



# *FIRST*® Robotics Competition Mentor Guide

*FIRST*® is a global robotics community that prepares young people for the future.



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# 1 Overview Of *FIRST*<sup>®</sup>

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*FIRST*<sup>®</sup> (For Inspiration and Recognition of Science and Technology) was founded by inventor Dean Kamen to inspire young people's interest in science and technology. As a robotics community that prepares young people for the future, *FIRST* is the world's leading youth-serving nonprofit advancing STEM education. For 30 years, *FIRST* has combined the rigor of STEM learning with the fun and excitement of traditional sports and the inspiration that comes from community through programs that have a proven impact on learning, interest, and skill-building inside and outside of the classroom.

*FIRST* provides programs that span a variety of age groups:

- *FIRST*<sup>®</sup> Robotics Competition for grades 9-12, ages 14-18
- *FIRST*<sup>®</sup> Tech Challenge for grades 7-12, ages 12-18
- *FIRST*<sup>®</sup> LEGO<sup>®</sup> League for grades PreK -8, ages 4-16\*
  - *FIRST*<sup>®</sup> LEGO<sup>®</sup> League Challenge for grades 4-8 (ages 9-16\*)
  - *FIRST*<sup>®</sup> LEGO<sup>®</sup> League Explore for grades 2-4 (ages 6-10)
  - *FIRST*<sup>®</sup> LEGO<sup>®</sup> League Discover for grades PreK-1 (ages 4-6)

*\*Ages and grades vary by country*

Please visit our website: [www.firstinspires.org](http://www.firstinspires.org) for more information about *FIRST* and its programs.

## 1.1 *FIRST* Mission

The mission of *FIRST* is to inspire young people to be science and technology leaders and innovators, by engaging them in exciting Mentor-based programs that build science, engineering, and technology skills, that inspire innovation, and that foster well-rounded life capabilities including self-confidence, communication, and leadership.

## 1.2 *FIRST*<sup>®</sup> Robotics Competition

*FIRST* Robotics Competition combines the excitement of sport with the rigors of science and technology. Teams of students are challenged to design, build, and program industrial-size robots and compete for awards, while they also create a team identity, raise funds, hone teamwork skills, and advance respect and appreciation for STEM within the local community.

Volunteer professional mentors lend their time and talents to guide each team. It's as close to real-world engineering as a student can get. Plus, team members and alumni gain access to career discovery opportunities, networking, and the *FIRST* Scholarship Program.

## 1.3 *Gracious Professionalism*<sup>®</sup>

*Gracious Professionalism*<sup>®</sup> 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.

*FIRST* often uses this term, and it goes a long way to describing the program's intent. [Dr. Woodie Flowers](#), (1943 - 2019) EAB Chair Emeritus & Distinguished Advisor, coined the term *Gracious Professionalism*. He often asked this question: "Why do *FIRST* folks talk so much about that phrase?" As a mentor and facilitator, this is one of the most important concepts you can teach a young person. At *FIRST*, we see team members helping fellow team members, but we also see teams helping other teams.

This is an indicator that this concept is effective and productive. Spend time with your team reviewing some of the wisdom from Woodie:

*“Obviously it would not make sense to endorse “asinine professionalism” or “gracious incompetence.” It is, however, completely consistent with the FIRST spirit to encourage doing high quality, well informed work in a manner that leaves everyone feeling valued. Gracious Professionalism seems to be a good descriptor for part of the ethos of FIRST. It is part of what makes FIRST different and wonderful.*

*Gracious Professionalism* has purposefully been left somewhat undefined because it can and should mean different things to each of us. We can, however, outline some of its possible meanings. Gracious attitudes and behaviors are win-win. Gracious folks respect others and let that respect show in their actions. Professionals possess special knowledge and are trusted by society to use that knowledge responsibly. Thus, *Gracious Professionals* make a valued contribution in a manner pleasing to others and to themselves.

Understanding that *Gracious Professionalism* works is not rocket science. It is, however, missing in too many activities. At *FIRST*, it is alive and well. Please help us take care of it. In the long run, *Gracious Professionalism* is part of pursuing a meaningful life. If one becomes a professional, and uses knowledge in a gracious manner, everyone wins. One can add to society and enjoy the satisfaction of knowing that you have acted with integrity and sensitivity. “That’s good stuff!”

## 1.4 *Coopertition*<sup>®</sup>

*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.

## 1.5 *FIRST* Core Values

We express the *FIRST* philosophies of *Gracious Professionalism* and *Coopertition* through our Core Values:

- **Discovery:** We explore new skills and ideas.
- **Innovation:** We use creativity and persistence to solve problems.
- **Impact:** We apply what we learn to improve our world.
- **Inclusion:** We respect each other and embrace our differences.
- **Teamwork:** We are stronger when we work together.
- **Fun:** We enjoy and celebrate what we do!

## 2 The Mentor Role

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Mentoring is an important part of the *FIRST* program and largely contributes to the program’s success. This document will focus on information to help all mentor(s) be successful and help their students have the best experience. If you are a Lead Mentor, be sure to also check out the [Guide to Running a \*FIRST\* Robotics Competition Team](#). Every adult on a *FIRST* team is a mentor, simply because they lead through guidance and example. It is important to remember students need guidance, structure, encouragement, and most of all, a fun experience!

When done correctly, this learning process builds and expands team members’ self-confidence and knowledge. If the process has a strong foundation and works properly, mentors come away with as much as students do.

A mentor:

- requires no special skills, but should have patience, dedication, and a willingness to learn alongside the team.
- is any person who works with the team in their area of expertise, for as little as one team meeting or as many as all of them.
- helps provide valuable support and serves as a resource in their own area of specialty.
- may direct the process the team follows to solve the yearly game challenge, without providing the solution themselves.
- is a coach, teacher, motivator, and/or facilitator.
- helps students gain the skills and confidence to forge ahead and build their future with *FIRST*.
- helps ignite curiosity, empower, and guide the collective skills needed to make a positive impact on each other, and the world.

In *FIRST*, it is important that mentors and students are equal and that the relationship is a partnership. Each person works collaboratively towards a mutual and beneficial goal. To succeed, all the mentors and team members must commit to this.

A mentor's role may include the following but note that not all mentors have to fill every role listed below:

- inspiring students in science and technology.
- actively sharing knowledge and experience with the teams to help foster intellectual growth.
- motivating and engaging students in meaningful activities.
- balancing effective work habits with FUN!
- encouraging the team to welcome and include all members.
- providing students with opportunities to make choices, both good and bad.
- encouraging students to take risks and be inventive.
- allowing and encouraging independent thought.
- creating, encouraging, and facilitating open, honest communication within the team.
- fostering a reciprocal environment of trust and respect for every member and their ideas.
- encouraging accountability within the team.
- facilitating team activities and discussion.
- developing roles within the team.
- coordinating help.
- maintaining equipment and purchasing supplies.
- communicating with sponsor organizations.
- registering for competition(s).
- planning and scheduling meetings, visits, and trips.
- acting as a liaison between team members, mentors, parents, and volunteers.
- being a champion for *Gracious Professionalism* and role modeling the principle within the team

## 2.1 Youth Protection Program (YPP)

Part of your role as a mentor is to ensure safety for the students. *FIRST* strives to create an environment in which team members can grow, learn, and have fun with minimal risk of injury. Two lead mentors must be screened by our *FIRST* Youth Protection Program (YPP) for teams within US & Canada but teams may choose to have all mentors screened.

[FIRST Youth Protection Program](#) has clear guidelines regarding adult and student interaction. Adults working in *FIRST* programs must be knowledgeable of the standards set by the *FIRST* YPP, as well as those set by the school or organization hosting their team.

*FIRST* requires a minimum of two mentors to be with students at all times. If they are in different locations at the build site those two mentors should be within sight lines and be interruptible. The two adults do not always have to be the Lead Mentors, and *FIRST* recommends screening non-Lead Mentors if they are present for 30% or more of the team's meeting time and/or activities. *FIRST* has put together this [Youth Protection Training](#) which is intended to enable adults working with *FIRST* teams to recognize situations

that may pose a threat to team member safety and take the actions necessary to prevent and report injuries.

## 2.2 Equity, Diversity, and Inclusion (ED&I)

Part of your role as a mentor is to be an example and to welcome and include all team members. *FIRST* is committed to fostering, cultivating and preserving a culture of equity, diversity, and inclusion. We embrace and encourage differences in race, ethnicity, national origin, sex, gender, gender identity, gender expression, sexual orientation, disability, age, religion, income, language, learning difference, or any other characteristics that make our adult-force and students unique.

*FIRST* collaborated with the National Alliance for Partnerships in Equity (NAPE) to develop training for mentors, volunteers, partners and other key stakeholders who work directly with students and are committed to creating a sense of belonging for students on teams.

We ask that all mentors take our complimentary, three-part training module course titled [Strategies for Inspiring Success for All](#). These modules will equip mentors with specific strategies to support community outreach, student participation, motivation, engagement, and success through engaging and reflective activities on interactions with students. *FIRST* recommends mentors take this training when they first start engaging as a team mentor. It is also recommended that mentors retake this training on an annual basis to refresh on the tools and strategies provided to best work with all students.

For additional resources visit the [Equity, Diversity, and Inclusion Training & Resources webpage](#) to find links to other resources for increasing your knowledge and practice on creating inclusive environments for all.

## 2.3 Safety

Instilling a culture of safety is a value that every individual in the *FIRST* community must embrace as we pursue the mission and vision of *FIRST*. Safety is a vital part of the *FIRST* culture, having established the framework for safety leadership in all aspects of the programs. Teams should use the [FIRST Safety Manual](#) to understand and implement safe practices. *FIRST* has also worked with UL to establish online safety training for team members and mentors through the [Safety Learning Portal](#).

## 2.4 Transitioning from Student to Mentor

Part of your role as a mentor is to help your team members understand that *FIRST* doesn't end with high school! Although a student's time as a team participant ends with their high school graduation, they then become *FIRST* alumni.

*FIRST* alumni make up a large portion of *FIRST* event volunteers and team mentors. The transition from team member to team mentor can be especially daunting. To help alumni mentors understand the expectations of the new role, we encourage them to take our [New Mentor Training](#).

# 3 Effective Mentoring

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Mentors differ in the amount of instruction they give their teams. Some give very little, and others give much more and it is up to you and the other mentors to decide which approach is best for your team. If you are a new mentor on a team, consult the Lead Mentor(s) for best practices.

An effective mentor demonstrates the value of success they have encountered during their career path and uses these skills and successes to share knowledge and values with team members. Successful mentoring may help optimize everyone's learning experiences by:

- Promoting independent thought

- Fostering a reciprocal foundation of trust and respect
- Opening communication within the team
- Encouraging effective facilitation

### 3.1 Promote Independent Thought

The following may help you to promote independent thought on your team:

- Approach problems with an open mind
- Treat all ideas as equal
- Ensure all students have equal opportunity to offer their thoughts
- Resist any impulse to judge ideas
- Capture ideas as stated
- Use creative problem-solving strategies to move beyond conventional solutions.

### 3.2 Foster Reciprocal Trust and Respect

It can be crucial to develop an environment of trust and respect between all team members and mentors to establish a place where are all welcome and excited to learn. Communication is a key component for building trust and respect. The foundation for this type of relationship begins when mentors become approachable and available to students. Facilitate in such a way that the students feel very much a part of the “thinking, contributing, and doing” processes for the team. The mentor/student relationship is based on common goals and continues to build on mutual trust and respect.

Many teams hold team-building events and other activities prior to Kickoff, so new team members can get to know everyone in a fun and non-chaotic environment. These team-building activities may help teams create healthy, working relationships amongst one another.

### 3.3 Facilitation Techniques

Resist doing most of the talking even if you know the correct answers. When communication is “one way” and the mentor has all of the answers, the other team members will not feel valued. To break through this challenge, learn to be an active listener.

- Encourage open communication.
- Ask open-ended questions such as "What do you think?" or "How do you think we should approach this?"
- Stay away from questions that require a simple yes or no answer.
- Don't jump in with your idea for the solution. Let the team member finish their thought.
- Take the time to make sure everyone understands
- Encourage them to ask questions when you see that something is not clear.
- Always ask if there is anyone who does not understand, and clarify discussions when there is a topic that some students don't “get” or there is a word used that has multiple meanings. The student may not have covered the topic in school yet.
- The effective mentor will pay close attention to what and how something is said. Try to eliminate frustration by letting the team member talk it out.

### 3.4 Advice for Mentors

Mentoring a team can be one of the most rewarding experiences in a person’s life. Like any great reward, it involves a commitment of time and energy. However, it should not be taken too seriously! The goal of *FIRST* Robotics Competition is to help students have fun with robots while they become comfortable with technology. Whether or not the team is successful at a competition, team members win just by participating.

It is important for every adult to remember that there are responsibilities that come with the adult/student relationship. Young people look up to people they trust and respect and will look to mentors as role models. A mentor's actions will be closely watched, and their behavior will be perceived as appropriate. Be intentional and conscientious in your behavior and language.

Prior to meeting with students, have a meeting with all mentors to set expectations. This can give adults an opportunity to ask questions they may not want to ask in front of the students, openly discuss topics such as diversity, and discuss ideas and potential problems or concerns about working with young people. If this is a school-affiliated team and the school district has an individual who works with school or business partnerships, they should be invited to this meeting to help answer questions.

### 3.5 Mentoring Tips

- If there is a problem within the team, allow the team to communicate its frustration, decide on a course of action, and then help them move forward
- Resist taking sides
- Keep the group focused
- Be an alert and active listener
- Include everyone. Bring quiet team members into the discussion and keep those who feel comfortable with communication from monopolizing the conversation
- Encourage members to build on ideas
- Respect all ideas
- Allow people to disagree with or challenge an idea, but not to judge the individual
- Record ideas
- Avoid rehash
- Encourage laughter

## 4 Additional Resources

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This guide is intended to be a starting point for mentors. Mentors should also consider looking at the following additional resources:

- [FIRST Robotics Competition Calendar](#) – A calendar of important dates for *FIRST* Robotics Competition teams
- [FIRST Robotics Competition Email Blasts](#) – Archive of *FIRST* Robotics Competition team email blasts.
- [FIRST Robotics Competition Blog](#) – Blog posts from the director of *FIRST* Robotics Competition and guests.
- [WPI Lib](#) – Control System and Programming documentation to help with wiring and programming your robot.
- [Technical Resources](#) – A collection of both mechanical and software/electrical resources to aid teams.
- [Supplemental Resources](#) – A collection of resources put together with the help of “The Compass Alliance.”
- [FIRST Robotics Competition Awards Page](#) – A page that shows all of the current *FIRST* Robotics Competition Awards, award deadlines, and links to the guidelines for the awards.
- [Find Local Support](#) – A page to find your local Program Deliver Organizations that partner with *FIRST* in each community that include Program Delivery Partners (PDPs), *FIRST* Senior Mentors, and *FIRST* AmeriCorps VISTA members
- *FIRST* Robotics Competition Social Media: [FIRST Robotics Competition Twitter](#) and [FIRST Robotics Competition Facebook](#)

Teams can contact [Team Support](#) for any additional questions.