

Course title	Metal Fabrication 1 HonkerShop
Credit	1.00 credit (36 weeks)
RESOURCES:	Direct instruction, Torchmate CAD training manual chapters, Bendtech, online help menus, local resources/in kind skill sharing, tribal learning, skill project sheets.
OUTPUT	Mild Steel projects using torches, welders, and benders
SKILL PROGRESSION EVIDENCE	Timestamped projects, Network folder, Weekly log sheets, Periodic online checkpoints, physical projects, elements of group projects.
Units of study	ORIENTATION AND CURRENT SKILL STATEMENT
Safety project	Local safety inspection project, online safety test, OSHA10 cert if requested
Jack Stand: blueprint reading, cut list, MIG welding, OAC bending, surface prep	<ul style="list-style-type: none"> ○ PRE-project: complete a welding coupon for layout, drill, cut, weld, grind ○ PROJECT 1: complete the cut list using band saw ○ PROJECT 2: layout and drill adjuster holes in pipe/tube ○ PROJECT 3: cut and clean up the base on CNC plasma ○ PROJECT 4: OAC bend tripod legs and top U-bend ○ PROJECT 5: level and weld tripod to base, u-bend to inner tube ○ PROJECT 6: clean up welds to prep for paint “blind man test”
Torchmate operator local certification	<ul style="list-style-type: none"> ○ PRE-project: observe CNC plasma and/or do the jackstand project ○ PROJECT 1: Torchmate CAD orientation ○ PROJECT 2: star project: star project-basic welds, toolpaths ○ PROJECT 3: lettering with hangers –positive and neg space lettering ○ PROJECT 4: scantools—use scantools to create shapes, toolpaths, node edits ○ PROJECT 5,6: combine CADD skills from project 2-4 and continue practicing operation of CNC plasma table to “I’ve got this” status. ○ PROJECT 7: complete the certification task (work order) with no help to “fire in the hole” step. Measure 11 points for accuracy score.
Book End Project: tube notcher/fish mouth	<ul style="list-style-type: none"> ○ PROJECT 1: complete the cut list and cut tubes needed for project as per specs ○ PROJECT 2: use tubing notcher to make 90 degree connection “zero gap”. ○ PROJECT 3: use tubing notcher to make the hypotenuse “minimal gap” ○ PROJECT 4: cut and weld in 3 inch gusset (CNC plasma or hand) ○ PROJECT 5: weld feet and finish weld/prep for paint “blind man test”
Tubing Bender project “get bent”	<ul style="list-style-type: none"> ○ PROJECT 1: complete BendTech training module ○ PROJECT 2: bend 3 tubes on the bender that match within 1 degree ○ PROJECT 3: design an assembly with 2 or more tubes that have 2 bends each ○ PROJECT 4: fabricate the design to specs using bender and tubing notcher ○ PROJECT 5: add extra tubes/gussets or remove extra from the design if needed ○ PROJECT 6: finish weld and prep for paint “blind man test”
Personal projects	1 personal project per semester pulling together the skills learned that semester <ul style="list-style-type: none"> ○ PROJECT 1: draw out design using CADD options or grid paper ○ PROJECT 2: create the cut list and calculate current cost of materials ○ PROJECT 3: fabricate the project using processes outlined in design Assessment: score 1-5 on processes used and finish prep for paint.
Veteran return 1-2 nd year	Design and fabricate a 3.0”x3.0”x3.0” cube using skills from level 1 <ul style="list-style-type: none"> ○ PROJECT 1: draw out design using CADD options or grid paper ○ PROJECT 2: create the cut list and calculate current cost of materials ○ PROJECT 3: fabricate the cube using processes outlined in design ○ PROJECT 4: submit detailed build instructions along with finished project Assessment: Cube will be measured 2x on each of the 3 axis for accuracy, finish prep for paint.
Veteran return 2-3 rd year	Icon project... use every fab tool and process to create an ICON that represents you that will stay with the shop <ul style="list-style-type: none"> ○ PROJECT 1: draw out design using CADD options or grid paper ○ PROJECT 2: create the cut list and calculate current cost of materials ○ PROJECT 3: fabricate the ICON using processes outlined in design Assessment: each process scored 1-5, finish prep for paint.
Group projects: veterans and rookie+	Veterans, and rookies to a point, get opportunities to contribute to the large group project. Usually an offroad tube frame vehicle: sandrail, etc. Individual contributions are noted in the build notes. Veteran’s are encouraged to include rookies when they are working on shared aspects of the large group project Assessments: as per the nature of the work, AND, if it functions in its intended environment.
Successful completion looks like	Zero major injuries or safety violations, 10 fingers+10 toes+2 eyes in working order. Complete 1 project grade every 6 working days= 2 skill projects plus 1 personal project per semester. 100 points of growth as measured by the online skill checkpoints Physical and electronic projects in the portfolio to demonstrate/support skill growth 36 work log sheets documenting the progression of units of study

Beginning JUNE 2021:

AHS HonkerShop and Columbia Gorge Community College (CGCC) are in process to articulate skills at AHS that can count for both courses in Welding 195, MFG115, and MFG150

ARTICULATION PARAMETERS

CGCC/AHS HonkerShop Articulation Skill Sets by Class:

Welding 195:

- ✓ Understand basic safety and be safety conscious in the shop
- ✓ Identify various types of welding PPE- chest, head, legs, hands and torso
- ✓ Identify hazards pertaining to different types of tools and equipment used in the welding shop
- ✓ Identify different types of weld joints
- ✓ Weld in basic welding positions using stick and MIG (GMAW)
- ✓ Take a mock AWS test in both groove and fillet
- ✓ Participate in destructive testing of a weld sample
- ✓ Explore different careers available in the welding field

Manufacturing 150:

- ✓ Learn the different “coding” for weld joints (e.g.: 2F, 3F, 1G, 2G)
- ✓ Diagnose common weld mistakes, such as improper shielding, speed fast/slow, or improper prep
- ✓ Find corrections to some weld mistakes- intentionally make some to fix them
- ✓ Perform / attempt some out of position welds, in position 3.
- ✓ Create by cutting or machining different types of commonly welded joints (lap, butt, fillet, edge, corner) and practice welding them.
- ✓ Identify precision tooling used in the manufacturing and welding labs
- ✓ Participate in destructive testing of some more difficult welding procedures (e.g.: position 3 groove)
- ✓ Integrate math in to the creation of a project that includes use of a tubing bender
- ✓ Understand applied math as it applies to angles in a welding project

Manufacturing 155:

- ✓ Identify the most basic weld symbols and how they are used in blueprints
- ✓ Integrate the use of computer design (CAD) to draw parts
- ✓ Assemble parts via welding after designing them on the computer
- ✓ Understand basic GCode functions and how they pertain to using CNC equipment
- ✓ Understand the manufacturing process
- ✓ Check tolerances on welded parts
- ✓ Create a blueprint either digitally or on paper that includes weld symbols
- ✓ Produce a product from a blueprint that includes weld symbols

Miller OpenBook A good option for digital learning and we will likely try to use some of it in the future as "homework" to maximize helmet time when we are in the lab or can be done on campus in the FabLab. Completion of the Miller classes will represent the book part of the AHS/CGCC dual credit option.

<https://openbook.millerwelds.com/>

1. INTRODUCTION TO WELDING
2. GAS METAL ARC WELDING (MIG)
3. GAS TUNGSTEN ARC WELDING (TIG)