and more life like. Building your own three dimensional game is no longer impossible, and the technology is accessible. This class will teach students to use the Unreal Engine to develop a game of their own design. The Unreal Engine is free to use and download, and only incurs a fee if you decide to sell your game for a profit (making it perfect for young developers!). Not only is Unreal Engine a popular choice for current developers with many new releases using it, it also supports mobile and virtual reality development. Students will leave this class with a simple, working 3-D game of their own design and the knowledge to expand it or develop brand new projects in the Unreal Engine.

Build Your Gaming PC
Grades 6th and Up • Half Day • Cost: $225

Parents, here's your chance to let your kids design and build their own gaming computer from the ground up by picking out the individual parts and putting them together themselves. Students who take this class will build their own personal computer from the component parts. This class requires that students and parents attend a seminar with the instructor several weeks before the week of camp in order to learn about the parts that will be bought. During this evening seminar, students will generate a parts list, which must be approved and ordered before the class begins in order to make sure everything arrives on time. During the week of class, students will learn about each component, its function and how to install it. The students will learn which parts are responsible for how the PC performs and how to modify their performance through overclocking. Students will leave this class with a completed and functioning PC of their own design and construction.

Camp Catapult
Grades 5th and Up or Grades 3rd-5th
Half Day • Cost: $195

Siege Alert! Look out, it's time for flying tennis balls, eggs and bags of Jell-O as this camp offers participants the opportunity to design and build a table top size catapult or trebuchet. Students start with a kit of wood, steel, aluminum and plastic parts and create their catapult. When students finish their inventions, they field test them in a fun and exciting activity.

Camp Chemistry I & II
Grades 5th and Up or Grades 3rd and Up
Full week - Half Day • Cost: $195
Single day - Half Day • Cost: $45

Glowing water, blue and red flames, and mountains of oozing foam are everyday occurrences in Camp Chemistry at Newton's Attic. This camp will expose students to the fun and sometimes bizarre world of chemistry, chemical reactions and exciting things that can be made with the right mixture of knowledge, chemicals and materials. In addition to playing with (safe) chemicals, students will work in the shop to fabricate various items, such as test tube holders and similar gadgets that will aid in their exploration of the world of chemistry. Students in the 10 to 15 year old class will delve deeper into fascinating reactions, learn about the periodic table, chemical equations and the mysteries of molecules. So, let's all put on our safety glasses, lab aprons and rubber gloves and see what strange potions we can concoct.

Camp Kaboom!
Grades 8th and Up • Half Day • Cost: $275

Be the envy of the block this 4th of July and show up Dad this year with the best fireworks show ever! In this camp, young pyromaniacs will learn how to take commercially available (and legal) fireworks and arrange them into a spectacular display of lights, action and sound. Campers will use tools in the shop to create and test fireworks equipment, design associated items and techniques used in pyrotechnic shows, and actually construct simple and safe (and again, legal) fireworks. Instructors will discuss the basic chemistry associated with pyrotechnics and even touch on the psychology that helps to create memorable fireworks displays. At the end of the week, each student will design and present a fireworks show to all the students at Newton's Attic. So, be prepared to be dazzled in this exciting and colorful excursion into the world of fireworks. Parents, don't worry-- proper safety techniques and practices will be taught and strongly emphasized.

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Camp Katniss Bow Design & Archery (Girls Only!)
Grades 5th and Up • Half Day • Cost: $235

Almost every young girl knows who Katniss Everdeen is, and she has mystified us with amazing archery skills on the movie screen (thank you Hollywood special effects). In Camp Katniss, not only will girls learn real archery skills, but each student will design and build her own bow in the Newton's Attic wood shop. Here, girls will learn engineering design and tool use and even incorporate a little math and physics while they construct their bows. Once their bows are completed, the all female class will move to the archery range to begin developing recognized archery skills and practices under close, experienced adult supervision. We can't guarantee that girls learn to be as proficient with a bow as Katniss is, but all will gain many new skills, make new friends and have a great time.

Catapult Girls (Girls Only!)
Grades 5th and Up • Half Day • Cost: $195

Siege Alert! Look out, it's time for flying tennis balls, eggs and bags of Jell-O as this camp offers participants the opportunity to design and build a table top size catapult or trebuchet. Students start with a kit of wood, steel, aluminum and plastic parts and create their catapult. When students finish their inventions, they field test them in a fun and exciting activity.

Crash Landing
Grades 8th and Up • Full Week • Cost: $695
By Invitation Only

Your spacecraft mission will meet a terrible fate. Your team will be stranded and alone. Can you engineer a way to survive until help arrives with the tools and supplies on hand?

This is a full week class with three offsite overnights. There is an application for this class. Please email newtonsatticoffice@gmail.com for the application. ALL REGISTRATIONS WILL BE WAIT-LISTED PENDING APPLICATION APPROVAL. There is a BOYS ONLY session scheduled for the week of July 17th, and there may be a co-ed session or girls-only session added.

Creative Aviation
Grades 5th and Up • Half Day • Cost: $195

After learning about aerodynamics, wing plan forms, airfoils, balance and flight controls, each student will construct a custom giant glider (4ft wingspan) from ¼" foam board, balsa and glue. Stock designs are available, but creativity is encouraged, and each student can create a craft of his or her own design. Our instructor, Keith Hollifield, has successfully built and flown hundreds of aircraft, and he stands ready to assist students who want to venture outside the box. These creations will be launched using our high-tension accelerator to put some serious air under their wings. Students will use their crafts to engage in a series of challenges including flight distance, time of flight, payload capability and precision landing tasks with an award given for the best overall performance. This is precision work. Students should be prepared to use discipline, focus and patience to complete this course. Everyone keeps the aircrafts they create in this course, and each glider could be later adapted to radio control for use at home or elsewhere.

Da Vinci Kids
Grades 1st-3rd
Full week, Half Day: Mornings • Cost: $225
Full week, Half Day: Afternoons • Cost: $225

Science, math, engineering, art: Da Vinci was a master of it all. In this class designed exclusively for young developing minds, students get to follow in his footsteps by engaging in a variety of stimulating activities that cut across a wide range of disciplines. Tool use, building and engineering, chemistry and biology, art and design, spontaneous improvisation, and a healthy dose of brain and body play are all mixed together to form this experience. Each activity will last anywhere from 30 to 60 minutes as students move from one subject to the next while making new discoveries about the diverse world around them. Who knows - with this wide range of topics, your child just may discover something of interest that he or she never even imagined.

Don't Try This At Home!
Grades 5th and Up • Half Day • Cost: $225

The name says it all. It's the one phrase that strikes terror in the hearts of parents everywhere. It's also the one phrase that almost guarantees that kids will try to do something unwise in the basement or garage. But fear not, the purpose of this camp is to help youngsters vent the natural desire to do 'exciting' things, and we'll do them here at Newton's Attic – all under close adult supervision – saving you all the headaches. Most of the activities will be science related stunts or things presented on YouTube that would otherwise be very difficult or costly to do at home. Running through a kiddie pool filled with ooblek or igniting balloons filled with hydro-

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gen gas (remotely from a safe distance) are a couple of examples of what we'll get into in this week of guilty pleasures. So grab your safety glasses, earplugs, heavy gloves (all provided by Newton's Attic) and let's create some excitement!

Fig Newtons
Grades 1st-3rd • Half Day • Cost: $225

Little campers having big fun in the shop is what Fig Newtons is all about. This camp is designed to be a companion to Da Vinci Kids, Jr. Apprentices and Tesla Tykes, offering youngsters different projects. Fig Newtons also offers the opportunity to spend more time in the shop making hands-on projects that teach about science and engineering. Egg drop vessels, stomp rockets, and tool boxes are just a few examples of the types of projects kids will fabricate and take home with them. Youngsters, grab your aprons, dust off your safety glasses, roll up your sleeves and get ready to get your hands dirty in the shop at Newton's Attic.

Game On!
Grades 5th and Up or Grades 3rd-5th
Half Day • Cost: $195

Defending castles, breaking codes and chasing gold coins are just a few of the exciting activities we'll do in this internet video game based adventure. However, the real fun of this class is developing the critical thinking skills needed to conquer these games. These skills consist of applying parts of the scientific method to problem solving: data collection, analysis of data, and the formation of conclusions based on that data. That is what this class does, and it does it in a fun way by studying how to play a select group of games that develop logical thinking skills, test perception time, employ spatial recognition and word use analysis. Kids in this camp will be introduced to one game at a time and strategies will be developed to conquer the challenges each game poses. There will be class discussions, data collection about the nature and rules of the games, and from this, students will create unique approaches to playing the games(that is, solving problems). Sure, there will be plenty of game playing in this camp, but what they are really doing is learning how to approach any problem that may come their way.

Goldberg Girls (Girls Only!)
Grades 5th and Up • Half Day • Cost: $195

We've all seen them, but not everyone knows them by name. Rube Goldberg machines are contraptions made of household items, junk and just about anything that can be connected

together in a convoluted arrangement that can be set off to produce a chain reaction of motion that typically ends in some sort of grand finale. In this introductory class, young students learn how to engineer table top sized Rube Goldbergs from all sorts of items found in the extensive collection of vintage parts at Newton's Attic. So crank up your creativity, imagination, sense of humor, and get ready to learn about tool use, basic engineering and outside the box thinking in this entertaining and educational experience.

Goldie Blox and the Three Gadgets (Girls Only!)
Grades K-4th • Half Day • Cost: $195

This girls-only class incorporates GoldieBlox, an award winning book series and construction set starring Goldie the girl inventor, developed by Stanford-degreed Mechanical Engineer, Debbie Sterling. GoldieBlox taps into girls' strong verbal skills and uses a story-based construction set to explore concepts such as the wheel and axel, belt drive, the hinge and other engineering concepts all while building spacial skills and confidence in problem solving. True to Newton's Attic, we will expand on the program by teaching basic tool use and further developing the engineering skills by having the girls build projects in the shop that reinforce the concepts in the construction sets. The girls may keep the projects they build in the Newton's Attic shop. For more information, visit http://www.goldieblox.com/.

Imagineering
Grades 5th and Up • Half Day • Cost: $195

Let your imagination run wild in this hands on exploration of impromptu engineering using common items found around the home or office. This class will focus on the basics of mechanical engineering as young inventors use everyday objects, materials, and tools to design and build gadgets to accomplish various challenges. Can you build a better parachute? Do you like saving eggs from certain destruction? Want to move radioactive material safely across the country? Once the challenge is known, campers are given tools and materials, and the only thing between them and conquest is their imaginations. So, get ready to have an office drawer full of fun in this adventure that is anything but ordinary.

Introduction to Website Development
Grades 6th and Up • Half Day • Cost: $195

What words are to a book or bricks are to a wall is what websites are to the Internet. There are millions of them, and they are as diverse as the people who created them. If your child

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wants to help build and expand the internet, then this camp is for them. Students in this class will learn how to create and host their own website in a Linux environment on a LAMP stack. This class will cover the use of HTML, PHP, JavaScript, and SQL, as well as some higher level development tools. Students will leave this class with the knowledge to build and host their own websites at home, how to properly secure them, and how to make them useful.

Jr. Apprentices
Grades 1st-3rd • Half Day • Cost: $225
Hand tools, saw dust, wood, metal and plastic are just some of the things kids will get their hands on and learn to use in this very creative camp. At the beginning of the week, students will be instructed on the safe and proper use of tools as well as how things are built. Then, participants will begin making projects ranging from wooden puzzles, games and toys, model rockets, and household items to other larger projects like collapsible castle forts and geodesic domes. When finished with one project, campers will move onto another. Students will be working with tools and will be closely supervised throughout the week. Small class size insures personalized instruction. There will also be other periodic activities such as recess and game time, snack time, quiet time and other fun science related activities to break up the day.

Kerbal Space Program
Grades 5th and Up or Grades 3rd-5th
Half Day • Cost: $195
Just about everyone has heard of Minecraft, but there is another computer game phenomenon that is just as much fun and much more educational. It's called Kerbal Space Program, and its popularity is skyrocketing. In this computer based camp, students will learn how to use the game software to create and manage their own mini –space program.They construct virtual rockets, launch them into orbit and attempt to do a variety of NASA like activities like dock with a space station, land on the moon, or attempt to mine an asteroid. Although this is a computer game, playing it is not as whimsical as one would think. Students must learn and apply some basic physics, math, engineering and even a little orbital mechanics as they attempt to become virtual test pilots and astronauts. It's not just a kid's computer game, it actually IS rocket science.

Kiddie Chemistry
Grades 1st-3rd • Half Day • Cost: $195
Formulated for the youngest of Newton's Attic participants, Kiddie Chemistry offers all the fun of our older kids' chemistry camp tailored to 1st through 3rd graders. Bubbling potions, flash paper experiments, glow in the dark liquids and other mystifying phenomena will be the reaction products in this fun and stimulating excursion into the world of kitchen chemistry. So kids, prepare to get out the lab equipment and be ready to avoid those fumes(just kidding) because Kiddie Chemistry is going to be just the right mix of fun and learning.

Lego Robo-Sumo
Grades 3rd and Up • Half Day • Cost: $195
This introductory/intermediate course of Remote Control Sumo Robotics can be enjoyed by students with varying experience levels. Some build experience is beneficial, but not required, and no programming experience is required. Participants will build Sumo-style Lego robots which will be remote controlled via an Android device (phone or tablet) as the robots battle it out in the Sumo-bot arena. Instructor will supply Android devices if students don't have their own.

Lego Robotics Multi-level Mindstorms NXT
Grades 3rd and Up• Half Day • Cost: $195
This multi-level course is structured for beginners with no Lego robotics experience as well as students with some programming experience. The small class size (no more than twelve students) allows for individualized instructional pace. Students will be taught to build and program a robot and will learn how to use the NXT's motors and sensors in a small project that can be completed in a single day.

Lights, Camera, Action!
Grades 6th and Up • Half Day • Cost: $295
Budding film directors, YouTubers and videographers are going to want to check out this camp, which is all about creating the hardware used in good filmmaking and video production. In this hands-on class, students will create mechanical items that are used to create various visual effects. These items include a steadicam, a camera slider, and additional equipment as time allows. As these devices are created, students will use them to shoot test video and see the results. Participants will need to bring their own cell phone or digital camera that will play back video in real time. The focus of this class is not video editing, but creating the hardware used by experienced camera operators. So, let's get out of the director's chair and get behind a

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camera to create some really cool visual effects this summer.

Little League Legos
Grades 1st-3rd • Half Day • Cost: $195
Designed for 1st through 3rd graders, this introductory Lego class is the perfect first step for Lego loving little ones. Students will learn to use the robotic Lego bricks and motors in a series of hands-on projects such as creating animated pictures, dancing Lego-bots or other simple motion projects requiring limited programming of the Lego bricks.

Maker Board Mayhem
Grades 5th and Up • Half Day • Cost: $195
The first lesson most budding engineers learn is how to take something apart and see how it works. That is the approach we take to coding in this class. Students will be presented with code examples, components and in-depth walkthroughs to guarantee early success. Example projects include a Countdown LED and Alarm, Four Note Piano, Multi-Glow Colored Lamp, Coin Toss, Dice Roll, Reaction Timer, Simon Says and many others. We will dissect how the system works and from there the student can modify and expand as far as their creativity will allow.

Maker Board is a tiny, simple computer that you can learn to program in minutes. It was developed in Kentucky by our friends at LetsStartCoding.com. It is designed as a first step to bridge between the real world and code. The code you develop is compatible with the widely used Arduino architecture so there are many opportunities to use the lessons learned in your home projects. After the week is over, you can buy your own Maker Board kit so the learning can continue at home.

Maker Mania
Grades 5th and Up • Half Day • Cost: $195
Maker Mania is a program for students with varying levels of experience using tools and building projects. This structured, supervised class introduces students to the engineering process and hand and power tool use. Students work in the shop on predesignated, age-appropriate projects for the duration of the class. No experience is required, but students must be able to exercise self-discipline and some amount of self-reliance. Please make sure your child is interested in and comfortable with learning to build projects and use tools before registering him or her for this class.

Minecraft Mod with Java
Grades 5th and Up • Half Day • Cost: $195
Join a world of cubes and coding in this class for creating your own Minecraft mods! Students will work with the popular video game Minecraft and will use Java code as well as sound and image editing software to make their own resource pack and eventually a mod for the game. The mods will be limited in depth of changes to the game, but will set the basis for future modifications that the student may want to make. The class will teach students to work with the code of other developers and to read and decipher pre-existing code, a common practice in the software development field. No previous programming experience is required, but students must have a Minecraft account prior to joining the class. If students would like to work on code outside of class, they should bring a flash drive to save their work.

Minecraft Mod with MCreator
Grades 3rd-5th • Half Day • Cost: $195
By popular demand, we have adapted the Minecraft Mod class to include revisions to the curriculum to allow students as young as 8 to join in. The students will be introduced to MCreator, a code-generating program that is used to make modifications without programming knowledge. The class will teach students to work with the code of other developers and to read and decipher preexisting code, a common practice in the software development field. No previous programming experience is required, but students must have a Minecraft account prior to joining the class. If students would like to work on code outside of class, they should bring a flash drive.

Mini Robots - Mega Fun
Grades 3rd-5th • Half Day • Cost: $195
The toy designers at the Attic have created a fleet of notebook sized remote control robots on which teams of students can build a variety of mechanisms and constructs to engage in numerous activities. In this camp, each student will be assigned his or her own mini-bot platform to use for the week. Each day the class will be presented with a new competitive challenge to be completed during that class period. Players will engineer and construct gadgets to accomplish these challenges, attach their inventions to the robots and then engage in competitive events using their inventions. Trophies will be awarded to the winner of each daily challenge, but the real prize will be the fun and learning that goes on in this highly creative, engineering intensive class.

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Nerf Gun Mods
Grades 5th and Up • Half Day • Cost: $195 + $60 materials fee, students keep their Nerf Gun

Lots of youngsters love nerf guns, and the only thing more fun than shooting foam darts at each other is modifying our favorite model so that it shoots farther and faster and has more bling. In this toy filled camp (and yes, there are plenty of adult engineering lessons to be learned studying how toys work), we will provide each student with a popular model of nerf gun and proceed to mod the heck out of it. We'll overvolt the motors, add flashing lights, customized mechanical parts and maybe even a laser sight. Students will learn about electrical circuits and mechanical design as they tweak the shooters. Toward the end of the camp, students will design and construct on our CNC machine reactive targets to use in shootout competitions. Students keep the nerf guns as part of the camp.

Pinball Apprentice
Grades 5th and Up • Half Day • Cost: $235, students keep pinball machine

Parents, remember life before video games when pinball machines ruled the arcade halls? This camp is a somewhat nostalgic return to those days as students design and build their own table-top sized pinball machine complete with steel balls, flippers and flashing lights. Working in the shop with a variety of tools, young wizards design and fabricate various mechanical parts of their machine including things like bumpers, spinners, ramps and tunnels. So limber up your wrists and tell your friends it's time to head to the arcade!

Pinball Wizard
Grades 5th and Up • Full Day • Cost: $495, students keep pinball machine

Parents, remember life before video games when pinball machines ruled the arcade halls? This camp is a somewhat nostalgic return to those days as students design and build their own table-top sized pinball machine complete with steel balls, flippers and flashing lights. Working in the shop with a variety of tools, young wizards design and fabricate various mechanical parts of their machine including things like bumpers, spinners, ramps and tunnels. They will also add wiring, lights and motors that are controlled by a microprocessor as they learn simple electronics and basic programming. This is a full day class that combines mechanical design, electrical circuitry and real world computer programming application to create a great take home project. So limber up your wrists and tell your disciples it's time to head to the arcade!

Programming With JAVA
Grades 6th and Up • Half Day • Cost: $195

Learn one of the most popular computer programming languages, JAVA. Experienced programmer and engineering student Robert Mcgillivray will lead students on a programming odyssey as he takes them through the history, development and implementation of this and other high level programming languages. Then, students will learn how to write a variety of programs in JAVA that can compute solutions to math problems or read and receive user inputs in code. Participants will also learn how to write a JAVA applet and executable JAR file as well as create a paint program that will allow them to draw on their computer screens. Expand your computing horizons by delving into this easy to learn yet powerful programming language. Past JAVA students may continue with this class and progress in their work.

Programming With Scratch
Grades 3rd-5th • Half Day • Cost: $195

Scratch is an easy to learn and easy to use 2-D computer programming module designed by the MIT Media Lab. Scratch helps young people learn to think creatively, reason systematically, and work collaboratively. With Scratch, students learn the design and development process that goes into some of their favorite computer programs. Students will be designing and programming their own ideas into interactive stories, games and animations. For beginners, this camp will show them the basics of programming. For students with experience, this camp will allow them to develop their ideas into more complex programming. No prior experience required.

Python Programming
Grades 6th and Up • Half Day • Cost: $195

Learn to program Python at Newton's Attic! Python is an easy, yet powerful programming language used in all sorts of applications, from robotics to game development. With simple syntax, Python is the perfect way to introduce beginning coders to the world of variables, if-statements, and while-loops. This course will cover the basics of programming, applicable to all languages, including variables, logic statements, loops, and functions. Plus, students will be introduced to the idea of object-oriented programming, a key component of all modern programming languages. Core concepts of game development will also be introduced during the latter part of the week, and by the end of the week, students will have completed their own playable version of Flappy Bird!

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Raspberry Pi Programming
Grades 6th and Up • Half Day • Cost: $195 + $75 optional materials fee to take home a Raspberry Pi.

The Raspberry Pi computer is a small, inexpensive and versatile computer that can be incorporated into countless fun and educational enterprises. No larger than a deck of cards, the R-Pi is perfect for many Newton's Attic style projects, and that is exactly how it will used by students who participate in this class. Participants will learn the basic characteristics of the R-Pi, how to program it, and how to use it in projects like dancing light boards, simple electronic games and fun home automation gadgets. Not only do students learn programming and how to use cutting edge technology, they will be exposed to tool use, mechanical design and circuitry while creating their inventions. At the end of the class, students keep their projects (bring a flash drive!) along with the Raspberry Pi computer if you choose to purchase the associated merchandise for $75. The same Raspberry Pi can be used for many projects.

Robot CyberSpy
Grades 6th and Up • Half Day • Cost: $325

Want to become the master protector of your house even when you're not at home? Well, here's your chance! Long distance becomes a thing of the past when you can harness the power of the internet. In this far reaching camp, students will receive a Raspberry Pi robot kit, complete with a webcam, they will assemble. Then, students will learn how to write and host their own web server securely and safely on the raspberry pi, as well as use this server to host the telepresence robot at home. Their robots will be able to be controlled from anywhere and transmit data to and from their location, including a camera feed of what their robot is seeing. The robots are available to be taken home after the class and are very open to modifications and experimentation.

Robot Rodeo
Grades 5th and Up • Half Day • Cost: $225

Fly a drone! Program a GPS equipped all-terrain rover to autonomously maneuver itself through an outdoor obstacle course. Use our mini robot to perform a rescue mission. These are the kinds of activities you can expect during your week of Robot Rodeo. Newton's Attic will break out our full herd of robots for you to wrangle. Each day will present a new experience. Students will learn the practical application of robotics in simulated real-world situations. From package delivery to first person view operation, you will learn to control robots to carry out the missions you design. Playing with robots for a week, what could be more fun than that!

Robotic Gladiators
Grades 6th and Up • Full Day • Cost: $495

Based on the popular Wrestling Robots, Robotic Gladiators incorporates newly designed, bigger, faster, tougher and rougher Robo-Chassis that will challenge each other in the Robo-Coliseum. Students will learn and practice hand and power tool use and the basic principles of design as they construct complex mechanical devices that will mount atop the remote controlled vehicles. Steel will grind and gravel will fly when students face off using the devices they have constructed.

Rocket Dragsters
Grades 6th and Up • Half Day • Cost: $195

Rockets are fun, and dragsters are fun. Combining the two gives more than twice the thrill, and that's what this class does. Rocket dragsters are built from wood and other materials similar to pinewood derby cars (think rocket powered pinewood derby cars racing on wires). They are designed to fly along a 200 foot long straight horizontal wire about 5 feet off the ground and are powered by rocket engines. Students start with blocks of wood from which they create their dragsters by first generating their own design, then they cut, shape, drill, sand, add wings or whatever they choose until they have their dragsters the way they want them. Following this, students learn how to pack their own rocket motors using potassium nitrate and sucrose. To test and race their dragsters, students place them on the two parallel wire tracks and race two at a time. The automatic gate at the finish line determines the winner. Testing and racing many times is par for the course as racers optimize their designs in hopes of getting the aerodynamic edge to beat their competitors.

Rube Goldberg Machines
Grades 5th and Up • Half Day • Cost: $195
Grades 3rd-5th • Half Day • Cost: $195

We've all seen them, but not everyone knows them by name. Rube Goldberg machines are contraptions made of household items, junk and just about anything that can be connected together in a convoluted arrangement that can be set off to produce a chain reaction of motion that typically ends in some sort of grand finale. In this introductory class, young students learn how to engineer table top sized Rube Goldbergs from all sorts of items found in the extensive collection of vintage parts at Newton's Attic. So crank up your creativity, imagination, sense of humor, and get ready to learn about tool use, basic engineering and outside the box thinking in this entertaining and educational experience.

NEWTON'S ATTIC

Engineering Education

ALL CAMPS HELD WEEKLY >> TO REGISTER ONLINE, CLICK <u>HERE.</u>

Steam Punk Circuitry
Grades 6th and Up • Half Day • Cost: $325

Part style, part attitude, this camp combines 19th century style with 21st century technology. It's Steampunk. Combining old with new is just what students are going to do in this high tech retro class that teaches about electronics, programming and design. Students will be provided with an arduino uno microcontroller and various electrical components including four "Nixie" tubes (or similar LED display) for the display, and by then end of the week will have produced their own digital clock with plenty of opportunity to create custom modifications. The clock uses the built in quartz timer on the arduino board for timing and a custom built circuit to format the display. Students will learn to count in binary, the uses for a multiplexer and how to construct one, as well as an introduction to binary logic. The clock can be implemented in a number of different ways and will include display timing and binary data conversion.

Swordcraft
Grades 6th and Up • Half Day • Cost: $255
Grades 3rd-5th • Half Day • Cost: $255

Swords have been around for about 5,000 years and are simple and easy to use. Well, not really. There is much more science and engineering to a sword than meets the eye, and skillfully using one takes considerable practice. In this class, students will make wooden and pvc swords and learn about engineering related topics such as balance, angular inertia and momentum, and center of percussion. Then, after padding the swords with foam and outfitting each participant with the proper safety gear, the class will introduce students to basic sword handling and sparring techniques. So, get ready to put on your suit of armor, learn some new skills and engage in some high energy medieval fun in this highly creative, engineering intensive class.

Tesla Tykes
Grades 1st-3rd
Full week, Half Day • Cost: $225

Tesla was the master of electricity and father of alternating current. Like Da Vinci Kids, Tesla Tykes is a mixture of projects, demonstrations and actives but will focus on Tesla-inspired projects that relate to electricity and simple circuitry. The projects and demonstrations will be different than those in Da Vinci Kids, Fig Newtons, Jr. Apprentices and Kiddie Chemistry so that you can enroll your child in any combination of these classes without being concerned that your child will be repeating projects.

WarGames

Grades 6th and Up • Half Day • Cost: $235

Part action, part engineering, and big part of pure fun defines this camp. Each day in this thrill packed experience, students will design and use tools in the shop to construct their own mechanical devices that shoot, propel or otherwise launch some sort of (safe) projectile that will be used in a paintball style activity. Mechanisms include pvc bows for archery tag (google it), sling shots, foam rocket launchers and a modern day atlatl. Each day, after designing and working in the shop, students will use their devices in competitions in the outdoor Newton's Attic Wargames arena, a field filled with obstacles through which students chase each other. On the 5th day, the class will be divided into two groups, and each team will be given a quantity of materials from which to construct a car-sized fort. Instructors will discuss basic engineering and fabrication techniques that work to strengthen the forts as much as possible. When the forts are complete, each team will then use the Newton's Attic giant Ballista and some heavy, hard projectiles (think bowling balls) to try to destroy the other team's fort. (No, students will not be occupying the forts at this point.) So, let's suit up in plenty of safety gear and have a ball exploring the science and engineering of things that shoot in this exciting camp.

Water Wars
Grades 5th and Up • Half Day • Cost: $195 plus $30 materials fee; students keep their water toys

Prepare to get wet in this water soaked engineering based class. It's the middle of summer and it's hot, so let's cool off by building various gadgets that squirt, spray, stream and launch water in a variety of ways. Students will explore the basics of pressure, fluid flow, and engineering design as we build air powered super soakers, water balloon launchers, water rockets and similar devices designed to strike fear in the hearts of siblings and neighborhood bullies. So grab your bathing suits and be prepared to get wet in this fun filled, hands on exploration of high powered water toys.

White Hat Hacking
Grades 6th and Up • Half Day • Cost: $195

From Sony and Target to Home Depot and Yahoo, companies, organizations and individuals have all been targets of hacking and security penetrations. Well, we're not going to take it anymore! We're going incognito in this adventure into cyber security so that you don't have to worry as much about who might have access to your computer and sensitive data. Your internet privacy is at risk, and there are ways to control it. Students in this class will learn the risks they take by connecting to the internet and precautions they can take to mitigate those risks. Students will also learn

about the dangers and uses of closed source software versus open source. By the end of the class, students will be able to use and install software to monitor and protect their privacy, both on and offline.