

**Technology Education Standards**

**How to Make Almost Anything**

**Course Overview:** This is a hands-on course where you will learn the Digital Design and Fabrication Process. This includes learning and using the Engineering Design Process, 2D and 3D design software, and a variety of machines (vinyl cutters, laser cutter, mini-mills, 3D printers, and CNC routers).

**Bold standards are essential standards that all students will learn as they complete the course.**

**Unit 1: Safety Unit (4 day and ongoing)**

**Description:**  Learn what we must know to insure everyone’s safety in the Fab lab.

**Standards**

1. The students will be able to demonstrate proper use and inspection of personal protection equipment (PPE). MnF1.a.7.h
2. **The students will be able to demonstrate proper safe operation practices in the work area. MnF1.a.7.h**
3. The students will be able to demonstrate proper use and inspection of ventilation equipment. MNF1.g.11.h
4. The students will be able to demonstrate proper “Work Zone “operation. MnF1.a.7.h
5. The students will be able to demonstrate proper use of precautionary labeling and MSDS information. MnF1.a.7.h
6. **The students will be able to safely demonstrate the proper use of all shop tools and equipment (maintain a personal safety license). MnF1.a.7.h**
7. Take the responsibility to get trained on the safe and proper operation of all Fab Lab equipment. MnF1.a.7.h

**Unit 2: Machine Functions (10-15 days, ongoing)**

**Description:** The unit will cover the proper setup and safe, proper use of all Fab Lab equipment.

**Standards**

1. **The students will be able to setup and properly operate the Divinci and Airwolf three dimensional printers. MnF1.a.7.h**
2. The students will be able to set up and properly operate the Epilog Laser MnF1.a.7.h
3. The students will be able to set up and properly operate the EZ-Router CNC Plasma table. MNF1.3.8.h
4. The students will be able to set up and properly operate the EZ-Router CNC router table. MNF1.3.8.h
5. The students will be able to set up and properly operate the Tormach CNC Milling Center. MNF1.3.8.h
6. The students will be able to set up and properly operate the Roland Vinyl Cutter. MNF1.3.8.h
7. The students will be able to set up and properly operate the Skanects 3d scanner. MNF1.3.8.h

**Unit 3: (12 Weeks Ongoing)**

**Description:** This unit will develop the students’ abilities to use the equipment in the Fab Lab to design and built a project.

**Standards**

1. The student will be able to produce a useful design on sticker material using Corel Draw and Cut Studio Pro to be cut on the Vinyl Cutter. IICT1.a.13.h
2. The student will be able to use Cut Studio Pro to create a multi-layered (3 color) vinyl sticker ICT1.c.7.h
3. The student will be able to use Skanect & Kinect Scanner to scan a person and be able to create a watertight STL file for printing on a 3D printer. ENG1.a.12.h
4. The student will be able to use Corel Draw software to design a project with a rastered and vectored image to be cut on the Epilog Laser Engraver. ICT1.a.13.h, ICT1.c.7.h
5. The student will be able to use Corel Draw and the Laser Engraver raster and vector functions to make something into acrylic and other multi-materials. ICT1.a.13.h
6. The student will be able to use Corel Draw to produce a design to be engraved on a round object and the rotary attachment on the Epilog laser to make a useful object. ICT1.a.13.h
7. The student will be able to use Sketch Up software to reverse engineer a simple useful object accurately and save it as a file usable on the appropriate machines. ICT1.f.11.h
8. The student will be able to use SolidWorks and Measurement tools accurately reverse engineer an existing part and save it in a usable format. ICT1.f.11.h
9. The student will be able to use the web site 1, 2, 3 make to design a press fit structure and cut it using the laser vector cut functions. ICT1.k.12.h
10. **The students will be able to functionally use all the specific software programs needed in the HTMAA course and be able to convert and save from one program to others. ICT1.a.13.h**
11. Use multiple CAD software and the laser engraver to create a press fit (friction fit) structure of their own design. ICT1.c.9.h
12. The student will be able to use multiple software and the CNC Router Table to create a useful object. ICT1.c.9.h
13. The student will be able to to use multiple software and the CNC Plasma Table to create a useful object. ENG1.a.9.h
14. The student will be able to use the DaVinci 3D Printer and the XYZ software to utilize STL files to make a single plastic 3D object. ENG1.a.10.h, ENG1.a.11.h, ENG4.cia.7.h
15. The student will be able to use the AirWolf 3D Printer and the APEX software to utilize.STL file to make a 2 plastic 3D object. ICT1.f.11.h, ENG4.c.6.h, ENG5.a.7.h
16. The student will be able to use SolidWorks design a useful object and Path Pilot software to generate a G code file to be used on the Tormach 440 mill. ENG1.a.12.h, ENG2.a.6.h
17. The student will be able to use a 4th axis attachment on the Tormach CNC Milling machine. ENG2.a.7.h, ENG2.a.8.h

**Unit 4: (2-3 Days)**

**Description:** This unit will develop the student’s knowledge of related careers.

**Standards**

1. The student will be able to research engineering occupations related to Manufacturing or Mechanical Engineering. CD4.c.7.h, CD4.d.7.h
2. **The students will be able to use their skills learned in class to design and produce a product for another Technology education course (entrepreneurship) CD4.c.4.h**
3. The student will review their results from the Career Cruising website to compare skills to this course. CD4.c.4.h

**Unit 5: Occupational Orientation (2 weeks, ongoing)**

**Description:** This unit is an ongoing unit to demonstrate important employability skills in the working world

**Standards**

1. The students will be able to prepare work reports or records. MNF1.e.6.h

2. The students will be able to perform housekeeping duties. MNF1.c.7.h, MNF1C.9.h

3. The students will be able to follow verbal and written instructions to complete work assignments. MNF1.c.10.h

4. The students will be able to use work time efficiently. ENG.4.b.5.h

**5. The student will be able to use critical thinking skills to problem solve assignments. ENG 4.b.5.h**