



The Fighting Calculators

FIRST Robotics Competition Team 2175

TEAM MANUAL



Math and Science Academy

fightingcalculators.org



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Introduction

This manual covers important details of team policies. Students, parents, and mentors must know and abide by the information in this manual.

What is *FIRST*?

FIRST (For Inspiration and Recognition of Science and Technology) is an organization founded by inventor, Dean Kamen, in order to get students involved in engineering and technology. *FIRST* authorizes and hosts the *FIRST* Robotics Competition (FRC) in which our team competes.

The *FIRST* Robotics Competition is the only competition that places high school students side-by-side with industry professionals to work towards a common goal. This unique interaction aids students in developing a wide variety of technical and nontechnical skills. We aim to expose students to opportunities in Science, Technology, Engineering, and Math (STEM) through participation in this competition, and inspire them to pursue these opportunities later in life.

FIRST's Mission

“To inspire young people to be science and technology leaders, by engaging them in exciting mentor-based programs that build science, engineering and technology skills, that inspire innovation, and foster well-rounded life capabilities including self-confidence, communication, and leadership.”

FIRST's Philosophies

- **Gracious Professionalism®:**

“*Gracious Professionalism* is part of the ethos of *FIRST*. It's a way of doing things that encourages high-quality work, emphasizes the value of others, and respects individuals and the community.

With *Gracious Professionalism*, fierce competition and mutual gain are not separate notions. Gracious professionals learn and compete like crazy, but treat one another with respect and kindness in the process. They avoid treating anyone like losers. No chest thumping tough talk, but no sticky-sweet platitudes either. Knowledge, competition, and empathy are comfortably blended.

In the long run, *Gracious Professionalism* is part of pursuing a meaningful life. One can add to society and enjoy the satisfaction of knowing one has acted with integrity and sensitivity.” (From [FIRST Website](#))

- **Coopertition®:**

“Coopertition® produces innovation. At FIRST, Coopertition is displaying unqualified kindness and respect in the face of fierce competition. Coopertition is founded on the concept and a philosophy that teams can and should help and cooperate with each other even as they compete.

Coopertition involves learning from teammates. It is teaching teammates. It is learning from Mentors. And it is managing and being managed. Coopertition means competing always, but assisting and enabling others when you can.” (From [FIRST Website](#))

About Us

Who Are the Fighting Calculators?

The Fighting Calculators are a team of students and mentors from the Math and Science Academy (MSA) in Woodbury, Minnesota. The team was founded and organized by MSA senior Kevin O’Connor in 2006. Will Preska was the first lead mentor. The team’s rookie season was 2007, and it has been competing ever since as *FIRST* Robotics Competition (FRC) Team 2175.

The Fighting Calculators’ Mission

The Fighting Calculators’ mission is to provide the chance for youth to participate in FRC, to prepare for college and careers, and to become the problem solvers of the future. The goal is to excite youth about the opportunities and rewards in Science, Technology, Engineering, and Math (STEM), to increase self-confidence and build life skills. The Fighting Calculators partner with mentors from industry and academia to broaden students’ perspective. The team is student led and student driven; with mentors who provide support, encouragement, direction, and education. We subscribe to two of *FIRST*’s foundational philosophies: Gracious Professionalism® and Coopertition®.

Goals

The Team’s main goals are:

- Inspire students to excel in math, science, and technology
- Prepare students for leadership roles
- Promote the ideals of *FIRST*
- Increase community and state awareness of science and technology education opportunities
- Promote teamwork skills
- Introduce students to positive role models

- Boost the level of competition in *FIRST* by providing technical assistance and organizational mentoring to any *FIRST* team

Member Eligibility

In order to join FRC Team 2175, the applicant must be a high school student. Students must attend the Math and Science Academy in Woodbury, Minnesota. Non-MSA students will be handled on a case-by case basis. The Fighting Calculators will follow the MSA extracurricular guidelines.

Expectations

- **Demonstration of Appropriate Behavior:** The Fighting Calculators represent both the Math and Science Academy and our sponsors at all times. Appropriate behavior shows respect to members of the team and those that we represent. See the Activities Handbook on the MSA website for details.
- **Consistent Demonstration of Good Judgment and Positive Behavior:** Each team member reflects back on the team as a whole. Team members need to be role models for other students. Good behavior should be demonstrated at all times, both in and out of school activities.
- **Ability to Commit to a Project:** Staying with a project until completion is critical to team success. Team members need to dedicate themselves and avoid getting side-tracked or discouraged. If a student is having difficulties with a project, they should ask for help.
- **Ability to Work Both Independently and as a Team Member:** Team members must be able to work both independently, with little to no direction, and as part of a team.
- **Commitment to Team Activities:** This team requires many hours of a student's free time. The benefits of being involved with this team only come through active participation..
- **Commit to the Principles of *FIRST*.**
- **Commit to Effective Team Communication:** Team members must respond to direct communication (email, Slack, etc.) from another team member within 24 hours.
- **Team Information:** Any team information in the form of scouting data, files, video, and pictures gathered or created in the interest of the team must be available through the team Google Drive, Smugmug, or team website.
- **Commit to Be Safe:**
 - Follow general safety protocols specified during [safety training](#)

- If a safety incident occurs, inform a mentor and fill out the incident report form in the safety binder
- Only [authorized team members](#) may use the mill, lathe, laser cutter, and 3D printers alone
 - Unauthorized team members may only use these machines with an authorized team member
- Team members exhibiting unsafe behavior will be referred to the lead mentors

Team Positions

Leadership positions within the team are divided amongst the most qualified students and mentors who offer the best fit for the position.

Executive Board

The Fighting Calculators receive guidance and strategic direction from the Executive Board. For a complete description of the Board refer to the link below.

<https://docs.google.com/document/d/11Hkf0NYBI0VDNnSnnIObx1ry2KIGZQTT7maIGXReXIU/edit>

Lead Mentor/s

The lead mentors are responsible for all administrative aspects of the team, including registration for official *FIRST* events and coordination of other team mentors in organizing team activities. The lead mentors also help organize all team events and build times. Lead mentors have the power to remove students from team facilities and activities for a certain period of time, if necessary.

Team Captains

The team captains are student members who have demonstrated leadership ability. The team captains organize students on the team at meetings and in other team activities, and work closely with the lead mentor/s and the rest of the team mentors on team leadership. Captains must meet the lettering requirements. Team captains are selected by the lead mentor/s. Team captains are also on the executive board.

Student Representatives

Student representatives are voting members of the Executive Board. They attend board meetings and represent the interests of their teammates. Candidates for student representative are elected by popular vote. All students that meet the minimum

requirements for membership can vote and are candidates to be a representative. One representative per grade is elected each year. For full student representative responsibilities see the Board description.

Subteam Lead

Subteam leads coordinate the various subteams, and are responsible for making sure everyone on their subteam is safe and understands what they're doing. Leads are also responsible for reporting the progress of their subteam to the team as a whole and mediating communication between the sub-team and the rest of the team. Subteam leads are appointed by lead mentor/s and team captains. Students who have lettered in robotics the past season will be preferred over students who have not. . The subteam leads are announced once the captains and mentors have decided whom to select.

Subteams

The team consists of a variety of sub teams, each specializing on a specific aspect of the build season or competition. Students are not limited to involvement in one subteam. Students are encouraged to join multiple subteams to experience all that our team has to offer. Most students will eventually find a few areas to focus on based on their interest and abilities. Descriptions below of subteams are a general guideline and do not restrict the activities of that subteam. Further information will be sent out from Subteam leads about team specifics such as how to join, when to meet, etc.

Awards Team

The awards team is responsible for the record keeping of the team. Members prepare submissions for select awards, which may include the Chairman's Award, the Woodie Flowers Award, and the Dean's List Award. They also work with the team to help them talk to judges who walk through the pits during competitions. Members of the Awards Team also work as pit ambassadors. The awards team writes press releases after events.

Build Team

The Build Team is responsible for the construction of the robot. Early in build season members of the Build Team brainstorm, build, and test prototype ideas. In the final weeks of the build season, the build team is responsible for the final construction, or fabrication, of the competition and practice robots.

CAD Team

The CAD team is responsible for designing computerized models of the robot and its parts from prototypes. The CAD team works with the build team to create computer models of the final robot design. It ensures that the team has the parts and machining resources required to construct the robot, and provides drawings and insight to machinists to assist part manufacturing and robot construction.

Code Team

The code team is in charge of all programming done for the robot. The Code Team uses the Java language and environment.

Marketing and Imagery Team

The Marketing and Imagery Team is responsible for the use of the team image. They design buttons featuring the team name, number, and mascot. Graphics for posters, business cards, and banners are created by the Marketing and Imagery Team. This team also orders items like lanyards, stress balls, and business cards and other promotional merchandise to give away at competitions. They are also in charge of all apparel.

Business Development Team

The Business Development Team is responsible for organizing the fundraising data, creating a target list of potential prospects, provide sponsorship materials for use by team members, and facilitate the collection of information for use in grant materials and online applications. This team is also responsible for: record keeping of all donations and sponsorships, including in-kind donations; appropriate follow up and thank you's to donors; and coordinating fundraising records with MSA accounting professionals. All fundraising and development records become property of the team.

Online Presence (OP) Team

The Online Presence (OP) Team is the Fighting Calculator's face and voice on the internet. It keeps the team's online image up to date by writing blog posts and posting to the team's Twitter and Facebook pages. OP team duties include writing for the public view to keep our online presence both attractive and informative. The OP team also deals with photography, video production, and webcasting. Another main responsibility of OP is maintaining/programming the [team website](#).

Scouting and Strategy Team

During a competitive robotics event, the scouting team is responsible for collecting important information about other teams at competitions. Data on the capabilities of the other teams at the competition is collected and considered. The Scouting and Strategy Team creates pick lists so the team can choose the best alliance possible. The scouting team may assist the drive team with strategy for matches and interacts with other teams.

Outreach Team

The outreach team is responsible for organizing, planning, and leading the team's efforts toward community outreach. Outreach includes community events, team volunteering efforts, and mentorship of other teams. An outreach event is any event that spreads the message of FIRST and brings awareness of STEM to the community (robot demonstrations, STEM activities, seminars, etc). The outreach team participates in mentoring other FIRST programs such as FLL, FTC, and other FRC teams. Mentoring of another team is considered to be regular and consistent help provided to a team during their season.

Team Requirements and Obligations

There are two levels of participation. The first level would be minimum membership. If a student does not fulfill the minimum membership requirements, robotics will not appear on their transcript. However, the student will still be encouraged to come and cheer on the team. They must make their own travel arrangements and be accompanied by a parent. The second level of participation requires a student to qualify for a school letter.

	Minimum	Letter
Attend Shop Clean Ups	1	2
Total Hours of Team Activities*	-	150
Attend Outreach/Fundraising Events**	1	3
Attend Sponsorship Contact Events	-	1
Attend <i>FIRST</i> Regional Events	-	1

*Note: Hours spent at competitions do not count towards the total hours.

**Note: Attending multiple days of the same event only counts as one event.

***Note: All requirements must be completed and documented by April 30th each year.

Grades

Please Note: Students must be in good academic standing with a C- or higher in all classes to participate in robotics. If a student is on academic probation, they are not allowed to participate in robotics until the MSA Activities Director notifies the Lead Mentor that they are able to participate. Participation includes: competitions, shop time, fundraising, outreach and any other things that involve the team both during the week and on weekends. This policy is strictly enforced.

Sponsors and Fundraisers

Although not required for the minimum team requirements, all team members are encouraged to participate in the fundraising process. The captains and the business subteam lead(s) are responsible for organizing meetings between potential sponsors and representatives from the team. A group of team members will then present a practiced presentation to the potential sponsor. One of these presentations is considered a sponsorship contact event for the lettering requirement.

Note: If students know a contact within a company, they are encouraged to still approach the company and ask the company to sponsor the team.

Facilities

The Fighting Calculators currently utilize three main facilities: MSA, the East Ridge shop, and the field house.

Travel

The robotics season team requires travel to different events and activities. If money is an issue, there are scholarships available. Please contact the Activity Director at MSA if you need a scholarship.

Identity

The Fighting Calculators are a well-known and respected team in Minnesota. It is important to maintain a consistent team image. This includes a distinctive color scheme and uniform, as well as other branding details.

Team Name

Official team name is FRC Team 2175, The Fighting Calculators. Sponsors that meet platinum level (\$5000+ donation) sponsorship requirements will have their name added to our official team name, for use in the current robotics season.

Uniforms

The current team uniform is a black polo shirt with the calculator logo and current sponsors on the back. Team polos will be ordered and handed out during build season.

Communication

With over 40 people on the team effective communication is not an easy task. To best keep everyone informed and involved in discussion we use a variety of communication methods so everyone will receive up to date information. All team members are expected to respond to communications within 24 hours.

Team Website

The team website, <https://fightingcalculators.org>, is frequently updated with all the team information for the public to see. Some of the content includes: team history, team organization, sponsor information, and team requirements. There are also links to all the different media pages the team has. Members can create an account in order to gain access to important team documents and find links to the team drive and slack. To create an account, click the login button on the toolbar and then click the sign up link.

Google Group

This is one of our secondary forms of communication to Slack (see below). You should be registered on the google group at the first team meeting. When you join the team you will be required to register. If you have any problems contact one of the team captains.

All students, parents, and mentors will be added to the Team 2175 Google Group for important team announcements.

Email and Phone List

When you join the Fighting Calculators, your email and phone numbers are added to a list. Parent phone numbers are not available to students. This list is used when full team communication is not necessary, or if an email regards only you. This is especially useful at competitions when we cannot find a specific student. When giving your phone number and email address, please give the email and phone number that is easiest to reach you at.

Slack Slack is the main source of communication throughout the team. All important info is shared through the #general channel, and each subteam has their own channel for specific communications. All team members should have (at the very least) all message notifications on for the #general channel, as time-sensitive info will be shared through it. Slack can be accessed at <https://frc2175.slack.com>.

Trello

The Fighting Calculators use the project management website Trello to organize the tasks of the team. These tasks are divided into boards for each individual subteam. You can access Trello at

<https://trello.com/invite/team2175subteams/3c35b11f66350c2e681d4aeae01891b1>.

Blog

We use a blog to publish team activities throughout the year for the rest of the world. This is useful for people both on and off the team to keep track of our progress. Go here to see our blog posts (<http://fightingcalculators.org/blog>).

Social Media

Our team's Facebook and Twitter pages are mainly used to communicate with non-team members but are also useful for team members to check for updates and cool team videos. During competition season we will regularly post results to them if you cannot attend the event. The YouTube Channel is used to feature videos of our robot and Team. Pictures from outreach events, competitions, and the shop are posted on SmugMug.

- Facebook: [The Fighting Calculators FRC Team 2175](#)
- Twitter: [@frc2175](#)
- YouTube Channel: [FRC2175](#)
- SmugMug: [FRC2175](#)

The team also has a google calendar found at:

<https://calendar.google.com/calendar/embed?src=2175.first@gmail.com&ctz=America/Chicago>

Additional Resources

Here are additional resources to help you understand how our team is managed & run.

Projected Calendar

The season starts after the end of year banquet in May and goes until the banquet of the following May. The start of the season until kickoff (the first Saturday in January) is the offseason. The build season runs from kickoff until our first competition. The competition season runs from bag day until the end of the season.

This calendar is approximate and subject to change.

- September: EMCC (East Ridge High School)
- October: M.R.I. (Roseville Area High School)
- November: Minne Mini Regional (Prior Lake High School)
- January: FRC Kick-off
- January - February: FRC Build Season
- February: Week Zero Event
- March: Alternate Regional
- March: North Star Regional (Mariucci Arena)
- April/May (*if qualify*): *FIRST* Championships (Detroit, MI)
- May (*if qualify*): MSHSL Competition (Williams Arena)
- July (*if invited*): I.R.I (Lawrence North High School)
- July: Gitchi Gummi (Duluth East High School)
- August: Woodbury Days (Ojibway Park)
- August: MN State Fair (Education Building)

Marketing and Fundraising Portfolio

All team members are encouraged to help with the team's fundraising in some way. To aid in this, we have created a portfolio on the fundraising process. Before approaching a sponsor you should ask the Lead Mentor or a Team Captain for a bound copy of this document. See Fundraising/Sponsor Section on page 9 for more information.

Important Contacts

If you ever have any questions please feel free to email the following address and the lead mentor(s) or captains will get back to you:

- Official Team Contact, info@fightingcalculators.org

Robotics Season

Please note that FRC Team 2175 participates in outreach and competition events throughout the entire year (including the summer break), but the largest time commitment is during the build season, usually starting with kickoff on the first Saturday in January to our first competition in February or March. During build season, the team meets at the East Ridge High School Shop to design, prototype, and build the new

robot. Students will also work on awards submissions, fundraising, and marketing. Weekday sessions are from about 4pm to 10pm; Saturday sessions from about 10am to 10pm; Sunday sessions from about 10am to 5pm. Students will have nutritious meals to eat during build season provided by parents. Besides working on the robot, there are many non-technical parts of the team students can participate in.

Team Application Steps

Students cannot attend any event (competitions, shop time, fundraisers, etc.) with the team until the Student Liability form is turned into a lead mentor.

Each student must do both **Part 1** and **Part 2** of the application process to **receive credit for participating in FRC Robotics on their high school transcript**. This consists of a number of different forms, some that you will download from links and some you will complete online. Some forms will need a parent/guardian to sign them. Students and parents must read the Manual before filling out the application forms.

If you have multiple students in the program, please fill out a separate set of forms for each student. A single payment may be submitted for all applications.

Part 1

These materials must be done/turned into Mr. La Casse (Building B Front Office) by two weeks after the Recruitment Meeting or your first team participation.

(please staple all forms and check together)

1. Read team manual
2. Fill out health/permission slip (**stapled at the very back of all forms**)
3. Sign Student Liability form
4. Sign Adult Liability form (one for each parent)
5. Sign FIRST Code of Conduct (student & parent)
6. Read & Sign MSHSL Form (only signature page needs to be turned in)
7. Activity Fee

Access the forms here:

https://drive.google.com/drive/u/0/folders/173F4GbFyINaMYtWXcTE5OWb4C_dlrS_S

Part 2

These things must be done two weeks after the Recruitment Meeting or your first team participation:

1. Register with First Inspires:
 - a. If you do not have an account:
<https://my.firstinspires.org/AccountManager/Account/Register>
 - i. See Tutorial: <http://fightingcalculators.org/resources/stims/>

- b. If you already have an account from past years:
<https://login.firstinspires.org/core/login?signin=e00942fe8fd19e5d2dc35db9f284616b>
2. Fill out and submit Student Information Form
 - a. https://docs.google.com/forms/d/e/1FAIpQLSeyuonoDIptHjnOqVtKiJ2fXZM1rXOd8lftQtRLZh4piu-bJQ/viewform?usp=sf_link
3. Parents please go to <http://www.usfirst.org/aboutus/youth-protection-program>, and select *FIRST* Youth Protection Program Guide, open, then select and read the section “Guidelines for Parents” on page 32.

Activity Fee

The FRC Team 2175 activity fee for **2019-2020** is \$175 for each student, with a family cap of \$350. If your family is not able to pay these fees due to financial hardship, please contact the lead mentor(s), as FRC Team 2175 does not wish to exclude any student on this basis.

Deadlines

Two weeks after the Recruitment Meeting or your first team participation:

Deadline to complete the entire application process (includes all of part 1 and part 2), including turning in all forms and the activity fee listed above, to Mr. La Casse, Building B, Front Office.