Instructional Machine Shop Training Guideline

Prior to beginning your machine shop training, a class sign up form must be submitted to(alopez@seas.harvard.edu), Alejandro Lopez. This form can be found on the Instructional Shop website, or by clicking this link.
https://projects.iq.harvard.edu/files/shopclass_form.pdf

We also require all new machine shop users to complete Environmental Health and Safety's on-line Machine Shop and Makerspace Safety Awareness class before the Hands-on shop training can begin. This training can be found on the training portal, or by clicking this link.
https://www.ehs.harvard.edu/training.

All Shop Users are required to achieve, at a minimum, Basic Machine shop training (formerly RED training). This Training is explained below.

Basic Training is offered by appointment. Email Alejandro Lopez to schedule your training.

Upon completion of this class, students will be able to use the Machine Shop, but only during business hours and only when the shop manager is present. *All users with Basic Certification will not be granted after-hours shop access.*
The following equipment is available to this group of users:

- All sheet metal equipment (shear, punches and brake)
- All measuring tools (rules, tape measure, calipers and micrometers)
- All hand tools (hammers, screwdrivers, hacksaw, etc)
- Band saws, both vertical and horizontal
- Abrasive saw
- Hydraulic press
- Drill press
- Belt sander and grinding wheel

Once the Basic training has been completed those students who wish to learn to use the Milling Machine and/or the lathe will have two options:

1- Machine Specific Training
2- Full training

Machine Specific training will allow the student to learn to use just the milling machine or just the lathe with the option of providing a project from their lab to learn on. Please note that if the lab project does not provide all the competencies that are required to complete the training the Instructor will provide a small project with the additional operations included before the student can be signed off. Those students who select machine specific learning will not be

granted after – hours access until both the lathe and milling machine have been signed off by the Instructor and they meet the after-hours requirements.

Full training (Formerly GREEN training) will have the students learn to use the milling machine and the lathe while fabricating one of our shop projects. These projects have been designed to include the operations that are required to complete the course. Completion of the Full Training makes the student eligible for after-hours access if they meet the requirements.

Requirements for after-hours access:

- User must be affiliated with Physics or SEAS
- User must be a Grad student, Post-Doc, faculty Member or Staff Member
- Users must agree to comply with all rules and conditions of our after-hours access policy
- Undergraduates with Full Certification do not qualify for after-hours access but can work when the Instructors and Shop Monitors are present

Milling Machine Competencies

- Rundown of levers, controls and emergency stop
- Align the table vise
- Install / uninstall tooling from spindle
- Square up part in the vise
- Locate hole / slot position using an edge finder
- Drilling and tapping processes
- Slot cutting
- Cut simple angles
- Mount large parts to the table for machining
- Prototrak programming (at the machine)
- Basic machine lubrication
- Machine clean up expectations

Lathe Competencies

- Rundown of levers, controls and Emergency Stop
- Install workpiece into spindle using a collet
- Install workpiece into spindle using chuck
- Cutting tool set up (including precautions on tightening and loosening)
- Using the tailstock to drill holes and support parts
- Internal and External threading using a tap and die
- Facing a piece off and reducing Diameters with precision
- Measuring using a micrometer
- Cutting angles using the lathe compound
- Basic Machine Lubrication
- Machine clean up expectations