(100 pts) Approx. 8 days

This fourth unit is all about learning a new machine. On the surface, this is a unit in learning how to use a machine in our lab/makerspace that you haven't used much before – in reality, it's also a unit in *how to learn*. Great students and engineers are conscious of their own learning process, and are able to apply a strategy similar to the Engineering Design Process. Here, you'll take the time to learn a new machine, the corresponding software, and to make something cool; you'll also work to develop a process for learning things in the future.

1. To get started, consider the following analogy. I think that the *process of learning* is very similar to the *engineering design process*. Think about the following:

Engineering Design Process	Define the Problem	Research & Brainstorm	Choose a Solution	Build a Prototype	Test & Evaluate	Communicate
Learning Process	Identify what it is you're trying to learn or do	Research how other people have done it (YouTube, Wikis, talk to people, etc)	Identify which processes and software are worth trying out	Try and use the machine/skill to build something simple	See if your product matches your needs and expectations. Try and build something bigger/more complex	Share your work with others, and receive feedback

2. Think about the two processes above and what adjustments you might make to help them better reflect your own learning processes. Then, take a page of notes including thoughts on how you learn new things as well as notes on the *Exploration Overview* and *Machine Options* presentations.
3. Next, you'll need to choose one of the machines in our lab. You can choose whatever you want, but the intent is for you to choose a machine you've almost never used before. This is a good chance to learn something very new! Consider each of the following machines:

Laser	*Vinyl Cutter*	CNC Router	*CNC Plasma Cutter*	Denford MicroMill
Tormach (Mill)	3D Printers	*Voxel 3D Printer*	Latex Printer	*Roland 3D Scanner/Mill*

4. Once you've chosen a machine to learn and work on, it's time to start some research! Go online and look up the exact machine that we have in the lab. Check places like YouTube, Wikis, Company Websites, DIY Blogs, etc. Find some reliable resources and start learning what processes and tools are used to make your machine function. Take at least 1 full page of notes (though 2 seems more appropriate) on how the machine works.
5. Then, find out what software is needed to run the machine and make cool things. Do the same kind of research on the software you'll need to learn. Make sure you understand how that software works for your machine. Find examples and get some practice using that software. Take at least 1 full page of notes (though 2 seems more appropriate) on how that software works.
6. Use your new knowledge to make something SIMPLE with your machine. Record your process in your notebook!
7. Get some feedback on your simple prototype and plan from Mr. Benshoof and your fellow students. Think about what could be improved.
8. Plan a more complex build project and see if you can make something really cool with your machine. Draw up your idea, be specific as you plan, and make something carefully that you'll actually be proud of. Record your process in your engineering notebook!
9. Give a 10-minute presentation to the class about how you learned the new machine, what it does, and how you made your final (second) prototype.

Part 1: Exploration Tasks		*5 points*	*4-3 points*	*2-1-0 points*
Machine Notes		+ You took notes on how the machine works + Your notes reflect extensive research on the use of the machine	- Your notes are limited - Your notes do not reflect good research	- No notes - No research apparent
Software Notes		+ You took notes on how the needed software works + Your notes reflect extensive research on the use of the software	- Your notes are limited - Your notes do not reflect good research	- No notes - No research apparent
		4 points	*2 points*	*0 points*
PROTOTYPING	Process Notes	+ You have a page of notes that summarizes the process of creating something on your machine + Your notes include a flow-chart	- Your notes are limited - Your notes do not include a flow chart of the process	- No notes
	Build Plan 1	+ You planned out your first (SIMPLE) prototype + Your plan includes dimensions and all the needed information for a successful build	- Your plan does not include enough details for you to repeat the work later	- Your plan is missing - Your plan has no picture
	Build Your First Prototype	+ You followed your plan to build your first prototype + Your first prototype is close enough to your intent that we can see what worked and what didn't	- Your prototype is noticeably incomplete - You did not follow your plan	- Your prototype is missing - You did not follow your plan at all
	Build Plan 2	+ You planned your second (COOLER) prototype + Your plan includes dimensions and all the needed information to be successful	- Your plan does not include enough details for you to repeat the work later	- Your plan is missing - Your plan has no picture
	Build your Second Prototype	+ You followed your plan to build your second prototype + Your second prototype is close enough to your intent that we can see what worked and what didn't	- Your prototype is noticeably incomplete - You did not follow your plan	- Your prototype is missing - You did not follow your plan at all
		10-7 points	*6-3 points*	*2-1-0 points*
Prototype Feedback		+ You got feedback on both of your prototypes (the simple one and the more complex one) + Your feedback is included in your engineering notebook	- Your feedback only came from one person - Your feedback is limited in scope	- You did not get feedback - Your feedback is not recorded
Exploration Presentation		+ You gave a good 15-minute presentation to your class + Your presentation covered how you learned the machine as well as how you used the machine	- Your presentation missed some important parts - Your presentation did not cover HOW you learned the machine	- Your presentation was too short - Your presentation did not cover the necessary material
Achievement		+ Make an introductory assignment appropriate for freshmen engineering students that could give them exposure to the machine you've been exploring		