



12 Week Level 2 Program Overview

(Updated 2/17/2015)

Level 2 – Quick Reference

1. Basic Power Mechanics
2. CAD Design concepts 1 Assemblies
3. CAD Design concepts 2 Drawings
4. Sheet Metal Fabrication – Metal Star
5. MIG Welding- Metal Star
6. DC Electronics Circuits – Metal Star Wiring
7. Arduino Programming Basics
8. Drawing and 2D Graphics in Adobe Illustrator
9. Vinyl Cutter
10. Wood Shop Project – Wooden Box
11. Wood Shop Project – Wooden Box
12. Wood Shop Project – Wooden Box

Week 1: Basic Power Mechanics

Activity: Disassemble and reassemble lawn mower engine

Tools required: Assorted hand tools including: Ratchets and sockets, box wrenches, allen wrenches, screw drivers, adjustable wrench, various types of pliers

Materials required: 1 engine per 2 kids, rags, UW tool box

Instructor Notes: Be prepared to discuss 4 cycle engine theory and explain engine parts and function when motor is disassembled.

Kids prep / supplies: None

Week 2: Autodesk Fusion 360 Software Intermediate – Working with Assemblies

Activity: Work in classroom with overhead projector to show them how to make a design. This will include walking thru a tutorial and doing part model development into an assembly.

Students will learn top down design vs bottom up design in assembly mode.

Tools required: Free downloaded software from Autodesk, a laptop and overhead projector

Materials required: None

Instructor Notes: Use Instruction materials provided by Autodesk. If kids finish early they can start to model the metal marquee star.

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

Homework assignment: Create assembly model and detail parts of metal star.

Week 3: Autodesk Fusion 360 Software Intermediate – Drafting and drawing creation

Activity: Review drafting principles and creates drawings of parts files provided. Goal is to be able to produce a manufacturable drawing.

Tools required: Free downloaded software from Autodesk, a laptop and overhead projector

Materials required: None

Instructor Notes: Use Instruction materials provided by Autodesk. If kids finish early they can start to create the manufacturing drawings of the metal star.

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

Homework assignment: Model and draw metal star



Week 4: Sheet Metal fabrication (Metal Marquee Star)

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

Tools required: Ruler, sharpie, sheet metal brake & shear, tin snips, file, flattening hammer

Materials required: 24 (.025") Gauge steel sheet metal

Instructor Notes: Prepare all the cut metal pieces ahead of time so the kids can cut stuff up and practice. Assume they will not cut out anything usable. For larger groups (8+) split the class in half and run the MIG welding class simultaneously.

Kids prep / supplies: None

Week 5: 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 tool tray assemblies fabricated in previous class. Black spray paint when done.

Tools required: MIG welder, wire brush, files, black spray paint

Materials required: 24 (.025") Gauge steel sheet metal practice welding tabs

Instructor Notes: Prepare all the cut metal pieces ahead of time so the kids can weld stuff up and practice. Assume they will not cut out anything usable in previous class. For larger groups (8+) split the class in half and run the Sheet Metal class simultaneously.

Kids prep / supplies: None

Week 6: DC Electronic Circuits (Metal Marquee Star wiring)

Activity: Kids will be challenged to design the circuit for the lighted star then build a working prototype using basic electronic components and hand skills. Then they can build the final circuit with the correct parts and install to the metal star.

Tools required: Assorted electronics hand tools including: wire strippers, crimpers, scissors, heat gun, soldering iron, multi-meter (Use 1 UW premade tool box per 2 kids)

Materials required: 20 GA red and black wire, light bulbs and round bulkhead sockets, round bulkhead rocker switch, AAA batteries, 2 AAA battery enclosure, hot glue guns and glue, cardboard backing.

Instructor Notes: Prepare all required final electrical pieces into kits ahead of time. Discuss the required functionality of the circuit and then challenge the kids to design the circuit themselves. Allow them to use scrap materials and parts to build a practice circuit. Once that works, give them the final parts to assemble into the metal star.

Kids prep / supplies: None

Week 7: Intro to Arduino Basics

Activity: A first step into the Arduino universe of physical computing. Build circuits to light an LED and control the LED with a switch and a potentiometer an analog input device. Learn how to use the Arduino Integrated Development Environment (IDE) to modify Arduino sketches.

Tools required: Assorted electronics hand tools including: wire strippers, crimpers, scissors, heat gun, soldering iron, multi-meter (Use 1 UW premade tool box per 2 kids)

Materials required: Urban Workshop Arduino kits

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



Week 8: Drawing and 2D Graphics in Adobe Illustrator

Activity: Use Illustrator software to create graphics of your own design.

Tools required: Adobe Illustrator software.

Materials required: None

Instructor Notes: Use Urban Workshop Illustrator class documentation. If kids finish early they can start to create their own graphic design for vinyl cutting in the next class. Limit them to two colors for vinyl cut designs.

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

Week 9: Vinyl Cutter

Activity: Use vinyl cutter to make personalized stickers of graphics created last week.

Students will learn how to prepare files, load cutter, set head pressure, weed stickers, use application film and create multi-color stickers.

Tools required: Roland vinyl cutter and software.

Materials required: Vinyl (2 colors), application film, scissors, weeding tools, straight edge,

razor blade **Instructor Notes:** Use Urban Workshop Vinyl Cutter class documentation. As a group show the kids how to prepare graphics, set up the machine, format plots, and perform all adjustments. Then let them individually setup and run a graphic. Take them thru the entire process of weeding and transfer.

Kids prep / supplies: None.

Week 10, 11 & 12: Wood shop – Build small storage box or clock *

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

Materials required: 1/4" board, nails, hinge, small nails, wood puddy, stain, paint, clear coat

Instructor Notes: This is a complex project. We may need to prepare precut materials for the box if students struggle to prepare materials. All parts should be cut and dry fit by end of the first class. By end of second class box should be assembled with students doing customization to exterior. Final week is for finishing with paint, oil, or staining.

Kids prep / supplies: None

*** Please note:**

These class topics, activities, and descriptions are all subject to change at any time without notice.