

### Level 2 Overview

- Basic Power Mechanics
- Autodesk Fusion 360 Software Intermediate
- Torches and Braising
- Metal Power and Air Tools
- Sheet Metal Fabrication – Metal Marquee Star
- MIG Welding – Metal Marquee Star
- DC Electronics Circuits – Metal Marquee Star
- Intermediate Arduino
- Fastening Techniques and Geo-Board
- Woodshop – Wooden Keepsake Box

### Basic Power Mechanics

**Activity:** Disassemble and reassemble lawn mower engine.

**Tools used:** Assorted hand tools including: Ratchets and sockets, box wrenches, allen wrenches, screw drivers, adjustable wrench, various types of pliers. Use 1 UW premade tool box per 2 students.

### Autodesk Fusion 360 Software Intermediate

**Activity:** Students will learn top down design vs bottom up design in assembly mode. Using modeling skills learned Level 1, create an assembly model with constraints. Review drafting principles and create drawings of parts files provided.

**Tools used:** Free downloaded software from Autodesk, a laptop and overhead projector.

**Students prep / supplies:** Students to bring their own PC based laptops. Please preinstall software.

### Torches and Braising

**Activity:** Use oxy-acetylene and propane torches. Learn settings, material properties, prepare metal for braising, rod selection and clean up. Students will use torches to fabricate some light weight metal items or jewelry as well as learn practical skills including sweating pipe for plumbing applications.

**Tools used:** Oxy-acetylene torch rig, Bernzomatic propane torches, braising rod, wire brush, files.

### Metal Power and Air Tools

**Activity:** Use electric and air powered metal shop tools to learn and practice basic skills.

**Tools used:** Hand drill, angle grinder, cut off wheel, die grinder, nibbler, jig saw, dremel.

### Sheet Metal Fabrication - Metal Marquee Star

**Activity:** Use basic metal shop tools to layout, cut, fold the parts of a metal decorative star.

**Tools used:** Ruler, sharpie, sheet metal brake & shear, tin snips, file, flattening hammer.

### MIG Welding - Metal Marquee Star

**Activity:** Review the use of Miller MIG welders and settings as well as material properties. Learn to prepare metal for welding, rod selection and weld clean up. MIG weld together Marquee Star assemblies fabricated in previous class. Black spray paint when done.

**Tools used:** MIG welder, wire brush, files, black spray paint.

### DC Electronic Circuits - Metal Marquee

**Activity:** Design a circuit for the lighted star then build a working prototype using basic electronic components and hand skills. Build the final circuit with the correct parts and install to the metal star.

**Tools used:** Assorted electronics hand tools including: wire strippers, crimpers, scissors, heat gun, soldering iron, and multi-meter.

### **Intermediate Arduino**

**Activity:** This session will introduce more advanced use of inputs and outputs, both analog and digital for use with a variety of sensors, relays and servos. Knowledge learned in this lesson lays the foundation for advanced control systems and robotics. Students will gain more experience in programming and creating their own Arduino sketches.

**Tools used:** Assorted electronics hand tools including: wire strippers, crimpers, scissors, heat gun, soldering iron, and multi-meter.

**Students prep / supplies:** Bring their own PC based laptops. Pre-install Arduino software.

### **Fastening Techniques and Geo-Board**

**Activity:** Learn the variety of fastening options available to join metals, plastic, wood, and composites. Everything from structural adhesives, nut and bolts, to rivets. Use tools for specific fasteners and join several types of material. Make a “geo-board” to measure accurate angles and perform pitch calculations.

**Tools used:** Assorted hand tools including: Rivet gun, ratchets and sockets, box wrenches, screw drivers, adjustable wrench, rulers, protractors. Use 1 UW premade tool box per 2 students.

### **Woodshop – Wooden Keepsake Box**

**Activity:** Use basic and powered hand tools to make a small personal storage box. Week one cut and prepare all materials and start assembly. Week 2 complete assembly and add exterior designs. Start finish work and paint. Week 3 complete finish work, paint, stain and clear coat.

**Tools used:** Circular saw, powered hand drill & bits, file, sand paper, hammer, screw driver, center punch, Dremel for exterior design work.