What to expect:

Week 1 - Get to know lasers!

- Become familiar with the types of lasers including diode and CO2 based.
- Understand fundamental principles of the hardware
- Introduction to Lightburn software

Concepts Covered:

- 3 types of operations - cut, score, engrave
- Intensity and Speed settings
- 3 coordinate systems - work area, current position, user position
- Job Origin

Exercise 1 - Learn to connect to the laser from software and troubleshoot issues. Tour all of the tools available and experiment between the design and control sides of the software.

Exercise 2 - Master intensity/speed settings to create a small papercraft project with cutting and scoring

Exercise 3 - Engrave your first image on wood

Week 2 - Helpful tools & Materials

Having gotten the basics of controlling a laser, we learn by practical lessons how the laser reacts differently to various types of materials. We build practical tools that we can use in all of our projects for getting the ideal settings.

- Build useful tools, including a speed/power grid
- Make templates for multiple materials
- Learn to create a library of material settings
- Learn more advanced features of Lightburn

Concepts Covered:

- Linear arrays
- Alignment tools
- Shape Properties
- Cut and Art Libraries

Exercise 1 - Create a speed/power grid for use in dialing in settings with a variety of materials.

Exercise 2 - Create a cut grid

Exercise 3 - Create your own settings library, learn to save/load it.

Week 3 - Design Software

Having become quite familiar with Lightburn, we expand our skills into incorporating features of design software packages that are not built in to the software. We learn to use vector drawing tools in ways not available in Lightburn.

- Learn to use Inkscape features not available in Lightburn
- Make a workflow between design software and Lightburn
- Understand paths, shapes, and common terms
- Set up a work environment for laser

Concepts Covered:

- File formats, vector/raster
- Custom color palettes
- Shape On Path effect
- Text On Path effect

Project: Design and create a unique coaster. Working in Inkscape, learn to make patterns using paths, and produce a coaster design that you can bring into Lightburn for decorating and cutting.

Week 4 - Introduction to CAD modeling

Up to now we have used 2D software. In this introduction we look at the advantages of 3D software for creation of constructable projects. We learn about the parametric modeling, and how it can help us iterate on designs.

- Learn to sketch and design in CAD
- Make objects that can be easily adjusted, customized, and cut on the laser

Concepts Covered:

- Workbenches - part design, sketcher, draft
- Construction Geometry
- Constraint-based design
- Padding/Pockets
- Shape2d, exporting for laser

Project part 1: Base Model - Using CAD software, make a Parametric Box capable of being dynamically resized. This can be an organizer for your week 3 project, or another box of your own design.

Week 5 - CAD modeling 2

In this second part of CAD for lasers we learn how to design and create perfect joints and attachment points in our constructable objects.

- Plan and create connection points
- Design parametric features

Concepts Covered:

- Cloning
- Sub-object Shape Binder
- Transforms

Project part 2: Using Base Model - Building up from the base model, create and produce a fully functional, completely customizable box.

Week 6 - Bendables, Papercraft, Textiles

Expand our knowledge of constructable shapes into the wide world of bendable materials - papercraft, textiles, and leather.

- Learn to use a Sheetmetal workbench for a variety of designs
- Plan fold lines, tabs, and other bendable features
- Living Hinge
- Using adhesives, fastening techniques

Concepts Covered:

- Sheetmetal workbench
- K-factor
- Mitres, bends, extensions

Project 1: Create a paper lantern. Working between CAD and Lightburn, produce a papercraft lantern complete with attachment points and fold lines.

Or

Project 2: Create a leather pouch. Working in CAD and Lightburn, design and laser cut a leather pouch complete with attachment points, sewing holes, and surface designs.