LATHROP ENGINEERING

Name:

UNIT 6: INDIVIDUAL MINI-PROJECTS

Introduction to Engineering & Design Unit Due Date: **December 12, 2019**

Welcome to the sixth unit of Introduction to Engineering & Design! In this unit, you're given the freedom to learn or build something awesome. Maybe you've always been curious about programming or Photoshop and you've wanted to take the time to learn how they work: this could be that time! Or maybe you've seen other classes working on cool projects and you wanted a chance to do some of that too: this could be that time! Or maybe there's something you've been wanting to build all year and just haven't had the chance: this could be that time! In the end, the expectation is that you learn the following:

- How to plan out your own project from beginning to end
- How to create a complete design brief and GANTT chart
- How to follow the Engineering Design Process to build a project of your own design
- How to evaluate your own work, get feedback from others, and share your work with your peers

As we move through this unit, you are responsible for making adequate progress through the assignments, and for being done by the Unit Due Date (**December 12, 2019**). You are also responsible for completing each part before moving on to the next. Our unit is broken up into three main parts:

Part 1: **Define & Design** *(50 pts) Approx. 3 days*		
The first part of the unit will be all about planning. We've spent a lot of time this semester talking about planning, and here you get to show off what you know. You'll make a complete design brief for what you want to learn or build, and you'll make a detailed sketch of your learning plan or prototype!		Project Brainstorm
		Design Brief
		Diagram & Plan
		Check-off From Mr. Benshoof

Part 2: **Learn & Prototype** *(50 pts) Approx. 3 days*		
The second part of this unit is where you get the freedom to learn and build! Follow your plan to complete your individual project. Be sure to take daily notes on your progress, including details about what is going well and what isn't, as well as what needs to be changed along the way!		Learn & Build
		Follow Your Plan
		Daily Notes
		Check-off from Mr. Benshoof

Part 3: **Communicate** *(20 pts) Approx. 2 days*		
Finally, well conclude our engineering design process by communicating our work with each other. This will take an entire class period and will happen on the last Monday of the semester – plan accordingly! Here, you'll write a full-page reflection on your process. You'll also draw a final picture or flow chart describing what you accomplished, and you'll even share your work with your fellow classmates.		Project Reflection
		Picture & Flow Chart
		Communicate Your Work
		Check-off from Mr. Benshoof

(50 pts) Approx. 3 days

The first part of our unit requires that you make a choice for what you want to work on as our semester wraps up, and that you create a good plan for making progress! It all starts by choosing a project. You can either choose something to *learn*, or you can choose something to *build*. Some ideas of each are listed below to get you thinking:

Learning Ideas		*Building Ideas*	
Programming	*Autodesk*	Board Game	*Puzzle*
Beginning of Aerospace Eng.	Beginning of Digital Electronics	*Gift for Family*	Custom Name Plate

1. **Brainstorming:** Start by watching the short introductory video *Mini Project Overview*. Then, brainstorm ten (10) ideas for possible project topics or things to learn about.
2. Pick the idea you want to work on. If you think it's a pretty wild or big idea, double check with Mr. Benshoof to make sure we have the needed supplies!
3. **Design Brief:** Next, make complete design brief in your engineering notebook! Your design brief must outline what you're trying to accomplish and what will make it a success. Remember that a complete design brief has to include the following 5 ideas:
    a. Problem Statement & Justification
    b. Deadlines
    c. Criteria
    d. Constraints
    e. Audience/Scope
4. **GANTT Chart:** Finally, you need to make a plan for completing your work. Start with a GANTT chart to plan out your work between now and the end of the semester!
5. **Diagram & Plan:** Next, make a plan for what you're going to do based on what you want to do:
    a. **If you plan to learn a new topic:** Create a flow-chart that shows the progression of things you want to learn and what you might build/create with that knowledge to show that you've learned it!
    b. **If you plan to build something:** Draw a careful diagram that shows what you'll build, how big it will be, and what materials you will use. This will help make sure we have the tools to get it done!

Part 1: Tasks	*10 points*	*9-5 points*	*4-0 points*
Project Brainstorm	+ You brainstormed 10 ideas for different projects	- You brainstormed between 5 and 9 ideas for different projects	- You brainstormed fewer than 5 ideas
	20-17 points	*16-10 points*	*9-0 points*
Design Brief	+ Your design brief is complete, including all 5 of the necessary parts + Your design brief is specific to you in this project	- Your design brief is missing a component - Your design brief is generic and does not apply to you specifically	- Your design brief is missing more than one component - Your design brief is missing
Diagram & Plan	+ Your plan includes a GANTT chart + Your plan includes a picture of a prototype OR a flowchart of things to learn and work on!	- Your plan does not include a GANTT chart - Your plan does not include a picture	- Your plan is missing

(50 pts) Approx. 3 days

The second part of our unit is where you get to work on learning or building your awesome thing! Whether you've chosen to learn a new skill, program, tool, or topic; or if you have chosen to build something super cool and awesome, the process will be the same:

1. **Learn & Build:** This is what you've been waiting for. You'll use the appropriate tools, techniques, and resources to accomplish your plan.
    a. **If you chose to learn a new topic:** Then you'll need to find the proper resources to learn from. These may be on our class website, or they may be elsewhere on the internet. Talk to Mr. Benshoof to know where the best resources might be. Then, start learning! Read and watch various resources, and take good notes. Eventually you'll want to be able to build something with your new knowledge, and good notes will make all the difference! Think about your flow chart and the learning process you identified for yourself.
    b. **If you chose to build a new thing:** Then you'll need to get materials together and start building. You may need to start in a computer, working with Photoshop or some other software. Then, you'll get to start actually building your physical prototype. Talk to Mr. Benshoof to make sure that we have the materials you'll need. Also make sure that you have a place to store your work between classes. Keeping your work together and organized will be an important part of completing this project successfully!
2. **Follow Your Plan**: You made a very detailed plan, drawing, or flow chart before starting this work. Make sure that you refer back to it and follow it! If you need to change your plan in any way, make sure that you make note of that in your engineering notebook!
3. **Daily Notes**: *EVERY DAY* as you work through this unit, you need to end the day by making some short notes about what you accomplished. You can write about what you did successfully that day, what didn't work, or what needed to change as you continued working. This short 'journaling' of your engineering process is an important habit to get in to, and we'll remind ourselves about it every day!

Part 2: Tasks	*20-17 points*	*16-10 points*	*9-0 points*
Learn & Build	+ You learned the topic you were interested in, or to build the cool thing you wanted to build	- You completed part of your plan, but many things unfinished	- You did not do anything in the time given
Follow Your Plan	+ You clearly followed the plan you setup in your engineering notebook.	- You did not really follow your plan	- You did not follow your plan at all, and nothing is documented
	10 points	*9-5 points*	*4-0 points*
Daily Notes	+ You kept daily notes on your progress through this unit. + Notes are easy to find in your engineering notebook + Where appropriate, your notes include some pictures or diagrams	- Your notes are lacking - Your notes do not cover every day of work	- Your notes cover less than half our work days - Your notes are missing all together

(20 pts) Approx. 2 days

The final part of our project is communication. Just as the engineering design process ends with communication, so will our last unit of the semester. It's important to communicate your work with others because it helps share ideas, it helps you get feedback on your work, and it helps us hold each other accountable for doing good work and being done on time! Here, we'll communicate our work using a written reflection, a picture, and by sharing with classmates.

1. **Project Reflection:** With your project complete – either your learning sequence done or your prototype finished – it's time to think about the process. Take some time to write a full-page reflection in your notebook on what you did to complete your individual mini-project. As you write your reflection, answer the questions below:
    a. What was your original idea?
    b. How did that idea change as you worked through the project?
    c. What was easy about your project? What was difficult or frustrating?
    d. How might other engineers use the same ideas in their own work?
    e. When you have the chance to learn a new topic or build a new thing, how will you be able to do it better?
    f. What do you know now that you wish you had known at the start of the project? Why would that be useful to have known earlier?
2. **Picture & Flow Chart:** Now you need to draw a picture.
    a. **If you chose to learn a new topic:** Then draw and label a flow chart that shows what you ACTUALLY ended up doing in your learning process. What resources did you find helpful in learning those new ideas, where did you find them, what did you do to practice, etc.
    b. **If you chose to build a prototype:** Then draw a careful diagram of what you ended up building. Make sure you label your picture with dimensions and materials. What is different about your original plan and the final version?
3. **Communicate:** The last Monday of our semester will be spent sharing project work as a class. You'll get a little bit of time to tell us about what you learned or what you made, and to give us all advice on doing the same. This will take a full class period all together, so be sure to plan that into your GANTT chart right from the beginning!

Part 3: Tasks	*8 points*	*7-5 points*	*4-0 points*
Project Reflection	+ You wrote a full page reflecting on your building and learning process + You answered all the reflection questions posed above	- Your reflection is less than a full page - You did not answer all the reflection questions	- Your reflection is missing - Your reflection is off-topic
Picture & Flow Chart	+ You drew a picture of your final prototype OR you drew a flow chart that describes your final learning process + Your diagram is easy to understand and is complete	- Your diagram/flow chart is missing important parts - Your diagram/flow chart is difficult to understand	- Your diagram/flow chart is missing
	4 points	*3 points*	*2-1-0 points*
Communicate Your Work	+ Your parts are all assembled properly into the final car + Your final car looks a lot like the actual model + You assembled the car with the proper constraints	- Your assembly is incomplete - Your assembly is missing some parts	- You did not use constraints to make your assembly - Your assembly is missing