



## General *FIRST*<sup>®</sup> FAQ

### **What is *FIRST*?**

*FIRST*<sup>®</sup> (For Inspiration and Recognition of Science and Technology) was founded in 1989 by inventor Dean Kamen to inspire young people's interest and participation in science and technology. Based in Manchester, N.H., the 501(c)(3) not-for-profit public charity inspires 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 that foster well-rounded life capabilities including self-confidence, communication, and leadership.

*FIRST* provides four programs: the *FIRST* Robotics Competition (FRC<sup>®</sup>) and the *FIRST* Tech Challenge (FTC<sup>®</sup>) for Grades 9-12 (ages 14-18); the *FIRST* LEGO<sup>®</sup> League (FLL<sup>®</sup>) for Grades 4-8 (ages 9-16; ages 9-14 in the U.S. and Canada); and the Junior *FIRST* LEGO<sup>®</sup> League (Jr.FLL) for Grades K-3 (ages 6-9). *FIRST* also operates a research, development, and training facility called *FIRST* Place at its headquarters in New Hampshire.

### **What is Gracious Professionalism<sup>™</sup>?**

Gracious Professionalism<sup>™</sup> is part of the ethos of *FIRST*. The idea and phrase are found throughout *FIRST*, but no one has been a stronger champion than *FIRST* National Advisor, Woodie Flowers. "Gracious Professionalism is 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."

### **What is Coopertition<sup>™</sup>?**

Coopertition<sup>™</sup> 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.

### **How does the education community support *FIRST*?**

*FIRST* provides an education and career path for young people who might not otherwise have discovered an interest in and pursued education and careers in science and technology. *FIRST* works closely with schools at every level to transform both the perception and reality of education in science and technology. Some of the finest colleges and universities support *FIRST* by providing scholarship opportunities, sponsoring teams, and providing mentorship, equipment, and facilities.



## FIRST® Tech Challenge FAQ

### What is the *FIRST*® Tech Challenge (FTC®)?

The *FIRST* Tech Challenge (FTC) for grades 9-12 (ages 14 to 18) is a challenging mid-level robotics competition designed for young people who want a hands-on learning experience to develop and hone their skills and abilities in science, technology, engineering, and math. FTC was designed for teams who want the same real-world challenges as the *FIRST* Robotics Competition (FRC), but who require a more affordable build kit and more geographically accessible events. FTC is an ideal next step for students moving from *FIRST* LEGO League (FLL) or prior to participating in the *FIRST* Robotics Competition (FRC).

### What is the yearly Challenge?

The Challenge is the annual game revealed to teams each September. Teams must determine their strategy; develop their plan; and program, build, and test their robot. Working through the engineering process brings the reality of science and technology to students on a more intimate, hands-on level. The proving ground for this work is competition against other teams who are faced with the same challenge and resources.

### How is the game played?

The 2010/11 game *GET OVER IT!*™ was developed with input of professional robotics designers, engineers, and sensor experts from across the country. Using a combination of sensors, including infrared tracking (IR), line following, magnet seeking, ultrasonic, touch, and more, students program their robots to operate in both autonomous and tele-operated modes over a raised center goal. *GET OVER IT!* matches lasted two minutes and 40 seconds, and began with a 40-second autonomous period followed by a two-minute tele-operated period. The final 30 seconds of the tele-operated period was the “end game,” where teams could only make contact with their own bridge and tried to get their robots and goal on top of the bridges to get balance points.

### What do teams use to build their robots?

The 2010 FTC competition kit was a complete robotics platform designed to provide students with the same resources used by engineers and scientists. It consisted of an expanded *TETRIX*™ Education Base Set, LEGO® MINDSTORMS® NXT Education Base Set, DC drive motors, servomotors, controllers, and advanced sensors. It also included three software platforms which FTC teams could use to program their robots, including *LabVIEW Education Edition*, *ROBOTC* for FTC, and PTC's Pro/ENGINEER 3D CAD/CAM design software. Thanks to Cisco Systems for development and the Kaufman Foundation for financial support, each FTC team will receive a Samantha module, an innovative, new WiFi robotic interface which allows teams to communicate more reliably with their robots and provides a Field Control System (FCS) that operates in both autonomous and teleoperated modes.

### Who participates in the competition?

In the 2010-2011 season, approximately 15,000 young people on 1,500 teams competed in qualifying events and Championship Tournaments, and the *FIRST* Championship, April 27-30, 2011. Each team is comprised of a professional mentor or coach and a maximum of 10 students. The program is flexible in structure, allowing teams to form within the school or home-

school environment, as an afterschool program, with a neighborhood group, or as part of any youth-based organization.

### **What do the students win?**

Teams compete for a series of awards honoring accomplishments in areas including engineering, design excellence, competitive play, sportsmanship, and high-impact partnerships between schools, businesses, and communities. A judging committee of distinguished professionals makes award decisions. The most prestigious award is the *FIRST* Tech Challenge Inspire Award, a peer- and formal-judged award that honors the team that performs well in all categories, is viewed by other teams as the most desirable alliance partner, and is viewed by judges as best exemplifying all components of the *FIRST* Tech Challenge philosophy. With more than \$7 million in scholarships available to participants, FTC is an opportunity for students to enhance their education and personal development through a challenging and meaningful extracurricular activity. FTC programs are recognized by top universities and corporations as essential preparation for higher-education and workforce development.

### **Are there other benefits to participating?**

A team of researchers at the Center for Youth Development at Brandeis University conducted an evaluation of the 2006 pilot season that included observation of the six events and interviews with teams and their coaches/mentors. Both team leaders and team members assessed FTC positively:

- Ninety percent or more reported that the program had increased participants understanding of basic science principles, how technology could be used to solve real-world problems, and team members' understanding of the engineering design process
- Ninety-three percent of participants reported wanting to learn more about science and technology
- Eighty percent or more of participants reported increased interest in science and technology careers and doing well in school
- Seventy-four percent of team leaders participated as a way to get youth involved in science and technology.

### **Is scientific, technology, or mathematic expertise required for students to participate in the *FIRST* Tech Challenge?**

FTC motivates students just becoming familiar with basic concepts in science, math, and technology. The program effectively engages students from various backgrounds, instilling new ideas and concepts in more experienced students, while helping to inspire, motivate, and encourage learning basic principles and skills among students with less experience. Through their *FIRST* involvement, students also learn about important, life-long team skills such as planning, research, collaboration, mentorship, and teamwork.



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

### **What is the FIRST<sup>®</sup> Robotics Competition (FRC<sup>®</sup>)?**

The *FIRST* Robotics Competition (FRC) for grades 9-12 (ages 14-18) is an annual competition that helps young people discover the rewards and excitement of education and careers in science, engineering, and technology. FRC challenges high-school-aged students – working with professional Mentors – to design and build a robot, and compete in high-intensity events that reward the effectiveness of each robot, the power of team strategy and collaboration, and the determination of students. In 1992, the initial *FIRST* Robotics Competition took place with 28 teams in a high school gym in New Hampshire. In 2011, the largest-ever FRC includes 2,075 teams from nine countries competing in 48 Regional events, nine District competitions and a State Championship (in Michigan only), and the *FIRST* Championship at the Edward Jones Dome in St. Louis, Mo.

### **How is the game played?**

Each year's Kickoff event unveils a new, exciting, and challenging game. From the Kickoff, teams have just six weeks to solve the season's common problem using the same kit of parts and a standard set of rules. In the 2011 game "LOGO MOTION™", two alliances of three teams competed on a 27-by-54-foot field with poles, attempting to earn points by hanging as many triangle, circle, and square logo pieces as possible. Bonus points were earned for each robot that was able to hang and assemble logo pieces to form the *FIRST* logo. Robots were also able to deploy Mini-Bots to climb vertical poles for a chance to earn additional points.

### **Who participates in the competition?**

During the 2011 season, close to 52,000 high-school students on 2,075 FRC teams competed in 48 Regionals (in the U.S., Canada, and Israel); nine District competitions and a State Championship (in Michigan); and the Championship. Each team is comprised of professional Mentors and an average of 25 students in grades 9-12. In addition, each *FIRST* team has one or more Sponsors. Those Sponsors include companies, universities, or professional organizations that donate their time, talent, funds, equipment, and much more to the team effort.

Locally, 39 teams from eight states and Canada competed in the 2011 Pittsburgh Regional *FIRST* Robotics Competition from March 10-12 at the Petersen Events Center.

### **Why involve a professional Mentor? Why don't students build the robot themselves?**

*FIRST* creates powerful mentoring relationships between the students and professional Mentors. FRC teams include engineers and other professionals from some of the world's most respected companies. Students work closely with and learn from these "stars" of the engineering world. Meaningful involvement of adults in children's lives is proven as an essential component for developing young people's potential.

### **Is scientific, technology, or mathematic expertise required for students to participate in the FIRST Robotics Competition?**

*FIRST* invites students who may not be predisposed to science, math, or technology to participate. In fact, FRC is designed to inspire, motivate, and encourage students to learn basic principles while challenging more experienced students. Since there are critical roles for students in everything from design and building, to computer animation, to fundraising and research, every student can actively participate and benefit.

### **What do the students win?**

Teams compete for a series of awards honoring accomplishments in areas including engineering, design excellence, competitive play, sportsmanship, and high-impact partnerships between schools, businesses, and communities. A judging committee of distinguished professionals makes award decisions. The most prestigious award is the Chairman's Award, which recognizes the team that best represents a model for other teams to emulate and best embodies the purpose and goals of *FIRST*. All participating students receive a medallion in honor of their achievements.

### **Can you explain the new Dean's List Award?**

The new Dean's List Award individually recognizes members of the *FIRST* community who excel as student leaders and lead their teams and communities to increased awareness of the mission of *FIRST*. When Dean Kamen evolved the concept of the Dean's List Award along with his mother, Evelyn, and *FIRST* Volunteers Vince Wilczynski and Ceci Neumann, the idea was to individually recognize members of the *FIRST* community who excelled as student leaders and led their teams and communities to increased awareness of the mission of *FIRST*.

### **Are students offered higher education scholarships?**

Any FRC participant is also eligible to apply for more than \$14 million in scholarships from 140 of the leading engineering colleges and universities.

### **Are there other benefits to participating?**

Throughout their *FIRST* experience, students gain maturity, build self-confidence, learn teamwork, and gain an understanding of professionalism. Students have fun while building a network of friends and professional Mentors who enrich their lives.

A 2005 Brandeis University evaluation of *FIRST* participants primarily from urban and low-income schools found that, compared to a group of students with similar backgrounds in high school math and science, FRC participants were:

- Nearly twice as likely to major in science or engineering (55% vs. 28%).
- More than three times as likely to major specifically in engineering (41% vs. 13%), and they majored in engineering at roughly seven times the average among US college students overall.
- More than twice as likely to expect to have a science or technology-related career after college (45% vs. 20%).

Goodman Research Group, Boston, Mass., found positive results from its 2000 *FIRST* Robotics Competition evaluation. Their findings showed:

- Improvement in student attitudes about science, math, teamwork and the working world.
- Improvement in students' self-image, particularly among under-represented groups.
- *FIRST* students' attitudes about teamwork are significantly more positive after *FIRST* than they were before participating in the competition season.
- Two-thirds of student participants indicated interest in working for one of their team Sponsors after completing their education, and one fifth planned to work for one of their team Sponsors in a summer internship or part-time job.

Sponsors benefit by finding future employees and interns. Mentors benefit from renewed inspiration and a reminder as to why they chose science, technology, engineering, and math as a career. Volunteers are recognized as an integral and vital part of the way in which young people connect to the real world, in their own communities and in the world at large.