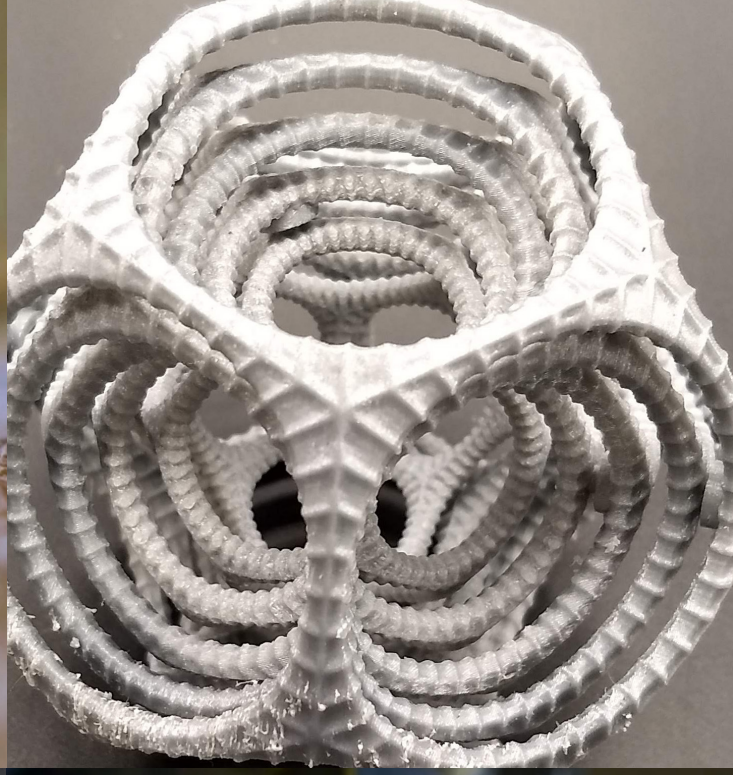

WESLEYAN **IDEAS LAB**

An Overview of Wesleyan's Makerspace

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WELCOME TO THE IDEAS LAB

FAQ

This document was written as an introduction to the makerspace as well as a beginner's guide to ensure safe and proper use of lab equipment. If you can't find an answer to a question, please talk to one of the lab techs.

What is a Makerspace?

One way to think of the IDEAS Lab makerspace is as a digital shop, much like a metal shop or a wood shop. It is a creative studio containing a core set of niche equipment for specific craft processes. What sets a makerspace apart is the focus on automation, digital interaction, and computer-driven control systems.

This commitment to the computer as an instrument for creative expression is most commonly manifested in two general ways: digital fabrication and physical computing. Digital fabrication employs programmable CNC machines such as laser engravers and 3D printers as well as multi-axis mills & routers to cut, shape or extrude on command. Physical computing, on the other hand, uses microcontrollers to interact with the world via some combination of sensors, motors, lights and speakers. Most people get their start with Arduino or Raspberry Pi, but that's just the beginning. When physical computing is paired with digital fabrication, the possibilities are nearly endless.

If you have an idea for a project of this nature, the makerspace may be able to help. While we won't do your work for you, we offer training, expertise and access to all in the Wesleyan community. Read further for details.

Where is the IDEAS Lab?

We are on the ground floor of Exley Science Center. Room 40. Take the double staircase down from the first floor and turn left. Look for the glowing sign.

Who can use the makerspace? When?

If you are an active member of the Wesleyan community who has passed the requisite training, you are welcome in the lab during open hours on Friday and Saturday. Weeknights are reserved for IDEAS class members. The makerspace is closed while class is in session during the weekdays. Please refer to the online calendar for specific times.

How do I receive training?

This booklet comprises the first and most general set of guidelines. After a tour and basic safety training, you are cleared to use the space as well as the level 1 and 2 hand tools. For the remaining machines, further training is required. If you are a member of an IDEAS course, you will receive regular demos throughout the semester in pursuit of your project objectives. For those in the greater Wesleyan community, or for IDEAS students who are interested in digging a bit deeper, weekend workshops will be offered throughout the year. Information will be posted physically, on the lab web page and through social media. If you don't see a listing for the process you are interested in learning, please email the lab coordinator, Shawn Lopez: slopez@wesleyan.edu

Is it dangerous to work in the lab?

Lab patrons must accept a minimum level of personal responsibility. A professor or lab attendant may be able to avert the majority of disasters, but for the most part it is up to you to protect yourself and your fellow makers.

What equipment is available for use?

Please read through the next pages for an overview of available makerspace equipment along with their associated safety concerns.

Is anything available for check out?

Generally, no. Most of our specialty equipment is either bolted down or too heavy to move. Hand and power tools must be used on site.

IDEAS LAB SAFETY OVERVIEW

A SIGNED AGREEMENT MUST BE ON FILE BEFORE USING THE MAKERSPACE

Welcome to the IDEAS Lab.

Regardless of race, religious belief, gender pronouns or level of experience - all are welcome here. The lab is intended to be a place for exploration, expression and creativity. If harassment of any kind takes place, please report the incident to a monitor or to the coordinator.

Safety Standards - Basic permissions given through this form are for general hand and power tool use only. Intermediate and advanced equipment requires further instruction. This list of protective measures, however, establishes a set of universal standards that set the baseline for general lab use. Failure to abide can result in loss of privileges. For your safety and that of others, please take these precautions seriously.

- When in doubt, ask. There is always someone in the lab whose job it is to facilitate safe operation of available tools. Don't try to figure it out for yourself if you are unfamiliar.

- No sandals or open toed shoes in the lab. Any dropped tool can cause injury. You may be paying attention but your neighbor may not be.

- Wear eye protection at all times when operating any piece of equipment. This applies to obvious machines like the belt sander as well as seemingly innocuous tools like hammers and hot glue guns. Goggles and safety glasses are available and easily accessible.

- No food in the makerspace. If drinks are brought in, make sure they are covered and kept in the classroom portion of the lab.

- No ear buds or headphones when using power equipment. Your complete attention is required. The only exceptions include foam ear plugs or noise canceling ear muffs.

- Dangling items can be caught in motors and cause injury. Button or roll up sleeves. Remove scarves, bracelets or other loose accessories. Tuck in hoodie strings. Tie or pin back long hair.

- Protect your lungs and respiratory system. Turn on dust collectors to machines where applicable. Particle masks are available for sanding and other operations.

- No spray paint or spray adhesive in lab or on asphalt. Spray over newsprint or cardboard outside by the loading dock.

- Our footprint is modest and the lab can fill up quickly. It's easy to get in one another's way. Make sure you have plenty of room around you, and that people working nearby are aware of your presence.

- Stay alert. Do not use machines while intoxicated, overtired, or emotionally distraught.

- Never leave machines running unattended. A laser engraving can take over an hour to complete but it can unexpectedly flare up and cause a fire. Someone must be watching over it at all times.

WHEN YOU ARE FINISHED

- For the lab to function smoothly, each user must be responsible for cleaning up after themselves. Vacuums, dust pans and brooms are all available.
    - Turn off, unplug and put away any tools you have used.
    - Sweep your debris from tabletops and stationary equipment.
    - Put waste material (no trash!) in the large dry bin.
    - Dispose of your garbage and recycling.
    - Place usable scrap in appropriate cubbies.
    - Store projects in space provided.

Print Name _____

Sign: _____

Email: _____

WesID#: _____

Date: _____

TOOLS AND EQUIPMENT IN THE LAB

A SHORT OVERVIEW

Safety Level 1 : Hand Tools

Included in these groupings are tools that have no motors and run on human power. It is easy to let safety standards slip when using these devices as they do not readily advertise their danger. Out of everything we offer, however, it is the simple utility knife that causes the most accidents. Always be aware when using this class of tool!

BLADES

Includes X-Acto Knives, Utility Knives, Box Cutters, Razor Blades

CONSIDERATIONS

- Extremely sharp edges.
- Deep cuts are possible requiring stitches and a hospital visit.
- Be aware of the location of fingertips, especially when using a straight edge or ruler.
- Wear safety glasses to protect from pieces of broken blade.

HAND SAWS

Includes Coping Saws, Hacksaws, Bow Saws

CONSIDERATIONS

- Serrated edges sharp enough to cut wood.
- Deep cuts to flesh unlikely.
- Stock should be held securely.
- Watch fingertips and hands.
- Wear safety glasses to protect from splinters and dust.

HAMMERS

Includes Mallets, Deadblow, Ball Pien, Claw

CONSIDERATIONS

- Made to produce a high impact.
- Can break bones and cause severe bruising.
- Fingers are at greatest risk.
- Protect your hearing.
- Wear safety glasses to protect from broken pieces of struck objects.

PLIERS/NIPPERS

Includes Needle Nose, Channel Locks, Wire Strippers, Flush Cutters

CONSIDERATIONS

- Hand-held lever designed to pinch and hold or pinch and cut.
- Can break skin or cause bruises.
- Injuries likely shallow
- Always know what is in the jaws of the pliers.
- Wear safety glasses to protect from chips or flying offcuts.

Safety Level 2 : Handheld Power Tools

Unlike level one hand tools, the majority of these devices are power-assisted in some way; from heat to oscillation. The very thing that makes them useful makes them dangerous. Be respectful of the forces these tools can produce.

HOT GLUE GUN

Heated device for adhering material.

CONSIDERATIONS

- Tip can cause burns.
- Hot glue can stick to skin
- Glue will continue to flow if left on. Turn off when finished. Allow to cool before storing.

SOLDERING IRON

Heated device for soldering electronics.

CONSIDERATIONS

- Tip reaches temperatures in excess of 650 degrees Fahrenheit.
- Skin burns usually minor.
- Flowing solder can accidentally be flicked and sent airborne. Wear eye protection.

DREMEL ROTARY

Hand held unit with interchangeable bits, incl burrs, abrasive disks and buffs

CONSIDERATIONS

- Does its job with speed, not torque. Rotates at thousands of revolutions per minute.
- Tool has a tendency to "climb" across work surface, pulled by the rotation.
- Most injuries surface-level.
- Eye injuries can be quite serious. Wear safety glasses.

HAND DRILLS

Includes rechargable and corded units. Hammer drills and impact drivers are available.

CONSIDERATIONS

- Units are portable and have a surprising amount of power.
- Rotating bit will pierce material. Be sure to drill on top of something that can be damaged. Drill boxes are available.
- Bits can break during use.
- Wear eye protection for dust, debris and broken bits.

PORTABLE SANDERS

Rotating or oscillating disk of abrasive.

CONSIDERATIONS

- Hand-held device with a disk of abrasive material moving at high speed.
- Though there is a small dust collector onboard, a large amount of debris escapes.
- Eye and breathing protection are required.
- Gloves may be used.
- Hazards associated with media being removed. Old paint can contain lead and old surfaces can contain asbestos. If you don't know what you're working with, don't work with it.
- Not to be used in the main room.

Safety Level 2 : Corded and Stationary Power Tools

Unlike level one hand tools, the majority of these devices are power-assisted in some way; from heat to oscillation. The very thing that makes them useful makes them dangerous. Be respectful of the forces these tools can produce.

JIGSAW

Portable saw with thin blades. Must always cut through material.

CONSIDERATIONS

- Blade emerges from underside of material during normal operation. Keep area clear. Keep body parts out of the way.
- Be sure blade is secured tightly in receiver after installation. Ask if unsure.
- Eye, ear and dust protection required.

DRILL PRESS

Stationary drill with movable belts for speed control.

CONSIDERATIONS

- Work must be held securely using clamps or a vise. Small objects held with fingers can get wedged in the bit and spin, causing lacerations or abrasions.
- Gloves can get caught and drawn in. Do not wear them.
- Loose clothing or long hair can get caught in rotating chuck. Tie hair back, push up sleeves.
- Do not attempt to adjust belts yourself.
- Wear safety glasses to protect from debris and dust.
- Do not operate with key in chuck!

SCROLL SAW

Stationary unit using thin blade. Capable of intricate cuts.

CONSIDERATIONS

- Can toss your work around violently if not held down using integrated fence. Adjust to the top of your material.
- Hands can get close to blade during operation. Be conscious at all times.
- Blades break frequently. Ask for help if you need a replacement.

BELT/DISK SANDERS

Stationary machine with rotating disk or belt.

CONSIDERATIONS

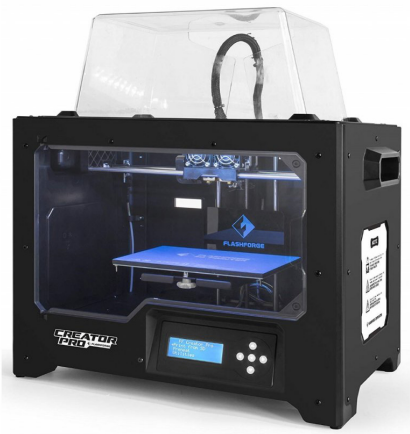
- Abrasive moving at high speed.
- Rotation hazard can pull in loose clothing or long hair. Same with gloves, so do not wear them.
- Most injuries arise from knuckle scrapes. Can remove a fair bit of skin, but most abrasions are shallow with no hospital attention required.
- Use vacuum dust collection when running.
- Dust mask recommended.
- Eye protection required.

Safety Level 3: Further Training Required

Because of their complexity or inherent danger, each piece of equipment in this section requires it's own specialized training. Some are available via weekend workshop, others are by request only. Contact lab coordinator with questions.

2 Epilog Helix laser engravers Bed size 24"x18". One 75W, the other 80W. A rotary attachment is available for cylindrical objects. Cuts medium and light density materials such as acrylic, wood, paper, cardboard. Can engrave glass, stone, anodized aluminum, painted steel.

6 Ultimaker 3 3D printers Dual-extrusion FDM. 215x215x300mm build volume. 2.85mm PLA filaments standard for prints, water-soluble PVA for supports



FlashForge Creator MAX Dual-extrusion FDM. 225xx145x150mm build volume. 1.75mm filament. Full enclosure makes it suitable for ABS.

Axiom Precision CNC router Three axis. Bed size 24"x48". Max Z height 6". Water-cooled 1.5HP electrospindle. Ball-screw drive. For thicker, medium-density materials that can't be cut via laser, including wood, plastic, MDF, extruded nylon, polycarbonate, and acrylic. Relief carvings from 3D files possible.

Tormach PCNC 1100 mill Four axis. Work envelope 18"x9.5"x16.25". 1100W 1.5HP spindle. PathPilot control. For high-density materials that need rigid tooling and flood coolant. Steel, aluminum, brass, iron, titanium.

Formech 450DT vacuum former Forming area 11"x17" w/ 7" draw depth. For making relief molds of solid objects. Works well in tandem with router for creating multiples.

Grizzly G8688 mini metal lathe
Work area 7"x12". 1/3 HP. Variable speed, 2500 RPM maximum. 3" 3-jaw chuck.

Roland GS-24 CAMM-1 vinyl cutter Work area 24"x985". For contour cutting of adhesive viny sheet, films, heat transfer material, acid resist masks.

Singer 4452 heavy duty sewing machine For working with fabric and other woven materials. Capable of sewing denim and lighter grades of leather. Multiple stitch patterns for elastics.

ProtoMAX waterjet cutter Bed size 12"x12". Max Z height 1". 30,000psi at nozzle. For cutting dense, resistant materials such as steel, aluminum, tile, carbon fiber, stone, brass.

Wabeco F1200 manual 3-axis mill 1.4KW motor. Adjustable spindle speeds from 130-3000 RPM. Cutting head rotates from 0°-90° CW and CCW. Precise to .0004"

IDEAS Lab
Exley Science Center
Room 40
Wesleyan University
Middletown, CT 06459