

Greetings, future robotics enthusiasts! We are FRC Team #226, the Hammerheads. We've competed annually in the FIRST Robotics Competition since 1999, making this our 15th year of competition. Our team is composed of students from two Troy School District schools: Troy High School and Athens High School. This year, we've decided to help the members of the FIRST community by encouraging the growth of FIRST groups for younger ages; specifically, FLL and FTC!

FLL stands for **FIRST LEGO League**. In this FIRST sponsored program, elementary school students experience a team building challenge in which they learn specifics about that year's theme. Additionally, they construct a robot out of LEGOs to complete a challenge based around that theme.

### **How to Start a FLL Team:**

- Step 1: Education
- Step 2: Register Your Team
- Step 3: Order Your Materials
- Step 4: Begin Working on Challenge
- Step 5: Apply for Tournament
- Step 6: Attend a Tournament and Celebrate :)

### **Step 1: Education**

We've made it easy for you by highlighting the basic information every new team needs to know. FIRST LEGO League (FLL) annually releases a unique Challenge to all FLL teams. The Challenge is split into three parts: the Robot Game, the Project, and the FLL Core Values

#### **Robot Game:**

The kids build and program a LEGO MINDSTORMS® robot, which is not controlled by a remote control, to complete a series of Challenge-inspired tasks that are placed on the marked mat (the Playing Field). The robots have 2 ½ minutes to complete as many tasks as they can. The more tasks it completes successfully, the more points the team will receive.

#### **Project:**

The kids work as a team to design a solution to the real world problems presented by the Challenge. Lucky for you, FLL releases the theme long before the specific details of the Challenge. This gives teams some time to discuss and research the Challenge theme.

#### **FLL Core Values:**

The kids are guided by the FLL Core Values which ensure that they stay respectful while competing at the same time. The Core Values are:

- We are a team
- We do the work to find solutions with guidance from our coaches and mentors.

- We know our coaches and mentors don't have all the answers, we learn together
- We honor the spirit of friendly competition.
- What we discover is more important than what we win.
- We share our experiences with others.
- We display Gracious Professionalism and Coopertition in everything we do.
  - Gracious Professionalism: acting with a competitive spirit while respecting your competitors
  - Coopertition: working with other teams while simultaneously competing with them
- We have FUN!
- What *FIRST* LEGO League teams accomplish is nothing short of amazing. It's fun. It's exciting. And the skills they learn will last a lifetime.

#### **Helpful Tips:**

- Learn how to use LEGO MINDSTORMS®
- Fundraise for your team
- Share your solution and experience with the community

### **Step 2: Register Your Team**

Teams consist of a maximum of 10 members, limited to students from elementary school. Participants can only be a part of one team, but coaches are welcome to coach several teams at once. In order to practice successfully, teams should find a meeting place where a playing field can be set up, and has access to the internet.

### **Step 3: Order Your Materials**

There are two items that you need to start your team: The Field Set-up Kit, which is composed of the LEGO pieces, the dual lock fasteners, and the roll-out field mat, which is essential for setting up the playing field, and a LEGO MINDSTORMS kit, which will provide the materials to build your robot. The instructions for setting up the playing field are also available on the FLL website, through this link:

<http://www.firstlegoleague.org/challenge/missionmodelbuildinginstructions>.

If you bought a LEGO MINDSTORMS kit last year, you can reuse that kit for your robot this year. However, the playing field changes each year, so you will need to buy a Field Set-up Kit every year, even if you have bought one in the past, and register your team with FIRST through this link: <https://my.usfirst.org/fl/tims/site.lasso>

### **Step 4: Begin Working on the Challenge**

Make sure to frequently check the FLL website (<http://www.firstlegoleague.org>) for more information on what tasks you need to complete and how you will be judged at the competition. It is up to you to decide how frequently you want your team to meet. Teams should meet for at least eight weeks before the competition. Work with your teammates to find time for your meetings. Make sure that the robot and the project are completed before the competition date.

### **Step 5: Tournament application**

A you may already know, the deadline to complete the Robot game and the project is on the day of the official tournament. Remember to keep an open mind at a tournament because this is the best place for your team to meet other teams and learn from their robot and project. Keep in mind that it is not mandatory to attend a competition if you are not ready that year. Check the FLL website for a list of available competitions. The FLL partner for your area will email registered team coaches with Tournament application instructions. A separate tournament participation fee is paid directly to event your team is placed in and may vary from year to year.

### **Step 6: Attend a Tournament and Celebrate :)**

Finally the time of the year has come and you're probably itching to show off all that talent you have gained so far. In an FLL tournament, teams should give importance to the Project Presentation, the Core Values, and the Robot Design, since that is what they will be evaluated on. During the event you, along with many other teams, will compete in three rounds of the Robot Game, which also contributes to your team score. There are several opportunities to win awards at competitions, but don't get discouraged if you do not win. As FIRST likes to put it "What we discover is more important than what we win." If your team decides not to attend a tournament, take time to celebrate the hard work you have put into this season. The purpose of FLL is to grow and learn together so it's important to take a little time at the end to recognize each team member's growth, and to celebrate what you have accomplished in your rookie season.

For any other information, please visit the FLL website and <http://www.firstlegoleague.org/challenge/teamresources> for other helpful guidelines.

**FIRST Tech Challenge** is a challenge where students learn the value of hard work, innovation and creativity. It lets them design and build robots, learn computer programming, and computer assisted design (CAD). Students will then compete against other teams at the local, regional, and national level. Scholarships, internships, and volunteering positions are available from FTC.

#### **How to Start a FTC Team:**

- Step 1- Build your team
- Step 2- Registering your Team
- Step 3- Getting Started
- Step 4- Planning for Expenses
- Step 5- Apply for tournament

**Step 1: Build your Team** - Teams are made up of middle school students and adult mentors who are ready to take on the challenges applying Science, Technology, Engineering and Mathematics concepts to robotics. Although FIRST recommends a

maximum of 15 students on each team, through our experience we suggest no more than a team of 12 per team. Guidance for recruiting mentors and team members, training the team, and helpful resources are outlined in the FTC Mentor Manual.

To make a new team, you have to sign up with TIMS (Team Information Management System), where you can pay the fees and order kits. This is on the FTC website.

### **Step 2: Registering your Team**

Once you have gathered your team, go to the Registration section for details on cost, budgeting and instructions on how to register your team.

<http://www.usfirst.org/roboticsprograms/ftc/registration>

Once your Team is registered, have your students register in the Youth Team Member Registration System. If students are under 13 years old, printed consent forms will need to be filled out and turned in at the events.

### **Step 3: Get Started**

Review the materials on this website and, if possible, attend events like a kick-off, workshops and scrimmages. You will also find the following pages very helpful:

**The Game Page** - Every year FIRST uploads a page with .pdf files describing game manuals, materials, documentation of the forums, the playing field materials/manuals, and team materials.

For more information go to:

<http://www.usfirst.org/roboticsprograms/ftc/game>

**Team Resources** - Tools and resources, as well as guides describing different activities critical to the FTC team to get you through the season  
For more information, go to:

<http://www.usfirst.org/roboticsprograms/ftc/team-resources>

**The FTC Kit of Parts** - updated options for 2015-2016, including the FTC New Technology.

For more information, go to:

[http://www.usfirst.org/sites/default/files/uploadedFiles/Robotics\\_Programs/FTC/Team\\_Resources/2015-16\\_FTC\\_Kit\\_of\\_Parts\\_Options.pdf](http://www.usfirst.org/sites/default/files/uploadedFiles/Robotics_Programs/FTC/Team_Resources/2015-16_FTC_Kit_of_Parts_Options.pdf)

**Season Timeline and Calendar** - This page will help you understand the flow of the season and know when your team should meet certain benchmarks. For more information, go to:

<http://www.usfirst.org/roboticsprograms/ftc/seasontimeline>

**FTC Event Finder** - This tool allows you to find FTC events near your area. For more information, go to: <http://www.usfirst.org/whatsgoingon>

**FTC Awards** - Learn about the Awards your team earn both on and off the competition field. For more information, go to:

<http://www.usfirst.org/roboticsprograms/ftc/ftcawards>

#### **Step 4: Planning For Expenses**

Running a FTC team can be difficult, especially since the materials used can be so expensive. Thus, teams always are looking for ways to reduce the cost. The following methods are ways that teams can effectively save money, but still successfully compete

:

- Two ZTE phones, for controlling the robot, can be purchased online – variable savings (estimate \$50)
  - If you are purchasing these phones separately, buy the Control Support Set 2 – about \$220 savings
  - Tools can be borrowed from the community – about \$200 savings
  - Condense costs by reducing the parts needed for the robot – about \$150 savings
  - Spirit wear for your team is not necessary – about \$200 savings
  - Parents can be involved with the team by supplying gas, travel expenses, and food – about \$200 savings
  - Visit a printing shop nearby to obtain free printing services – about \$100 savings
- Total potential savings: about \$1,120 if all above measures were combined. New Expense Sub-Total for Rookie Team: 2,590. This may seem like a lot of money to start a team but don't be discouraged most of this can be covered by available rookie team grants.

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#### **Step 5: Apply for a Tournament**

Teams that take part in FTC events apply through the events organizer. This can be found on the FIRST Tech Challenge “What Teams & Events are in my Area?” page. From there you select the challenge and desired state from the drop-down menus. After that you

To register for tournaments, you must go to the event organizer. When you visit this site, select FTC, and select your state. This will lead you to another page, which displays a list of local competitions. By selecting an event, you can view a description of the competition. Make sure to check this site regularly, since it is frequently updated with more competitions.

Robot Guide:

### FLL

- Robot can be no taller than 12 feet
- Uses LEGO MINDSTORMS and NXT
- Uses LEGO sensors
- Can not use Samantha Module
- Main programming language is NXT-G
- Does not use CAD

### FTC

- Robot has to be less than 18 inches x 18 inches x 18 inches
- Uses Java with android devices
- Uses LEGO, Hightechnic, and more
- Can use Samantha Module
- Main programming language is Lab View and Robot C
- Uses CAD

### Field Guide:

#### FLL

- Field is on 8 feet x 4 feet table
- Needs to practice on full field
- Purchases from FIRST for the field
- One robot on the field during the match

#### FTC

- Field is on Floor
- Uses ½ field
- Purchases from local resources to build field
- Four robots on the field during the match

### Transition Guide:

The transition from the FLL program to the FTC program comes with alterations. These adjustments mostly deal with the team and the robots. For example, FLL mostly dealt with kids from elementary schools, FTC now works with middle schoolers. Due to this age change, the difficulty of the competition is increased. That means the robot has to

be more advanced. FLL works with LEGO Mindstorms and is called the FIRST LEGO League. On the other hand, FTC uses Tetrix/Matrix metal pieces with raw materials. Another addition to the FTC competition is that they have an engineering notebook, this notebook that will give the panel of judges a good overview of the team as a whole. How we function, how we overcome obstacles, how we design, possible awards, etc. will be all in that book.

We hope that this information gives you a better chance to compete in your rookie year!  
Have a fantastic season,

The Hammerheads of Team 226.