The Workbench

Handbook

IOWA

ENGINEERING

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The Workbench is a collaborative space designed for engineering students to explore ideas, develop projects, and engage in hands-on learning. Located in Room 2028 SC, it is equipped with tools, general equipment, and CNC simulators to support a wide range of engineering activities.

Safety

- Safety is everyone's responsibility – if you see something unsafe, it is your responsibility as a maker to step in.
- Know locations of all first aid, fire, and safety equipment.
- Follow the safety guidelines and instructions for each tool and equipment in the makerspace.
- Do not fool around, startle, or distract anyone while tools are in use.
- Tools and equipment may only be used when a Workshop Monitor is present — no solo work is permitted.
- Notify the Workshop Monitor immediately after any health or safety incident to ensure proper reporting.
- Have fun but be safe!

In case of Emergency, Phone 911

- If someone is seriously injured beyond what is manageable by simple first aid:
    1. Call 9-1-1 from any phone,
    2. Provide assistance to the injured party until the emergency response team arrives, and
    3. Immediately notify the Workshop Monitor and Michael Hillman at (319) 621-4156

Personal Protective Equipment (PPE) and Attire

- Safety glasses MUST be on when in The Workbench. Even if not working.
- Wear appropriate clothing to prevent injury:
    - Never wear gloves when operating machinery.
    - Roll up your sleeves or wear short sleeves.
    - Remove wrist watches, rings, and bracelets.
    - Remove or tuck in neckties.
    - Pull back long hair.

Use equipment and tools as intended

- Use equipment and tools only as they were designed to be used (A wrench is NOT a hammer).
- Handle equipment and tools with care and skill. If you are not sure what you are doing, or have questions, ask.
- Equipment should not be mishandled or used in a way that can cause damage.
- Never use a broken tool.
- Report any broken tools, malfunctioning machines, or damages immediately via e-mail to engr-edf@uiowa.edu.
- Do NOT remove tools / equipment from the makerspace.
- Please be courteous and share equipment when others are waiting. If others are waiting to use equipment, please limit your time to 30 minutes.

Clean up

- Clean up every time you leave an area, including sweeping / mopping the floor (i.e., leave the space better than you found it).
- Return all tools and materials to their designated places.
- Keep the floor clean, dry, and free from trip hazards.
- Mop up spills immediately and put Wet Floor sign out if floor is wet enough to cause someone to slip.
- Take your projects with you when you leave.

What Can I Make?

- The Workbench is designed for students to make and build a variety of projects, we encourage the making of items for:
  - Coursework; including but not limited to Intro to Engineering Problem Solving.
  - Engineering and university student team/group projects.
  - Personal projects and hobbies.
  - Research projects.
  - Entrepreneurial projects and prototypes.

- Use of The Workbench to produce or make any of the following items is strictly prohibited:
  - Weapons of any kind,
  - Drug paraphernalia,
  - Commercial products or any items that will be sold, and/or
  - Items that violate university policies, applicable laws, or contribute to an unsafe, disruptive, or hostile environment for other users.

Eligibility and Access

The Workbench is reserved exclusively for engineering students. The room is secured 24/7 and requires card access for entry.

- Utilization Hours: 8:30 AM – 4:30 PM, Monday through Friday.
- Access will be granted upon completion of required safety training and acknowledgment of usage expectations.
- Please respect time limits and reservations for shared resources (e.g., class office hours, workshops, etc.).

Required Safety Training

Before working in The Workbench (Room 2028 SC), students must complete the following:

1. Online ICON Safety Courses via Environmental Health and Safety (EHS)
   - Respirator Voluntary Use (Course # W050OS)
   - Machine Guarding (Course # W051OS)
   - Tool Safety (Course # W154OS)
   - PPE Awareness for Non-Labs (Course # W156OS)
   - Fire Extinguisher Safety Training (Course # W160OS)

2. Hands-On Safety Orientation (Equipment Room Only)
   - Students intending to use the equipment room (laser cutter, drills, sanders, etc.) must also complete a 30-minute in-person safety orientation.

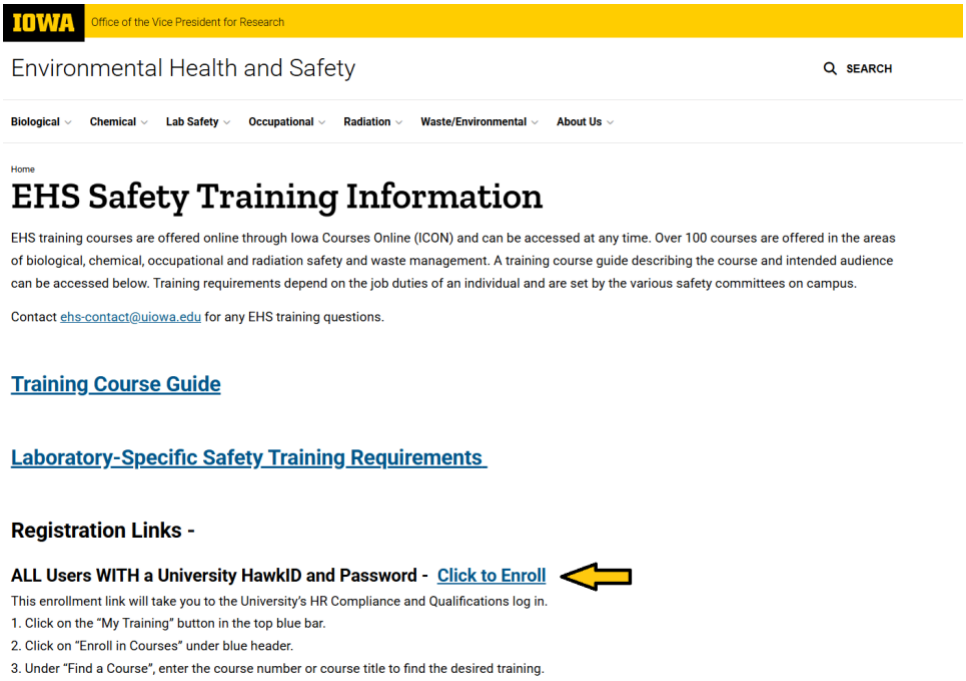
     This session can be scheduled through this link:
     https://uiowa.instructure.com/courses/273169/groups#tab-43658

Engineering Design and Fabrication reserves the right to modify these expectations at any time.

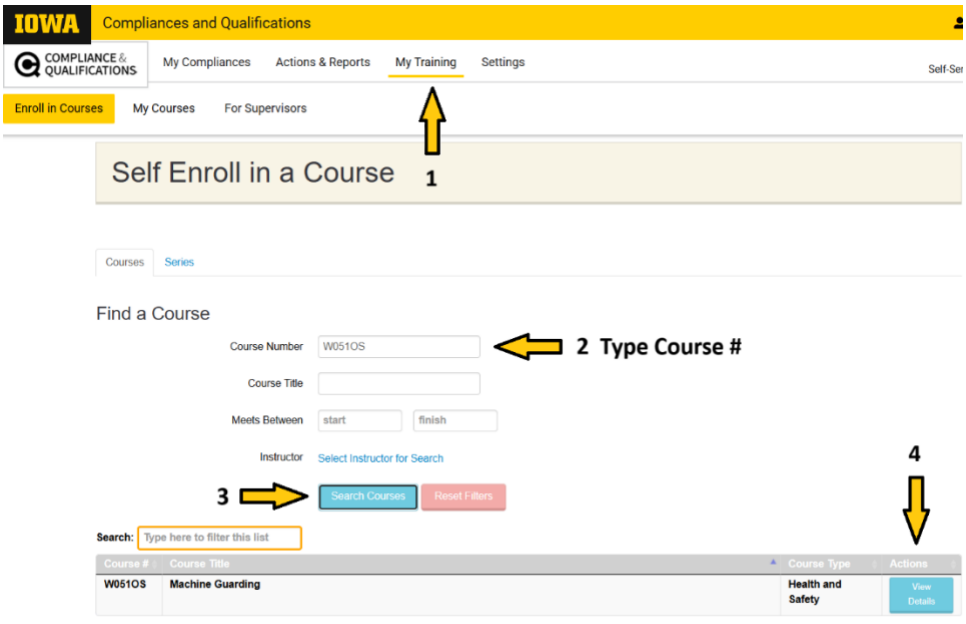
Directions to access the Safety Training

Link to training: https://ehs.research.uiowa.edu/ehs-safety-training-information

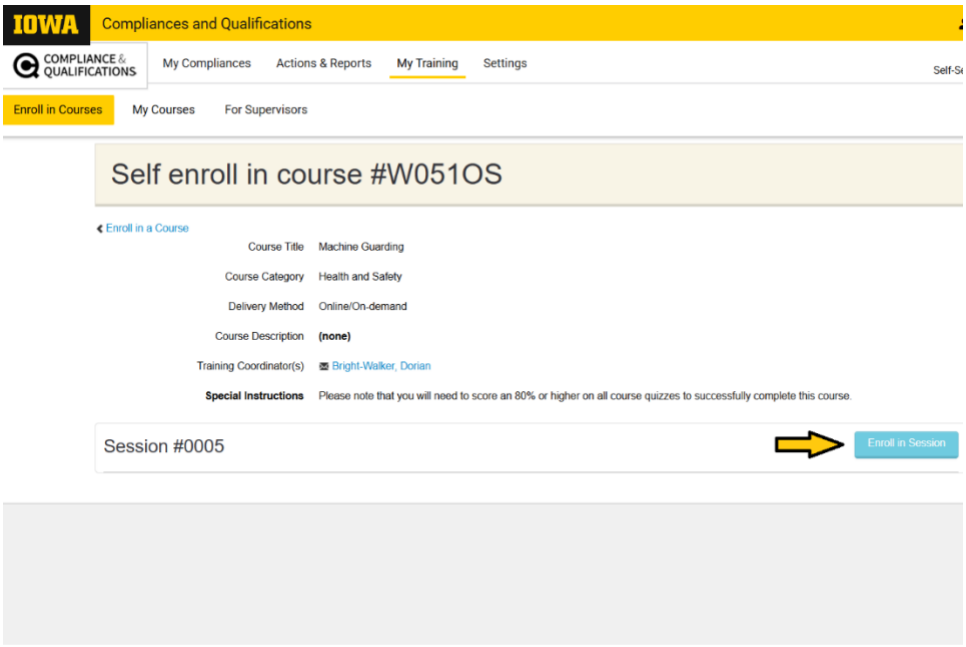
1. **Click to Enroll and enter your HawkID and password.**



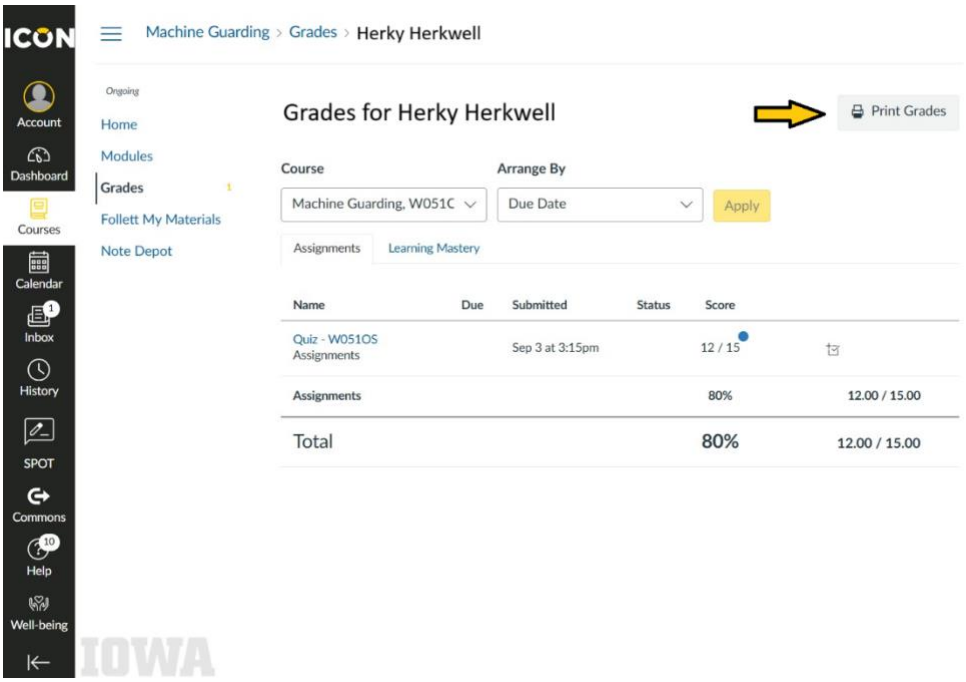
2. **Select "My Training" → Type the course # → Search courses → View Details of the course.**



3. Click Enroll in Session



4. After completing the 5 safety modules, take a screenshot of your grade (must be 80% or higher) and combine all screenshots into a single document. Submit your file via The Workbench Registration Form at https://engineering.uiowa.edu/form/workbench-registration.
Please note: Students are NOT required to submit the Site-Specific Training Forms.



Disk & Belt Sander

The Disk & Belt Sander is a dual-purpose machine used for shaping, smoothing, and finishing Wood, Plastic, and Metal. Its combination of rotating disk and continuous belt makes it ideal for both rough sanding and precision work.

Operating Instructions

1. **Inspect the machine**
   Check for damage, ensure guards are in place, and verify that sanding surfaces are clean and secure.

2. **Adjust Settings**
   Set the belt and disk angles as needed. Ensure the tension and tracking of the belt are correct.

3. **Power On Safely**
   Stand clear of moving parts and start the machine. Allow it to reach full speed before use.

4. **Begin Sanding**
   Hold the workpiece firmly. Use light, even pressure. Sand on the downside of the disk and the flat portion of the belt.

5. **Avoid Overheating**
   Do not press too hard or sand for too long in one spot. Let the abrasive do the work.

6. **Power Off and Clean**
   Turn off the machine, wait for it to stop completely, and clean the area of dust and debris.

Safety Tips!

1. Keep fingers and hands clear of the moving or rotating surface.
2. Sand only on the downward motion side of the disk sander.
3. Always be aware of where your fingers are in relation to the disc/belt.
4. Do not wear gloves when using this sander.
5. Do not sand pieces of material that are too small to be safely supported.
6. Do not remove jammed material while the sander is on. Turn the power off and wait until the machine has come to a complete stop.

Scroll Saw

The scroll saw is a precision cutting tool used for intricate curves and detailed work in wood and plastics. Its fine blade and variable speed control make it ideal for delicate cuts and tight patterns.

Operating Instructions

1. **Inspect the Saw**
   Insure the blasé is properly installed, tensioned, and free of damage. Check that guards and hold-downs are secure.

2. **Set Up Workpiece**
   Mark your cut lines clearly. Use hold-down foot to stabilize the material.

3. **Adjust Speed and Blade Type**
   Select the appropriate blade and speed for the material (e.g., slower for metal, faster for wood).

4. **Start the Saw Safely**
   Start the saw and allow it to reach full speed before beginning the cut.

5. **Make Controlled Cuts**
   Guide the workpiece slowly and steadily along the cut line. Avoid forcing the material – let the blade do the work.

6. **Power Off and Clean**
   Turn off the saw, wait for the blade to stop completely, and clean the area of dust and debris.

Safety Tips!

1. Keep fingers and hands clear of blade.
2. Maintain a safe distance from the blade, using guides for small or intricate pieces.
3. Avoid forcing the material, which can cause breakage or kickback.
4. Always power down the saw and wait for the blade to stop before adjusting or leaving the area.

Drill Press

The drill press is a powerful and precise machine used for drilling accurate holes in metal, wood, and plastic. Its fixed vertical design and adjustable speed settings make it ideal for repetitive and controlled drilling tasks.

Operating Instructions

1. **Inspect the Machine**
   Check for damage, ensure the chuck is secure, and verify that the drill bit is properly installed and tightened.

2. **Set Up Workpiece**
   Secure the material firmly using clamps or a vise. Align the drill bit with the desired drilling location.

3. **Adjust Speed and Depth**
   Select the correct speed for the material and bit size. Set the depth stop if needed for consistent hole depth.

4. **Start the Drill Press**
   Turn on the machine and allow it to reach full speed before beginning the cut.

5. **Drill with Controlled Pressure**
   Lower the bit slowly into the material using the feed lever. Apply steady, even pressure—do not force the bit.

6. **Retract and Power Off**
   Once the hole is complete, raise the bit, turn off the machine, and wait for it to stop before removing the workpiece.

Safety Tips!

1. Avoid loose clothing, jewelry, or gloves that could get caught in the moving parts.
2. Never attempt to hold the work piece while drilling. Use a clamp or vise.
3. Select the correct speed to prevent overheating or breakage. Decrease speed as bit diameter increases.
4. Apply steady, even pressure. Let the drill bit do the work—don't force it.

Spindle Sander

The oscillating spindle sander is a specialized tool designed for sanding curves, contours, and edges with precision. Its vertical spindle moves in both rotary and up-down motions, reducing heat buildup and improving finish quality.

Operating Instructions

1. Inspect the Machine
   Check for damage, ensure the chuck is secure, and verify that the drill bit is properly installed and tightened.

2. Secure the Workpiece
   Use both hands to hold the material firmly. Do not attempt to sand small pieces without a jig or support.

3. Adjust Table and Sleeve
   Set the table height and choose the correct sleeve size for the curve or edge being sanded.

4. Start the Sander Safely
   Turn on the machine and allow it to reach full speed before beginning work.

5. Sand with Controlled Movement
   Move the workpiece slowly and evenly against the sleeve. Avoid forcing the material or lingering in one spot.

6. Power Off and Clean
   Turn off the machine, wait for it to stop, and clean dust and debris from the table and spindle area.

Safety Tips!

1. Avoid loose clothing, jewelry, or gloves that could get caught in the moving parts.
2. Match the sleeve diameter to the curve or edge being sanded for better control and finish.
3. Maintain a safe distance from the sanding surface. Never touch the sleeve while it's moving.
4. Use the Spindle sander for inside curves and Disk or belt for outside curves.

Glowforge Laser

The Glowforge laser cutter is a precision tool designed for cutting, engraving, and scoring a wide range of materials including wood, acrylic, leather, and more. With intuitive software and high-resolution capabilities, it enables detailed and professional-quality results.

Operating Instructions

1. Prepare the Design
   Create or upload your design using Glowforge' s web-based app. Position it accurately on the material preview.

2. Place the Material
   Open the lid and place the approved material flat on the crumb tray. Ensure its within the printable area.

3. Check Settings
   Select the correct material type and verify cut, engrave, or score settings. Use presets or customize as needed.

4. Start the Job
   Turn on the dial on the filter below all the way clockwise. Close the lid, press the glowing button on the machine, and monitor the job through the app or window.

5. Remove Finished Work
   Allow fumes to clear, open the lid, and carefully remove the material. Check for residue or incomplete cuts.

6. Power Off and Clean
   Turn off the Laser and turn the dial on the air Filter all the way counterclockwise, close the lid, and empty the filter exhaust system as needed.

Safety Tips!

1. Only use approved materials. Avoid PVC or unknown plastics, which can release toxic fumes.
2. Never leave the machine unattended while it's running. Watch for signs of fire or malfunction.
3. Regularly clean lenses, mirrors, and the crumb tray to maintain performance and prevent fire hazards.
4. Place the material flat on the bed and use the software to align the design accurately.