

Summer Classes 2016

All classes \$185 per half day

WELCOME TO SUMMER AT LEONARDO'S BASEMENT

We are excited to present our schedule of summer classes. Every year instructors dream up ideas for classes after watching and listening to you during the previous year. They will encourage you to design and build engineering, art and technology projects that spring from your imagination.

Leonardo's Basement is unlike any educational organization in the world. It is the largest making space for builders of all ages. It is dedicated to helping students develop projects by dreaming and taking risks. To learn decision making by making decisions. To learn problem solving by solving problems. To develop technical skills using hand and power tools, computers and other technology. To value process over product. To have fun being curious, creative and industrious.

You will have considerable freedom. Along with freedom comes responsibility. We expect you to be self-directed, to respect others and to work hard. We expect that you will follow three simple rules:

Be safe, be nice and have fun.

New in 2016:

- A huge workshop for more and better classes PLUS an outdoor build area
- More TEEN classes
- More LEGO classes
- Star Wars WEEK!

We look forward to seeing you!



Steve Jevning
Founder and Executive Director

Summer Classes 2016

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Week 1 - June 13-17

AM

Claymation

It's time to create and animate colorful clays so they come alive on the big screen! Capture a story through the camera lens that you'll create with your own hands, frame by frame. Add sound and music to bring your movie to life.

Ages 10-14 Limit 8 Neal Swanger

Sling-it!

Build slingshots. When we learn how they work, let's scale them up to launch balls, water balloons, and cupcakes. We can even build a human slingshot!

Ages 9+ Limit 9 Chris Groth

Build a Table

Learn and practice your woodworking skills while you build a coffee, side or end table. After you decide upon size, style and design this project will teach you more advanced woodworking and construction techniques including measuring and cutting parts, design, joinery, power-tool use, and wood finishing. Material fee \$30

Ages 12+ Limit 8 Greg Flanagan

Phineas and Ferb

Invent and build amazing technology just like the famous duo. Perhaps a teleportation machine or magical device for time travel.

Whatever the contraption does it is sure to look cool. Perry the Platypus can lend a hand if you need him.

Ages 6-9 Limit 9

Get Your Wings

Feathery or leathery, metals or petals, make yourself, friends or family members a nice pair of wings. Fairies? Dragons? Wings! Holiday party? Tinsel wings! Arbor Day? Leafy wings! Whether your desired wingspan is two feet or twelve, we can do it! Good for any occasion.

Ages 8-12 Limit 9 Grace Petrie

Furry Friends

Design your own animal pillow. Start by learning to sew a simple pillow. From there, you'll draw, paint, sew and stuff to create fluffy animal creatures. Learn to sew by hand and with a machine to make your friendly pet or scary monster!

Ages 6-9 Limit 8 Lilly Robbins

PM

Advanced Lego Robotics: Walking Robots

Work in teams or solo to build robots that use legs for locomotion. Try building a multi-legged insect, maybe a four legged robot dog or try the ultimate challenge, a humanoid two legged walking robot. No wheels allowed. For students with previous experience building with LEGO Mindstorms.

Ages 12-17 Limit 9 Rand Whillock

Electronic Playground

Design, solder and build an electronic . . . anything. Let's heat up the soldering irons, take some electronic pieces apart and make your newest gadget.

Ages 9+ Limit 10

Dog Houses and Cat Furniture

Design and build a home for your pooch or a place for your cat to climb and play. We'll help you build it to last and add the customized things your pet will love.

Ages 10+ Limit 9 Greg Flanagan

The Art of Messiness

Summer is coming and it's your chance, nay, your duty to take advantage of the warm weather by doing all of the messy, squishy, crazy things outside that you can do in winter. We'll occupy ourselves with a shaving cream slip-n-slide, paint water balloons and maybe have a food fight. Start collecting your ideas so you can bring your messy dreams to life!

Ages 6-9 Limit 9 Grace Petrie

LEGO Vehicle Design

Short, long, wheels or tracks? Wings or fins, large or small. Make the wildest ride you can imagine after digging through buckets of plastic bricks. All blue? Room for six minifig passengers? Make a plan, change your mind, take it apart and perfect your ideal vehicle.

Ages 7-10 Limit 10

Build What You Wish

Come with an idea, or without. Familiarize yourself with the Leonardo's Basement workshop, its tools and building materials. Figure out how to plan, shape or cut and fasten pieces together to make a fantasy creation or practical masterpiece.

Ages 8-12 Limit 10 Marie Voreis

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Week 2 - June 20-24

AM

Intro to Raspberry Pi, mmmmm PII

Explore the many uses of the Raspberry Pi (<http://www.raspberrypi.org/help/what-is-a-raspberry-pi/>). Projects like: home automation, network file servers, network music players, touch-screen cameras and more are all within reach with some basic knowledge of the Raspberry Pi.

Material fee \$60

Ages 12 + Limit 6 Joe Glenn

Time Machines!

Make your own wooden clock and control time! Use salvaged, scrap, or fresh lumber to construct a real working clock. Learn and practice woodworking skills while building a tricked out timepiece.

Ages 8-13 Limit 8 Greg Flanagan

Mega Marble Run

Let's build the biggest, most amazing, marble run we can. Create a contraption that will tower over our heads and send marbles zigzagging through tunnels and tubes. We'll think outside the box and add some fun Rube Goldbergesque twists to the track. How big can we make it?

Ages 6-9 Limit 10 Cora Greenwald

Welding

Attention new or experienced welders: put on your safety gear and start welding at Leonardo's. We will explore the techniques of welding steel and then let our imaginations run wild. The sky is the limit as we weld together our designs, devices, and sculptures.

Ages 14+ Limit 8 Chris Groth

Labyrinths, Mazes and Pinball Machines

Enter the world of 3-dimensional puzzles. Start by making Cat's Cradles to loosen up your brain and your fingers. Grab some graph paper and design labyrinths (with a single path to the center and back out) and mazes (with multiple choices of path and direction). Finish up the week designing your very own working pinball machine.

Ages 8-13 Limit 9 Marie Voreis

LEGO Robotics

Design and build autonomous robotic creations using LEGO Mindstorms. Write computer programs to make the machines navigate on their own, sense their surroundings and perform practical and playful tasks. This class is a fantastic introduction to robotics. It is also appropriate for students with some experience who want to develop their skills.

Ages 9-14 Limit 10 Joe Norby

PM

Intro to Raspberry Pi, mmmmm PII

Explore the many uses of the Raspberry Pi (<http://www.raspberrypi.org/help/what-is-a-raspberry-pi/>). Projects like: home automation, network file servers, network music players, touch-screen cameras and more are all within reach with some basic knowledge of the Raspberry Pi. Program in Linux.

Material fee \$60

Ages 14 + Limit 6 Joe Glenn

Skateboard Obstacles

Build ledges, rails, funboxes, launch ramps, volcanos, spines or slopes. Build them strong and install coping. Make them small enough to take to the park (or put in a car). Learn tool safety and practice some tricks on your builds at the end of the week. Bring your helmet.

Ages 12+ Limit 8 Greg Flanagan

Everything Insects

Want to learn how easy it is to care for amazing insects at home? Learn about the science of entomology. Design and conduct experiments with live insects and make cool models and sculptures. You will even build your own unique terrariums and obstacle courses and bring home fascinating new pets. You'll study bees, beetles, Mantidae (praying mantis), Madagascar hissing cockroaches, crickets, grasshoppers and more.

Ages 7-10 Limit 10 Cora Greenwald

Laser Beam Playground

Spend the week experimenting with the laser engraver to see what you can do! Design from your imagination then cut, engrave and melt your creation into existence.

Ages 11+ Limit 8 Chris Groth

Water

Ever wanted to construct your own river? We'll use a hose, some PVC pipe and containers of various shapes and sizes to create a stream of water complete with boulders, waterfalls, lakes and rapids. Want to construct a small boat that can navigate these treacherous waters and make it to the ocean? We'll test that too, and as always, lunch water rockets!!!

Ages 6-10 Limit 10 Joe Norby

Stop Motion with LEGO

Make a video from pictures. Stop motion is a fun way to create the illusion of motion and tell a story through pictures. Use our huge collection of LEGO and add items from the shop. Create the stories and scenes, take the pictures and create short films.

Ages 8-12 Limit 9 Lilly Robbins

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Week 3 - June 27 – July 1

AM

Roller Coaster

First let's build small roller coaster models. We will design the cars and the tracks and then we will build one big enough for us to ride on!

Ages 12+ Limit 9 Chris Groth

Art Fancy Things from Wood

Use woodworking hand tools and power tools to create unique pieces of art. Paint, stain, and preserve your art with traditional techniques. Carve your masterpiece from a single piece of wood or combine as many pieces as you can find.

Ages 8+ Limit 9 Greg Flanagan

Internet Arduinos

In this class, teens will learn how to connect the real world to computers using the Arduino environment, detecting things with sensors and buttons and buzzing buzzers and lighting lights. We'll be using the Particle Photon, a low-cost Arduino compatible that connects to Wifi! You can make a box that lights up when someone goes to the International Space Station, or a buzzer that goes off when you're tagged in a photo on Facebook!

Ages 13+ Limit 6 Adam Wolf

Make it Move

Design, test, and build your own vehicles and toys that really move! Learn how balloons, sails, and rubber bands, can be used to make things come to life. So many possibilities, what will you make?

Ages 6-9 Limit 10 Cora Greenwald

Electrified Games

How does a light turn on with the simple flip of a switch? We'll explore the world of electricity and learn to make electric circuits. Use what you learn about electric circuits to build your own quiz board to challenge your friends and family, along with other games using electricity.

Ages 9-11 Limit 9 Amanda Nix

Build What You Want

This class is for independent builders who relish the joy of doing it their way. Wood and doodads and motors and the universe of odds and ends are all here for you to be your own boss in the land of creativity and invention.

Ages 6-10 Limit 10

PM

3D Printing

Learn how to use CAD software to make solid models. You will cover the basics of designing in 3-dimensional space and learn how software helps turn ideas into physical objects. After creating your CAD design you will use another software product to "slice" your model and generate machine code for the 3D printer. Finally, your 3-dimensional design will be printed in ABS plastic. Come learn how fun and easy it can be to bring your ideas to 3-dimensional life!

Ages 13+ Limit 8 Greg Flanagan

Playhouses

Make your own playhouse out of cardboard as fancy or as rustic as you like. If you want you can add a room each day of the week. It's YOUR cottage or castle so you'll design and build them to fold up and take home when you are finished.

Ages 6-12 Limit 10 Chris Groth

LEGO Pneumatics

You have used LEGO motors and wheels to make moving robots, now add a new dimension to your Lego creations: pneumatics. Design and build complex machines using LEGO pneumatics, harnessing the power of compressed air. You will work with motors, cylinders, valves and storage tanks to build working compressors, multi-cylinder air powered motors and heavy lift machines. You can add pneumatic suspension to a robot vehicle or build a model of a hydraulic crane, all using the power of compressed air.

Ages 11+ Limit 8 Rand Whillock

Outstanding Origami

Play with the ancient art of paper folding. You may have seen the paper crane or balloon, but have you explored the barking dog or hopping frog? Or used metal instead of paper? Will you fold the tiniest boat to sail or a giant castle fit for royalty?

Ages 8-12 Limit 10 Marie Voreis

American Girl Doll Carpentry

Make beds, cars or even a house for your action figures, stuffed animal or American Girl doll. Start with a plan to get everything the right size and build a rough prototype before you select final materials and construct your final project. Decorate of course!

Ages 8+ Limit 10 Grace Petrie

Metal is Magical

This workshop will help you harness our inner jeweler, sculptor, engineer, or inventor to make something from the most magic material at Leonardo's...METAL! Brass, Copper, Steel, Iron: you will learn to bend, cut, drill, and assemble it all.

Ages 12 + Limit 9 Chris Groth

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Week 4 - July 11-15

AM

Play with Your Food!

Experiment with food science to see what we can create. We can cast our imagination in chocolate and sculpt with your edible playdough recipe, figure out how to make JELL-O less slippery so that it's a better building material!

Ages 8-12 Limit 10 Chris Groth

MMORPG - Massively Multiplayer Offline Role Playing Game

Create a universe with characters that you'll become in game. Collaborate with your classmates to build a game board you can all explore together. Add characters and monsters from Minecraft, Star Wars, or LEGO to interact with. Create and build your own character. Find treasure and complete quests in the game. This world will be yours to explore!

Ages 10+ Limit 10 Neal Swanger

I Spy!

Design and or create props or gadgets like a Q blowgun cane or perhaps a rocket broom, walkie-talkie shoes or whatever you can think of. Make codes that only you and another spy can break.

Ages 9+ Limit 10 Mark Safford

Carve a Large Gnome or . . .

Make a large sculptured greeter for your home. There is a long standing tradition of having a figure greet your friends at the door whether it's the protective bull statue of Peru or a totem pole telling your family history. We provide the gouges, chisels and knives for you to learn how to carve a big chunk of wood and make your gnome, ah, greeter.

Ages 12+ Limit 8 Jess Hirsch

Workshop Tools

Do you ever just want to hit nails with a hammer? Or drill holes with a drill? This is the perfect class for you if you've never tried using tools before! Make wacky nail sculptures with wood, nails and a hammer. Drill holes to make pictures on wood. Then use your new skills

Ages 6-10 Limit 10 Joe Norby

PM

Molding, Melting, Aluminum Casting

The melting point of aluminum is over 1,200 degrees! In this class we will experiment with a few ways to cast our own sculptures, parts, pieces, and thing-a-ma-jigs in aluminum. Not sure what you want to make? Team up with other Leonardo friends to cast a team sculpture.

Ages 13-17 Limit 8 Chris Groth

Bigger and Better Arduino Projects

You will work on advanced Arduino projects using materials around the shop to program and control the real world using sensors, buttons, buzzers, lights, and other doodads for your individual project. We'll have wifi modules to connect some projects to the Internet! An if you want you can team up to make a large permanent project for the shop. Or to show at the 2017 Minneapolis/St. Paul Mini Maker Faire!

NOTE: Prior programming experience required (LEGO Mindstorms, Arduino, or other programming environments).

You don't need to be a programming wizard, but this class isn't for beginners.

Ages 13+ Limit 8 Adam Wolf

A Small Buoyant Structure for Travel on Water

Let's build boats or personal contraptions that float! Sailboat, bateau, catamaran, paddleboat, raft or anything else that keeps you (mostly) above water. After a little brainstorming and planning you will build your floating construction and travel to Lake Harriet for a day of play. Remember your paddle.

Ages 11+ Limit 9 Mark Safford

Wire Beading and Jewelry Design

Make your own earrings, bracelets, necklaces, and more. Create your own designs and learn how to bring them to life! We'll use wire wrapping, knotting, and other beading techniques to create handmade jewelry.

Ages 9-12 Limit 9 Lilly Robbins

Toy Lab

Now is your chance to take old toys apart to see what's inside. Use the parts from old toys to make a new toy of your own. We'll also make and test out different types of simple toys including slime and bouncy balls.

Ages 6-9 Limit 10 Amanda Nix

LEGO Castles

Your castle can be a fortress or a lordly home. It can take any shape or form but you might want to include these items: curtain wall, gatehouse, perhaps a moat, battlements, arrowslits and all of those internal structures like a keep and a dungeon. Do some research before class and come with your castle plans. Once your battlements are constructed you might have time for some battles! Oh yeah, knights and dragons too!

Ages 7-12 Limit 10 Joe Norby

Build What You Want

This class is for independent builders who relish the joy of doing it their way. Wood and doodads and motors and the universe of odds and ends are all here for you to be your own boss in the land of creativity and invention.

Ages 10+ Limit 10 Marie Voreis

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Week 5 - July 18-22

AM

Welding

Put your safety gear on and start welding at Leonardo's. You will explore the techniques of welding steel and then let your imaginations run wild. Learn about kinds of metal, how to cut and grind in preparation for welding together your designs, devices and sculptures.

Ages 14+ Limit 8 Greg Flanagan

Wooden Castles

Design towers and dungeons with dragons and trap doors. Create ramps and catapults with springs and lights and hinges. Learn to drill and saw.

Ages 8-12 Limit 9 Jef Pokorney

Creature Lab

A week of: puppets, cardboard, props & storytelling. Mr. Mark's laboratory will provide you with the materials and expertise to bring everyday objects to life!

Ages 7-12 Limit 9 Mark Safford

LEGO Machines

Designed for students who want to get started building motorized machines with LEGO. Classes will focus on building techniques and simple machines. This class is an opportunity for kids to design and build something that moves on its own. It's also great preparation for LEGO robotics.

Ages 7-9 Limit 10

Forget Stone, Carve it in Wood!

From spoons to figurines to your wildest dreams, whittle your way to the finished product.

Ages: 12+ Limit 8 Jess Hirsch

Wheel-y Fun Engineering: cars, trikes & ramps

Design and build projects using wheels! The number, size and even shape of the wheels is up to you, the inventor. Test your designs on the ramps you and your friends build: steep & dangerous? Curvy and hilarious? It's up to you!

Ages 6-10 Limit 9 Cora Greenwald

Laser 2D to 3D

We have a laser cutter. It cuts through things using lasers! Well, flat things. But you can make a lot of 3D things from flat things! Dioramas, puzzles, castles and models. It's time to turn your thinking up-side down and figure out how to create three-dimensional designs from two-dimensional pieces.

Ages 10+ Limit 9 Chris Groth

PM

Wacky Woody Derby

With ramp building and multiple races, build a wild and crazy pinewood derby racetrack. Then build and tweak your racer. Go for style, go for speed. Challenge each other in daily races.

Ages 8-12 Limit 10 Greg Flanagan

Far-fetched

Explore the history of arrows and then test your ideas for arrow design. You will build arrows with different weights and designs before launching them to see how far they travel. Do you know the "Eleven Steps to Archery Success?" You will learn them because what's the use knowing about arrows if you don't know how to shoot them! Plus, you need to make targets, quivers, and other items.

Ages 11+ Limit: duh . . . 11 Mark Safford

Electric Invention Lab

Use simple circuitry to create things that move and light up. Construct series and parallel circuits, and switches. Then you can design, test, and invent. What would you like to try? Let's do it!

Ages 8-10 Limit 9 Cora Greenwald

Leather Working

Want to make bracelets, cuffs, necklaces, wallets, belts, and more? Come to your Leonardo's Leather Headquarters for all your leather needs. We will learn to shape, cut, dye, and decorate your idea in leather.

Ages 10-15 Limit 9 Chris Groth

Intro to LEGO robots

Design and build autonomous robotic creations using LEGO Mindstorms. Write computer programs to make the machines navigate on their own, sense their surroundings and perform practical and playful tasks. This class is a fantastic introduction to robotics. It is also appropriate for students with some experience who want to develop their skills.

Ages 9+ Limit 9 Joe Norby

Engineers of the Sea

You will design make model boats, ducks, mermaids, rafts...whatever you can dream up that rides or glides on the surface of water. Your vessel may require a sail, wings, motor, fins, or a propeller. Whatever it takes, we'll make it out of a variety of materials. Use wood and foam plus learn how to use the tools to cut and attach them. Of course there will be many chances to test and re-design your craft or creature in the water!

Ages 6-9 Limit 10

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Week 6 - July 25-29 - STAR WARS WEEK!

AM

Welcome to Star Wars Week!

The release of Star Wars: Episode VII - The Force Awakens is a great reason for Leonardo's Basement to celebrate nearly 30 years of Star Wars. Most classes will have a connection to the science fiction opera - all movies are sources for inspiration! - like building a giant spaceship, costumes, and LEGO creations. This collective and imaginative work will be celebrated at a Star Wars Festival for the public on **Saturday, July 30** with food, music, building, games and performances.

Green STAR Screen WARS Dreams

In this class you'll make short movies using the same technique they used in the original Star Wars - green screen! This is the way they made the lightsabers, land speeders and many more effects work. Create your own props and scenes using the green screen filming technique. Learn how to edit out the green background and export your movie to YouTube! Ages 9-16 Limit 8

Fabricating Rocket Engines

Launch a well-engineered race car (or Speeder?) on tracks and pipes. Design them to blast through the air or lurch through an obstacle course. Learn to use rocket engines on multiple wheel systems. Find your balance between mass and velocity in a play land of crash testing. Ages 10+ Limit 10 Jef Pokorney

Droids to Stormtroopers

Explore these iconic images of space by making costume replications in cardboard and papier mache'. You can use our templates for a classic clone warrior or create your own templates for your favorite Bounty Hunter, Jedi or Drone. At the end of the week we will have our own troop! And then . . . Ages 9-16 Limit 8 Mark Safford

Everything Star Wars

Join with the galaxy's biggest Star Wars fans to make stuff from your favorite scenes. Start with a (Luke Skywalker or Kylo Ren) lightsaber and then...How about a ship; AT-AT, TIE fighter? A Rey staff and costume? Naturally! Headband with Yoda ears or Leia's hair? Absolutely! Bring your epic ideas! Ages 6-10 Limit 10

Millennium Falcon

Craft a life-sized space vehicle . . . well, not quite life-sized, but big enough to play in and imagine making the Kessel run in less than 11 parsecs. After some design work you will build the 20'-0" diameter skeleton of the ship before adding cannons and Girodyne engines. After plating the hull of your ship you'll finish the interior and modify the cockpit the same way that Hans Solo and Chewbacca made improvements to their vessel. NOTE: This is a BIG project with AM and PM class sessions. Sign up for one or both. Ages 9+ Limit 15 Chris Groth

Quote you on that?

Hand and laser cut your words and images onto stencils . . . then use them to paint fabric patches or clothes, metal, wood or the Millennium Falcon. OR add your design to the messenger bag you create, make a sign or other project that expresses your personal philosophy! Ages: 10+ Limit 10 Lilly Robbins

LEGO Star Wars

Think the Imperial fleet forgot a class of Star Destroyer? Or that the Rebel Alliance could use a new fighter? Want to replay an epic Star Wars battle with LEGO? In this class you will build things that are (or you think really should be) in the Star Wars universe. (And have them . . . fight?) Ages 10-16 Limit 9

PM

Land Speeders

Make cardboard models of the classic Star Wars hovering vehicle and then work collectively to build a human-scale craft. The models will help you appreciate the challenges of building a bigger machine with casters or bicycle wheels for rolling and a cardboard body to keep weight low for "hovering." Ages 10+ Limit 9 Mark Safford

Millennium Falcon

Craft a life-sized space vehicle . . . well, not quite life-sized, but big enough to play in and imagine making the Kessel run in less than 11 parsecs. After some design work you will build the 20'-0" diameter skeleton of the ship before adding cannons and Girodyne engines. After plating the hull of your ship you'll finish the interior and modify the cockpit the same way that Hans Solo and Chewbacca made improvements to their vessel. NOTE: This is a BIG project with AM and PM class sessions. Sign up for one or both. Ages 9+ Limit 15 Chris Groth

Geek Barista

Develop a menu of beverages and snacks from your favorite video games, books and movies: Hitchhiker's Pan Galactic Gargle Blaster? Romulan Ale? Harry's Butter Beer? Zelda's Chu Jelly? Mario's 1-up cupcakes? Obi-Wan's sweet-sand cookie, with a cup of tarine tea? Ages 10+ Limit 9 Amanda Nix

Electronic Accoutrements

Create cool electronics devices to populate or control the Millennium Falcon. Use existing devices like sound boards, test equipment and other items - make some of them kinda work - and add them to the group-built giant spaceship. Use EL wire for your personal lightsabers and other creations. Ages 9-15 Limit 9

Water Bottle Spaceship

Build replicas of science fiction or real spaceships. Or design your own. You will build upon large and small soda and water bottle frames. Star Destroyer, Millennium Falcon, Death Star? Space Shuttle, Falcon 9, New Shepard? Starfighter, X-wing, TIE fighter? Ages 6+ Limit 10

Di-a-rama-rama

Make your own 3D scene in a box to capture your favorite movie moments, fake historical events, comic book sketches or portraits of your family. Pick your own idea to illustrate in the 3D world and learn wood working skills and painting techniques along the way. Ages 6-16 Limit 9 Jess Hirsch

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Week 7 - August 1-5

AM

Raiders of the Lost Junkyard

Old (and new) machines are really fun to take apart. They are full of twirly, shiny cool, bits and pieces that you can use to make NEW cool, shiny, twirly, robotic sorts of things. No hammers allowed!!!

Ages 8-12 Limit 9

Inflatable Sculpture

Work together to create something spectacular using plastic sheeting, a little tape and a lot of moving air . . . like those giant tube-dudes in front of stores, but better! You'll brainstorm design ideas with your team and create several ginormous inflatable sculptures!

Ages 9-14 Limit 10 Chris Groth

Invent What You Want

Hard core inventors will love the freedom to master their own style of creativity. Learn to balance your wide open imagination with the focus of tool use and a finished product. Step through the process of fantasy and build a very real, and very cool, project.

Ages 6-9 Limit 10 Jef Pokorney

Engineering with CAD

Before you use the 3D printer or the laser engraver to cut 2D pieces, you need to design your project. First, you will learn how to make plans using CAD (computer-aided-design) software. Then you'll design a 3-dimensional object for the 3D printer and a flat piece to cut on the laser engraver. For novice and experienced designers.

Ages 13+ Limit 6 Greg Flanagan

Mega Marble Run

Let's build the biggest, most amazing, marble run that we can. Create a contraption that will tower over our heads and send marbles zigzagging through tunnels and tubes. Perhaps you will add some amazing Rube Goldbergesque features to the track. How big can you make it? How cool?

Ages 6-9 Limit 10 Cora Greenwald

Clothe Yourself

Take your sewing skills to the next level and create clothes or costumes! Make a shirt! Make a skirt! Design your own cosplay outfit! You'll use sewing machines and sew by hand.

Ages 9-12 Limit 8 Lilly Robbins

PM

Red Hot Metal

Use welding, blacksmithing, grinders, and torches to make your ideas come into a new metallic life. Design and build some new tools, sculptures, furniture, or a wondrous thing-a-ma-jig.

Ages 14-17 Limit 8 Chris Groth

Bows, Arrows and Katniss' Quiver

Design and create your own bow and arrows so you can join Katniss and Gale on their hunting trips beyond the fence. Or maybe you hope to try your luck in Hunger Games arena. Either way, the odds will ever be in your favor with your hand-crafted set of arrows. Play with your design to create large and small version and see how far your arrows will fly at outdoor target practice.

Ages 10-14 Limit 10 Marie Voreis

Wooden Game Boards and Toys

Mandala, kendama, kubb, Quoridor, chess, checkers, carrom, skittles and cribbage. Learn the secret language of building wooden toys. You will use the woodshop power tools and hand tools to make games of all sorts. You can even invent a game.

Ages 10+ Limit 10 Greg Flanagan

Defying Gravity

What do a helicopter, a rocket, and a Frisbee have in common? They all fly, of course, but in different ways! In this class we will explore as many ways of making things flit, float and fly as we can. Build and test your creations and push the limits of flight with a little ingenuity.

Ages 8+ Limit 10 Joe Norby

Everything Insects

Want to learn how easy it is to care for amazing insects at home? Learn about the science of entomology. Design and conduct experiments with live insects and make cool models and sculptures. You will even build your own unique terrariums and obstacle courses and bring home fascinating new pets. You'll study bees, beetles, Mantidae (praying mantis), Madagascar hissing cockroaches, crickets, grasshoppers and more.

Ages 7-10 Limit 10 Cora Greenwald

Water, Water Everywhere!

Ever think about all of the different things that water does? In this class you'll learn what you can do with water. Use hoses, PVC pipe, funnels, foam, wood and pumps. Make explosions, experiments (and cool off) with water . . . then make things to sail, float, sink and paddle.

Ages: 6-9 Limit 10

LEGO Stop Motion

Learn how to create and edit stop motion videos using LEGO. You will don the director's hat and create storyboards, your own sets and cast characters using minifigs and other creatures. Work together with your fellow LEGO directors to create masterpieces.

Ages 9+ Limit 10

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Week 8 - August 8-12

AM

Clever Clay!

Use clay with marbles and other trinkets to make bowls, plates, cups, wind chimes, trivets, pendants, whatever.

Add egg cartons to burn away in the kiln, and lots more. You'll be able to glaze and kiln fire your creations. There will be time for smaller polymer projects too.

Ages 12-15 Limit 6 Kay Steffenson

Furniture Making

Learn woodworking while you build a coffee, side or end table. After you decide upon size, style and design this project will teach you more advanced woodworking and construction techniques including measuring and cutting parts, design, joinery, power-tool use, and wood finishing.

Ages 12+ Limit 7 Greg Flanagan

Leonardo's Test Kitchen

Ever wonder how a food might taste with different ingredients? Do you like to experiment in the kitchen? Join us as we create our own quick breads, crackers, granola bars and more. We'll learn about different kitchen tools and about the importance of certain ingredients in recipes.

Ages 9-13 Limit 10 Amanda Nix

Tinker with Metal

In this class we will make creatures and creations out of old watches, nuts, bolts, cogs, springs, and anything else we can get our hands on. Experiment with different ways of attaching the metals- wire, glue and soldering to bring your idea to life.

Ages 10 + Limit 8 Grace Petrie

Sculpture Garden

Have you been to the Walker Sculpture Garden? Work alone to with others to design and build weather-hearty art to begin a Leonardo's Basement Sculpture Garden and perhaps one at your house!

Ages 12-17 Limit 6 Chris Groth

LEGO Dream City

Our cities are continually evolving. Build your own city (and the occasional monster) using Leonardo's collection of LEGO bricks as we learn how cities grow and work. This class is about building with LEGO bricks and you can expect a few surprise pop-up building competitions during the week. All you need is an interest in LEGO. (LEGO maniacs encouraged).

Ages 6-11 Limit 10

Toy Inventors Workshop

Use batteries and motors and rubber bands and balls and string and glitter and wood and cunning. Create toys that spin, catapult or roll on wacky wheels. Maybe the toy you invent will make people laugh or perhaps they will be challenged to think really hard! You can make your own strategy game, baby toy, dog toy or desk toy!

Ages 6-infinity Limit 10

PM

Treehouse

Work as a team to build an indoor treehouse and learn all you need to build your own in the out of doors. You will learn how to build structures that don't fall down and add things like rope elevators to haul your loot and different ladders and climbing walls to get up to your perch. All students will learn basic woodworking techniques and safety.

Ages 12+ Limit 8 Greg Flanagan

Mermaids, Rafts and Galleons

Ahoy, landlubbers! You will be afloat making small boats, ships, galleons, rafts, mermaids . . . whatever you can dream up that rides on the surface of water. Your vessel may require a sail or a propeller, or a viewing deck for the captain. Perhaps oars or a jet engine? Whatever it takes, you'll make it out of a variety of materials. Learn to use wood and foam plus learn how to use the tools to cut them. Of course there will be a big tank of water to test your craft! Wear your pirate cap, Arrrrr!

Ages 6-9 Limit 10

Open Electricity and Electronics Lab

You will learn the difference between electricity and electronics (HINT: electronics is a subset of electricity) building a variety of projects. Start with an introduction/refresher about simple circuitry and ways to control lights and motors. By the end of the week you will be making integrated circuit projects.

Ages 8-10 Limit 9

Rube Goldberg con LEGO

Complete a simple task like flicking a light switch or stopping an alarm clock in a convoluted way. Using NXT Mindstorms and/or Technics pieces you will work on one section of a causation machine and then integrate your part with the rest to create something so complicated that your class will spend the last two days getting it to work.

Ages 12+ Limit 10 Joe Norby

American Girl Doll Carpentry

Make beds, cars or even a house for your action figures, stuffed animal or American Girl doll. Start with a plan to get everything the right size and build a rough prototype before you select final materials and construct your final project. Decorate of course!

Ages 8+ Limit 10 Grace Petrie

Summer Classes 2016

All classes \$185 per half day

Week 9 - August 15-19

AM

Miniature Nature Worlds

If you've got a green thumb but also like to craft, this is the class for you. We'll build our own mini nature worlds with tiny succulents and cacti, and learn about what type of environment they need to live and grow. Create your own mini-figures to live and explore in your world too!

Ages 8-12 Limit 9 Amanda Nix

Minecraft

Join us for the ultimate building game! Work together to design a world on giant graph paper that you will build online. After discussion and decision-making, dive into the virtual world to bring your ideas to life. Maybe a castle, with turrets and dungeons; or a tower that stretches to the sky, or an enormous maze of mineshafts and tunnels below the earth. Anything is possible.

Ages 6-10 Limit 10 Joe Norby

Catapults and Trebuchets

Onagers or mangonels? You will create a small thing that flings based on Roman or medieval designs and take it home for additional mayhem. Or maybe a slingshot made out of crazy materials. As a group you will create two modestly-sized hand-powered trebuchets to battle with . . . Hmm, what about projectiles . . . ?

Ages 10+ Limit 10 Chris Groth

Practical, Playful Furniture

Add a custom coat rack to your porch or a bookshelf for your bedroom. Add clever personal elements as you develop your design. Use a number of different power tools to build your project. We will help you to make it look good and last a lifetime.

Ages 10+ Limit 9 Greg Flanagan

Faeries, Elves, Trolls and Their Houses

Create the perfect habitat for your favorite tiny friend. You decide what they need: Lights? Slides? Bunk beds? Gather metal, wood, sticks, bark, moss, cardboard, rock or plastic and put it all together with drills, hot glue and other workshop tools, to build the dwellings of their dreams.

Ages 6-10 Limit 10 Lilly Robbins

Tetris, Zelda and 8 bits of fun!

Use cubes of wood, paper and cardboard to design and build characters, scenes and props from your favorite pixelated games! The scale of your project can range from jewelry-to-bookshelf-to-You-sized! Make a cosplay costume or accessory. A mushroom kingdom model? Donkey Kong hammer? Space Invaders board game?

Ages 8-14 Limit 10

LEGO Ships (and Pirates)

Aarr! We have us a lot of LEGO pieces and kits waiting for your pirate stories: Shipwreck, islanders, treasure, Enchanted Island, cannons, Imperial Flagship, buccaneers, rafts, kraken, soldiers, Brickbeard, crocodile, Jack Sparrow, volcano, smugglers, Skull Island, sharks and The Black Pearl. Ahoy mateys, welcome aboard!

Ages 7-11 Limit 10

PM

Build a Halfpipe

Work as a team to build a halfpipe for skateboarding, rollerblading, scootering, and biking. At the end of the week, practice your skills while wearing appropriate safety gear. Learn everything you need to know to build your own rad ramp.

Ages 12+ Limit 8 Greg Flanagan

Welding and Woodworking

Let's use the new metal shop and woodshop to design and build from your imagination. Maybe you have a sculpture or a piece of furniture you have been wanting to make.

Ages 14-17 Limit 8 Chris Groth

Doctor Who Accessories

First things first: make a sonic screwdriver and a custom bow tie. After you complete the essentials this becomes a build-what-you-want class for enthusiasts of The Doctor. Make a model vortex manipulator, miniature TARDIS or Dalek salt and pepper shakers. Perhaps a Doctor Who cookie cutter. You can do it. Just keep calm. Your ARE The Doctor.

Ages 10+ Limit 10

Wooden Go Karts

Make ready-to-use go-karts with wood and wheels. Add special features and details to customize your creation. On the final day field test your vehicle. Racing is encouraged. Sorry, no motors.

Ages 12+ Limit 10

Build What You Want

This class is for independent builders who relish the joy of doing it their way. Wood and doodads and motors and the universe of odds and ends are all here for you to be your own boss in the land of creativity and invention.

Ages 6-10 Limit 10 Grace Petrie

LEGO Machines

This class is designed for girls and boys who want to build motorized machines with LEGO and will focus on basic building techniques for simple machines. This is an excellent opportunity for you to design and build something that moves on its own. It's also great preparation for LEGO robotics.

Ages 7-9 Limit 10

Summer Classes 2016

All classes \$185 per half day

Week 10 - August 22-26

AM

Honeydukes Sweet Shop

Design and create sweets to add to the fully stocked shelves at Harry Potter's favorite sweet shop, Honeydukes. What will you dream up to put beside Bertie Bott's Every-Flavour Beans, treacle tarts, pumpkin pasties, and Chocolate Frogs. Take muggle candy to a whole new level by designing packaging and magical properties!

Ages: 8-12 Limit 10

Rube G's Causation Contraption

Build a big, very BIG machine as a group project in the "build what you can," "make a ton of mistakes" spirit. The new workshop has 15-foot tall ceilings with metal trusses and a lot of support columns and beams: creating lots of possibilities for zip lines and pulleys and other hardware to create your chain reaction.

Ages 12+ Limit 10 Rube Goldberg

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Ages 7-9. Limit 10

R/C Tracks

Build up, down and all around an outdoor R/C car track. Think jumps, loops, obstacles, switchbacks, pits of mud and ramps! Race against the clock. Make jumps, banks, tunnels, puddles, loops and construct a few bridges and highways. Bring your own R/C or use one of ours.

Ages 9+ Limit 8 Joe Norby

Furniture Making

Learn woodworking while you build a coffee, side or end table. After you decide upon size, style and design this project will teach you more advanced woodworking and construction techniques including measuring and cutting parts, design, joinery, power-tool use, and wood finishing.

Ages 12+ Limit 7 Greg Flanagan

PM

Go Kart Conversion

We have three real go karts that were build a few years ago. Now that we have a big outdoor space to drive them we'd like to get them running and make some repairs and modifications. A few pieces need to be welded and all three are powered by gasoline engines. We want to replace 1-2 of the engines with electric motors. Students need prior metalworking, welding, advanced electricity or gas engines knowledge.

Ages: 13+ Limit 8

Take Apart

Telephones, toys, clocks, blenders, coffee makers, DVD players, toys, VCR's, radios, R/C cars, laptops, cell phones, toys, typewriters, printers, old cameras, video cameras.

Ages 6-10 Limit 10

EXPLOSIONS!

Learn a bunch of ways to make things explode. You will experiment with physical and chemical explosions. You MIGHT even combine the two! Safely, of course. In addition to making the explosions you might choose to explode some things, like small buildings or strap a rocket engine on a car.

Ages 12+ Limit 8 Chris Groth

Back to the Future

Marty McFly and the Doc taught us that inventions don't always work as expected, but that there is huge satisfaction in the journey! Take your big ideas and develop models and prototypes. Wood, metal, watches, springs, appliances and old toys will fuel your imaginative building. (Sorry, no plutonium; but we may have a bottle of deuterium for our Farnsworth-Hirsch fusor.)

Ages 8-13 Limit 10

Labyrinths and Mazes

Enter the world of 3-dimensional puzzles. Start by making Cat's Cradles to loosen up your brain and your fingers. Grab some graph paper and design labyrinths (with a single path to the center and back out) and mazes (with multiple choices of path and direction). Create other puzzles after you see how fun this is.

Ages 8-13 Limit 9