LATHROP ENGINEERING

Name:

UNIT 9: FTC ROBOT COMPETITION

Introduction to Engineering & Robotics Unit Due Date: **March 6, 2020**

Welcome to the ninth unit of *Introduction to Engineering & Robotics*! This next unit brings us back to our large FTC robots for the third and final time. When we first saw these robots last semester we worked on autonomous designs; then, in January we built tele-operational designs. Here your job is to create a competitive robot that can function both autonomously and in the driver-controlled periods of an FTC Competitive round. In the end, the expectation is that you learn the following:

- How to work with your team to make your robot successful
- How to program your robot to make it drive in autonomous
- How to program your robot to be drivable and controllable
- How to trouble-shoot problems with your robot as you make it work better and better

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 (**March 6, 2020**). Our unit is broken up into three main parts:

Part 1: **Design & Build** *(50 pts) Approx. 4 days*		
The first thing you'll do, is work with our FTC team to redesign and rebuild your robot and get it competition ready! To do this, you and your team need to look at your current robot and decide what needs to stay the same and what needs to be changed. You will need to consider the rules of the game and make a careful choice about how you want your robot to function. Your team will start with a plan and a picture before getting back to building!		Brainstorm & Plan
		Draw Your Robot Plan
		Build/Rebuild Your Robot
		Program Your Robot
		Daily Log of Team Progress
		Check-off from Mr. Benshoof

Part 2: **Competition** *(20 pts) Approx. 2 days*		
The class competition will take place over two days. You and your team will be scheduled for at least 2 matches per day, and you need to make sure your robot is ready to run. Each match will include both an *autonomous period (30 seconds)* and a *driver controlled period (2 minutes)*. Your robot will need to work with your alliance partner to score as many points as possible! Work together, make a plan, and good luck!		Compete in Class Competition
		Work With Your Team
		Check-off from Mr. Benshoof
Achievement: Win at least one competition match with your alliance partner during the class competition		

Part 2: **Reflection** *(20 pts) Approx. 1 days*		
As we wrap up our unit and the quarter, you need to take some time to write a reflection in your notebook, and help cleanup the work space! Take a little time to write a full page of thoughts and feedback on our FTC robotics work this year, and then fully participate in the Robotics part sorting day!		Complete Written Reflection
		Help with Robotics Cleanup!
		Check-off from Mr. Benshoof
Bonus: Come help sort robot parts during our "Robot Sorting Party"!		

(50 pts) Approx. 4 days

When it comes to a successful robot for competition, nothing is more important than having a good plan and acting on it! The best robots have a simple, reliable, and sturdy design. They also have good wiring, and a program that works correctly and is easy to adjust as needed. Your job in the first part of this unit is to work with your team to make a plan for what you want your robot to be able to do! Then you'll get to work making it happen!

1. **Notes:** Start by watching the FTC Game & Scoring Animation again. I know we watched it a few times last semester, but we should refresh our memories.
2. Then, watch the three demonstration videos: *Driver Controlled Practice, Full Practice Match,* and *More Robot Ideas*. Take a full page of notes on cool things that those robots can do, or neat things that you see built into the robots.
3. **Brainstorm:** Work with your team to brainstorm at least 20 ideas for how you might be able to build/re-build your robot to accomplish tasks while being driven.
4. **Agree on a Design:** Possibly one of the biggest jobs early on is for you and your team to *agree* on what you want to build. You'll need to agree on how you want your robot to score points, and how you think that can be done most effectively. Think about the following with your team:
    a. *How will you score points?*
    b. *What will you need to add to your robot to do that?*
    c. *Will it move with motors? With servos? Does it even need to move?*
    d. *How will the video-game style controllers control the mechanisms?*
    e. *Can you actually build what you want to build?*
5. **Draw Your Design:** Take some time to draw a careful diagram in your engineering notebook of what you want your robot to look like after you build/re-build it to score points during the driver-controlled part of the game. Everyone needs to draw their own picture into their own engineering notebook, but since you've agreed on what you're going to build, everyone's pictures will probably be very similar.
6. **Double Check:** Double-check that your picture has labels for important parts!

Part 1: Tasks	*10-8 points*	*7-4 points*	*3-0 points*
Brainstorm & Plan	+ You recorded all of your brainstorming and planning in your engineering notebook	- You only recorded a few ideas	- You did not record your ideas
Draw Your Robot Plan	+ You drew an image of your robot design + Your design includes details of changes you want to make	- Your drawing is lazy and sloppy - Your drawing does not include details	- Your drawing is missing completely
Build/Rebuild Your Robot	+ Build/Re-Build your robot in time for competition!	- You made NO changes to your robot	- Your robot does not move
Program Your Robot	+ You programmed your robot to move in the autonomous period + You programmed your robot to drive in the driver controlled period	- Your robot is only programmed for one part of the competition	- Your robot is not programmed to move at all
Daily Log of Team Progress	+ You kept a daily record of what your team did. + Your record includes major changes you made to the robot + Your daily log is recorded in your engineering notebook	- Your record is missing a day - Your daily log does not discuss major changes	- Your daily log is missing large parts - Your daily log is missing completely

(20 pts) Approx. 2 days

This is the fun part: compete! After 3 weeks last semester making our robots drive autonomously, and then another 3 weeks this last January getting our robots driving with remote controls, it's time to get ready for our class competition! Over the last two long days of the quarter we'll be having organized competition matches – it's your job to get your robot competition-ready for both autonomous AND driving.

1. **Compete in Class:** This is it! You get to make your robot do what you need it to do in our big class competition. Whose robot is best!? For our class competition, we will follow the FTC rules as outlined in the FTC Game Intro animation on the website. Keep the following ideas in mind:

   All of our matches will be either 1 robot vs 1 robot, or alliances of 2 robots vs 2 robots

   The match will start with a 30 second autonomous period
   (Your robot needs to be able to move in this period)

   The match will continue with a 2-minute driver-controlled "Tele-Op" period
   (Your robot needs to be able to move in this period)

   No rough contact between robots will be allows. It's ***not*** BattleBots

   The robot or alliance that scores the most points will win the match!

2. **Work with your team:** Making a robot work in competition is a big challenge. For the entire unit, you need to be a positive member of your team, working well with your teammates and making sure that you help move things forward. You need to communicate well and make sure that your teammates feel supported by your efforts.

   If you're just hanging out during our class time, you will lose all of your teamwork points

Part 2: Tasks	*10 points*	*9-5 points*	*4-0 points*
⊕ Compete in Class Competition	+ You were ready to compete in our class competition + You competed in at least 4 rounds of competition	- Your robot only competed in 2-3 rounds	- Your team competed in 0 or 1 rounds of competition - Your robot was never ready to compete
⊕ Work With Your Team	+ You worked well with your team + You were a positive and supportive member of your team + Your teammates rank your help highly	- You were not always present to help your team - Your help was sporadic	- You were not very helpful to your team - You were a bigger distraction than help

(20 pts) Approx. 1 day

As our unit and quarter wrap-up, it's important to take some time to reflect on the experience and what we all learned. Take some time to sit down and write a full page reflection on the process. If you need help thinking of things to write about, consider answering some of the questions listed in the reflection brainstorm below. Then, we need to finish cleaning up all our work spaces!

1. **Complete the Written Reflection:** It's important to take some time to reflect on our successes and failures at the end of any long-term project. As a class, we spent 3 weeks last October learning how to build basic robot frames and getting them driving autonomously. We then spent another 3 weeks in January adding to those robots, building new attachments, and getting them driving in the driver-controlled "Tele-op" mode. We're now wrapping up another two weeks of building challenges and competition. What worked? What didn't?

   For the end-of-unit reflection, YOU NEED TO WRITE A FULL PAGE REFLECTION on your robot, the building process, and what you've learned. If you need some help with ideas of what to write about, consider answering some of the questions below:

What about your autonomous program worked well?	What about your driver controlled program worked well?	What about your robot's design did you like the most?
What about your autonomous program did not work?	What about your driver controlled program did not work?	What about your robot's design did you not like?
What could have made your autonomous more successful?	What could have made your driver controlled more successful?	What would you build differently if you did all this again?

2. **Help with Robotics Cleanup:** We've made a huge mess of our robot room and the corresponding robot parts! We'll spend the last day of the semester dismantling robots and sorting pieces. If we all pitch in, the entire job can be done in one day! Here you need to be helpful in class on that final day by doing the following:
   a. You MUST make sure that your entire robot is 100% dismantled
   b. You MUST make sure your robot cabinet is completely emptied out
   c. You MUST help sort robot parts after your robot is dismantled
3. **Bonus Opportunity:** Looking for a chance to be more helpful or earn a little extra credit? Listen for announcements in class about our "Robot Sorting Party" and then come join us. You can earn up to 10pts extra credit for each hour you're willing to help sort robot parts with us and help clean up.

Part 3: Tasks	*10 points*	*9-5 points*	*4-0 points*
Complete Written Reflection	+ You wrote a full-page reflection on the entire FTC Robot process + Your comments are thoughtful and show that you understand the challenges of the process!	- Your response is not a full page - Your response shows that you do not really understand the process	- You did not write your response - Your response is significantly lacking
Help with Robotics Cleanup!	+ You full participated in our final day of dismantling robots + You helped sort pieces when your robot was dismantled	- You were not helpful for the entire time during the robot dismantling time	- Your robot did not get fully dismantled.

(+10pts/hr) Bonus Opportunity: Looking for a chance to help out Mr. Benshoof or to earn some small extra credit? Come to the extra "Robot Sorting Party". Look for information during class time and join us to help sort robot parts!