

**To inspire and prepare the youth of today to become the engineers and scientists of tomorrow.**

# Coaches Manual 2019-2020



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***This document is considered DRAFT until October 1, 2019.***





## CREATE Mission

*To inspire and prepare the youth of today to become the engineers and scientists of tomorrow.*

This will be done via competitive robotics competitions that are:

**Compelling** - Competitions will include both sports-like (head-to-head) competitions as well as engaging social interaction through teamwork and alliances. A signature event will be held annually to reward and celebrate teams' accomplishments.

**Accessible** - By use of re-usable robotic kits/components, low annual and tournament registration fees, and costs structured to reward schools/programs with multiple teams, we will help ensure cost is not a barrier to participation. Tiered events and activities will be offered that make hosting events accessible to any size school or group.

**Inspiring** - Robust challenges and tournaments that keep students engaged throughout the year, are educationally rich and give appropriate focus to mechanical and electrical engineering. All participants will be surrounded by others aspiring to live up to the Values of CREATE.

**Safe** - Careful selection of equipment and focus on proper safety procedures will ensure all participants have a safe environment to compete in.

## CREATE Values

### *"Honor by Design"*

**Honest** - Do "what's right" when no one is looking.

**Competitive** - Always give your best. Be humble in victory and gracious in defeat. Be respectful of your teammates, coaches and mentors, competitors, judges and spectators.

**Collaborative** - Act in the best interest of the team's goals and be supportive of each other. Share knowledge, tools and parts with other teams.

**Leader** - Encourage, praise, involve, and constructively challenge your teammates.

**Professional** - Works hard, determined, overcomes obstacles and is well trained and acts in a professional manner.





# Coaches Pledge

*As the coach, everything you do communicates values.*

1. To the best of my ability I will try to model “Honor by Design” at meetings, build sessions and competitions.
2. I will lead by example and expect my team to abide by the rules of any/all competitions we participate in.
3. The students come first. Our shared objective is to inspire and prepare through a program that is fun and exciting. Success is measured by how many students get excited about science and technology.
4. The students do the work and make the decisions. The students on my team will do all the research, design, problem-solving, building, programming and decision making. (Coaches are to facilitate and lead. As such coaches are encouraged to help the students find the answers and solutions.)
5. I understand that the competitions I attend are hosted by volunteers and will treat them with the respect and gratitude they deserve. I will make sure all team members understand that the competitions they attend are run by volunteers and will encourage them to be respectful and appreciative as well.
6. I will be responsible for reading all e-mails that are sent to me by CREATE and will forward all pertinent information to team members and parents of team members.
7. I will make “Honor by Design” an important part of my team.





# Building a Team

## *Advice for Coaches*

Enjoy the experience. Your goal is to help your students have fun with robotics. Whether or not your team wins a trophy at a competition, team members achieve success by participating.

## *The Foundation*

You will need to direct the process the team uses to solve the game challenge without providing the solution yourself. In addition, you must be willing to acquire some basic knowledge of robot building and mechanical systems. You may want to enlist the support of a technology teacher or technical mentor for additional assistance. You may want to invite other people with diverse backgrounds to share their knowledge and experience with your team.

## *The Students*

Teams of four to six members work best. The CREATE Open game is aimed at 9<sup>th</sup> through 12<sup>th</sup> graders but younger students with the right skills may also participate. Teams can be formed in any environment and need not come solely from a school environment.

## *The Mentors*

Mentors help provide valuable one-on-one interaction and serve as resources in their specialties. Here are some possible mentor contributions:

- ◆ **Engineer** - Mentors with experience with robots and/or mechanical system experience that are capable of teaching the students these ideas as well as how to apply the engineering design process.
- ◆ **Programmer** - Mentors with experience with computers and/or programming experience that are capable of teaching the students these ideas as well as how to apply the engineering design process.
- ◆ **College student**, preferably a former Robotics Competition member - Helps the team work through a practice challenge, shares strategy, serves as a role model.





## Registering a Team

**For 2019-2020 CREATE Open registration is FREE.** Go to [www.robotevents.com](http://www.robotevents.com) to register your team(s). You will receive an official CREATE team number such as C999A. This is used for tournament registration (described below). You must have an official CREATE number to register for tournaments. You need to have a team name for the registration process. Some teams use their school as the name. Many teams get very creative in the team name. Names such as Cheesy Poofs, Green Eggs, and Bionic Bears are often used. Have fun with your team name. Your name is announced at tournaments during competition. “Match number 12, on the red side we have team C999A, Mr. Spock and the Vulcanators...” may sound more exciting than “Match number 12, on the red side we have team C999A, Generic School name....”.

[Click here for the document “Registering as a CREATE Team” for further instructions.](#)

## The Coach

As a coach, you need to be involved, but you cannot allow yourself to take over the process, except when it comes to safety issues. Teach students to stop and think before they cut or bend metal, or do other similar tasks. As a coach, you may help everyone gain the most from this experience if you do not do the actual robot planning and building yourself. As much as you might like to build the robot, the team must design and build the robot with only limited assistance from you or other adult mentors.

Instead of telling the team to use smaller wheels from the kit, you could ask the team to brainstorm ideas to make the robot go slower. A successful coach controls the process, not the content. You are a facilitator, available to help your team complete the work and improve the way it works together. Students become problem solvers by finding solutions themselves, but coaches can assist young people best by facilitating problem-solving and helping students to reach their own solutions.

## The Team

Discuss duties, time commitment, meeting times, and dates up front. If students cannot make a reasonable number of meetings, you need to know that. The level of commitment should be generally the same among all team members.





## ***Roles and Activities for Team Members:***

### **Building:**

- Make decisions about building, and work to achieve consensus among team members on the mechanical design.
- Use guidelines for team brainstorming to build a robot that can accomplish the team's desired goals.

### **Robot Operators (2):**

- ◆ Up to two student team members can operate the robot during each round at a tournament. Each round can have different drivers if you wish. Refer to the Tournament Section of your respective Game Manual.

### **Engineering Notebook Documentation:**

- ◆ Engineering Notebooks are optional, but highly recommended. In the engineering notebook students record and document the entire team's thoughts, designs, decisions, actions, failures, and successes throughout the season.

### **Pit crew:**

- ◆ After each match, check that all nuts/bolts are tight, all needed adjustments are made to keep the robot functioning properly. Make up a checklist and go through it after each match.

***There are many other roles to fill.  
Your team will find its own identity as the season progresses.***

## ***Team Goals***

Keep your team focused on their goals during the season and review after the competition. Robotics events provide excitement and recognition and celebrate each team's accomplishments.

***The true goal has very little to do with winning medals or trophies.***

If you can look back at the end of the season and say even one of the following, you have achieved the most important goals:

- ◆ We learned how useful and fun math and science can be.
- ◆ We did something we didn't think we could do.
- ◆ We respected and considered ideas from everyone on the team.
- ◆ We figured out how to manage time, deal with setbacks, or communicate ideas.
- ◆ ***We had fun!***





## Safety

- ◆ **Safety Glasses:** Safety glasses should be worn when working cutting or bending metal and at other times when appropriate during the build process. Safety glasses ARE REQUIRED to be worn by the drivers when operating the robots during a match.
- ◆ **Safety Concerns:** Students should be doing actual work on the robot at all times EXCEPT when it comes to power tools and other dangerous or risky tasks. This is where adult's assistance is appropriate. Working with the students in this way is a great teaching moment. Don't just do it for them, explain and teach the students.

## Meetings

- ◆ **Kickoff Meeting:** Have printed copies of manuals and graphics, rules of the new robot game, and playing field drawings. Brainstorm and come up with a game plan for the new season!
- ◆ **Early Season Meetings:** Teach members how to organize the tools and parts according to your system or have the team agree on a system of its own. Label the locations for storing different items. Provide key printed information. Put student names and distribution date on each copy. Discuss the Engineering Notebook. Students should be proud of the contents because they will be sharing them with judges. Have a suitable notebook ready at the beginning of the season.
- ◆ **Ongoing Meetings:** Meetings during the season involve building, testing, re-building, and re-testing. Guide the students but do not take over. Be sure to allow time for clean-up and documentation at the end.

## Robotics Environment

- ◆ **Problem Solving:** Keep it Simple, Silly = KISS. In the engineering world, simple solutions are much more desirable than complex ones. The complex solution has many more places to fail, is more difficult to repair, costs more, and the operation is less intuitive. Students are sometimes drawn to complex solutions.
- ◆ **Robotic Design:** It is important to remember that:
  1. Design is an iterative, ever-changing process.
  2. Effective design involves making compromises.
- ◆ **Robot Mechanism Design:** In addition to moving around the playing field, a robot has to manipulate various objects. What looks simple to humans can be extremely difficult for a robot. In the early stages of the season, coaches often hear the team say, We will simply pick up the gizmo and zoom over there and dump it. Reality quickly sets in after the team begins to experiment with the game and begins to understand the difficulty involved.







## CREATE Forum

Please visit <https://forum.create-found.org/create-open> to visit the online forum specifically designed for CREATE Open teams and coaches to ask questions, share ideas, find out about other teams, and share knowledge. By using the forum, we hope that students and coaches can work together to inspire and prepare each other. We want to foster a sense of community between CREATE Open teams from across the globe and give them a place to share ideas and knowledge regarding educational robotics competitions.

There are official threads designed to allow you to ask questions, and get answers about, the current year's game and game rules. This function is restricted to coaches, but students can read through all this information and post on many other threads.

**Students:** You will need to register before you are able to post or comment. You will be unable to post or comment in the News or Rules categories but you can view these categories, as well as post and comment in the rest of the categories. If you have questions regarding News or Rules, please contact your coach.

**Coaches:** You will need to register before you are able to post or comment. Once you have registered, please send an email to [support@create-found.org](mailto:support@create-found.org) with your forum username so we can add you to the appropriate Coaches usergroup. You will be unable to post in the News category. You will be able to post in the Rules category, as well as post and comment in the rest of the categories. If you have questions regarding any News posts, please contact CREATE at [support@create-found.org](mailto:support@create-found.org).

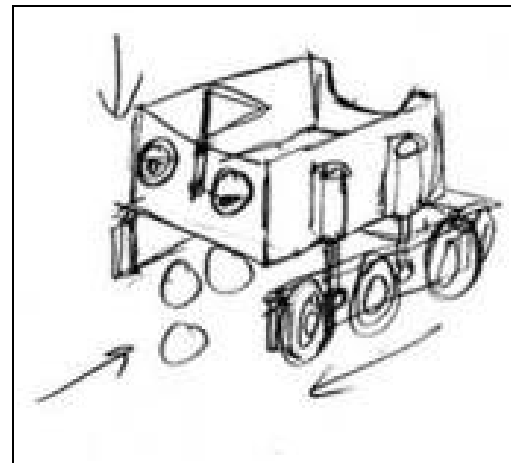
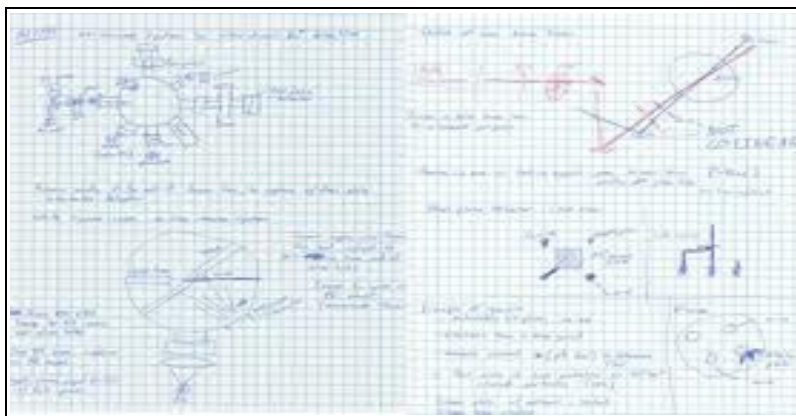


# What is an Engineering Notebook?

The Engineering Notebook is the story of the journey that a team makes during the phases of the problem definition, concept design, system-level design, detailed design, test and verification, and production. The notebook should be written by the team, not the coach. Throughout the building of your robot, you will come across obstacles, lessons learned, and the need to draw things out on paper. This is where you and your team will use an engineering notebook, which will follow your team from kickoff throughout the competition. Judges will review your Engineering Notebook to better understand your journey, design, and team.

## The Notebook Itself

Organize your Engineering Notebook so an outsider will understand your team and journey. Record all designs and changes to your robot directly into your notebook. Include details and sketches if possible. Make notes and calculations in your notebook.





# Tournaments

## *Registration Process*

Before you participate in a tournament you must register for the tournament at the RobotEvents website (<http://robotevents.com/robot-competitions/create-foundation>). This is usually done weeks or months in advance. Your team may register for more than one tournament in a season. Details for each tournament vary. You can find tournament information and register for tournaments on [www.robotevents.com](http://www.robotevents.com) under the CREATE section. (<http://robotevents.com/robot-competitions/create-foundation>)

## *What to Bring*

Sometimes, tournament organizers will send you an information packet prior to the tournament which will include some helpful hints on what to bring and what NOT to bring. In general, you need to bring your robot, controller, spare parts, extra batteries, tools, a power strip or extension cord, the Engineering Notebook, and enthusiasm. You may also want to bring some snacks and water. Most tournaments provide concessions.

## *Competition Floor*

Arrive early to your match and be ready to go. Pay attention to the volunteers as they direct you to the proper field. Up to two team members and a coach may be in the driver's box during a match. Only team members are allowed to handle the robot, position the robot, and drive the robot during a match. Once the match is over, wait for the referee to give you instruction to collect your robot. Your team has the option to count up and confirm the score with the ref prior to anyone disturbing the field. Once teams enter the field to collect their robots, the official score is set as the one on the scoresheet. After you retrieve your robot, you can take it back to the pits to repair and prepare for your next match. Keep an eye on the schedule though, as your breaks between matches may fluctuate.

## *Awards and Judging*

At regular season events, awards are given to the Tournament Champions (two teams) and the Tournament Finalists (two teams). There is an award for Innovation and one for overall team performance as well, known as the Honor Award. At some tournaments a Skills Award is also given. Please see Appendix B: Awards for more information, as well as additional awards that are given at larger tournaments (i.e. State Championship Tournaments and the U.S. Open Tournament). Refer to the Awards Section of the Game Manual. Judges and other tournament officials observe teams all day. Both formal and informal judging is the basis for several awards at the end of the day. Always do your best, even when no one is watching.

## *Qualification for National Competition*

Check with tournament organizers to see how many teams a tournament will qualify for the U.S. Open Robotics Championship Tournament.





## FAQs

1. **What does it cost to register a CREATE Open team?** A: Nothing. Registration of a CREATE Open team for the 2019-2020 season is free.
2. **Why are robots limited to 2 pneumatic tanks?** A: These components often represent a large outlay of money. It is our hope with the CREATE Open Program to have as level a playing field as possible. We want to promote extreme design flexibility AND low cost. Limiting the use of expensive parts is consistent with that philosophy.
3. **How is autonomous mode communicated to the robot?** A: A digital “high” signal will be sent on the data line coming from the Reoff. It will go “low” 19 seconds into autonomous (1 second before autonomous mode is to end).
4. **Is there any other way to determine the start of autonomous mode in a match?** A: Yes, but it is recommended as a backup in the event that your program has damaged their signal pin. If the Reoff is otherwise functional, a robot may use light sensors to ‘read’ the state of the robot based on the LED color/timing. A separate LED is positioned to allow access without obstructing the primary LEDs.
5. **If our robot does not have an autonomous mode may we keep the remote in our hands?** A: No. This would give a competitive advantage and thus reward a team that is less innovative in the programming area. This would be inconsistent with CREATE's philosophy of promoting innovation.
6. **Is it legal to stay in autonomous mode longer than 20 seconds?** A: Yes. A team may play an entire match in autonomous mode if it likes. But the robot must not move during the pause between autonomous and driver modes.
7. **Is an autonomous mode required?** A: No.
8. **Can any motors be used?** A: Yes. However safety is a primary concern. Great care must be used to selecting appropriate motors and electronics that safely operate within the power requirements of this program. Any robot deemed to be unsafe, for any reason, by the inspectors/referees will not be allowed to compete until modified to be deemed safe and/or may be disqualified from the tournament.
9. **Can any control system be used?** A: Yes. This includes, but is not limited to, FIRST robotics equipment, LEGO, VEX, Raspberry PI, or Arduino based systems such as Apollo Microcontroller from Higher Order Innovation.
10. **Can any sensor be used?** A: Yes. It is also encouraged. There are great, low cost sensors, available which can be integrated into almost any control system.
11. **Is one control system recommended over another?** A: No. Use what you are comfortable with/capable of.
12. **What ages/grades can participate in the CREATE Open program?** A: Any age. However, most events will be geared toward 12th grade and younger. The





Open is an advanced robotics program. However middle school teams that feel qualified are welcome to participate with the high school teams.

13. **How do I register a team?** A: Go to [www.robotevents.com](http://www.robotevents.com) and register like you would a regular team. Just be sure to select CREATE Foundation as the “type” of team.

## Coaches Manual Highlights

*Now that you have read the entire Coaches Manual, here are some guidelines and other things to remember:*

### **Coach and Lead**

Your job is to organize the team, get the kids started, and then let them take over.

This is a student-driven activity. Keep parents involved, as mentors, teachers and facilitators. Let the students make the decisions and do the work.

Encourage kids to try different ideas. If it doesn't work, re-build it into something else.

90% of progress comes in the last 10% of the time line. Deadlines of tournaments have a way of inspiring students, but try to get things done early so testing and small modifications can occur.

Practice. Practice. Practice. Drivers can never get enough practice driving.

### **Organize / Paperwork**

Get bins for parts. Fishing tackle boxes work well. So do small tool boxes. Set aside time at the end of meetings for clean up. Don't live in a vacuum. Talk with other teams/coaches.

### **Tournament Culture**

Tournaments are competitive. But this program's culture is one of sharing. It is common for one team to help another to get their robot working just before they compete against each other. We thank you in advance for helping this culture of cooperation and friendly competition continue to grow.

Talk with your alliance partners BEFORE you get to the field. Know what your “agreed upon” game strategy is for that match.

Failure is OK. Learn from it. Robots WILL break down. It's OK if something breaks. It usually breaks in an educational sort of way. Grasp this as a teaching moment.

