Beach Cities Robotics

Team Handbook

Welcome

Welcome to Beach Cities Robotics. We are so happy to have you join our team. Each year we try to make our team more efficient and productive and we are delighted to have you be a part of this process. This handbook is a brief overview of the team that covers the major items you may encounter on the team, so please read thoroughly.

Contents

FIRST

For Inspiration and Recognition of Science and Technology

WHAT IS FIRST? *FIRST* is a non-profit educational organization that was founded to inspire and excite young people about science and technology by bringing together professional mentors with students.

THE ORGANIZATION: *FIRST* was founded in 1989 and held its first robotics competition in 1992. From that modest beginning with 28 high school teams in a New Hampshire high school gymnasium, *FIRST* has expanded to include more than 13,000 elementary through high school teams in 38 countries. The *FIRST* Robotics Competition (FRC) alone has grown from those original 28 teams to more than 1,500 teams, competing in 41 Regional events in Brazil, Canada, Israel, and the United States as well as Championship events at the Georgia Dome in Atlanta, Georgia. *FIRST* leagues include the *FIRST* Robotics Competition and *FIRST* Tech Challenge for high school students, the *FIRST* LEGO League for ages 9 to 14, the *FIRST* Junior LEGO League for ages 6 to 9, and a variety of education-related projects and programs. *FIRST* is a 501(c)(3) organization headquartered in Manchester, New Hampshire.

VISION: World-famous inventor Dean Kamen, founder of *FIRST*, imagines a day when the act of invention—that is, the work of scientists, engineers and technologists—is as revered in popular culture as music, athletics and entertainment are today. The *FIRST* vision is to inspire in young people, their schools, and communities, an appreciation of science and technology and an understanding that mastering these enriches the lives of all.

HOW IT WORKS: *FIRST* builds alliances that inspire and prepare the workforce, leaders and capable, technologically literate citizens of tomorrow through a large, successful and growing community of educators, parents, community leaders, engineers, volunteers and sponsors. *FIRST* designs accessible, innovative programs that build self-confidence, knowledge and life skills while motivating teams and their supporters.

FIRST ROBOTICS COMPETITION (FRC): The *FIRST* Robotics Competition is a unique varsity sport of the mind designed to help high-school-aged students discover how interesting and rewarding the life of engineers and researchers can be. FRC challenges teams of students and their mentors to solve a common problem in a six-week timeframe using a standard "kit of parts" and a common set of rules. *FIRST* redefines winning for these students because they are rewarded for excellence in design, demonstrated team spirit, gracious professionalism and maturity, and the ability to overcome obstacles. Scoring the most points is a secondary goal. Winning means building partnerships that last.

FIRST TECH CHALLENGE (FTC): The *FIRST* Tech Challenge is a mid-level robotics competition for high-school students. It offers the traditional challenge of a *FIRST* Robotics Competition but with the ultimate goal of reaching more young people with a lower-cost, more accessible opportunity to discover the excitement and rewards of science, technology, and engineering. It provides a transition from *FIRST* LEGO League into FRC and trains those never before exposed to *FIRST* or the world of robotics.

FIRST LEGO LEAGUE (FLL): Like FRC, *FIRST* LEGO League combines academic challenge with a sports-like competition. Between mid September and mid November, teams of

up to ten 9-14 year old students design, build, program, and test LEGO MINDSTORMS robots and prepare presentations based on research on a scientific theme. During November and December, they compete in local, regional and state tournaments. Our team helped create and continues to support the Los Angeles Regional Tournament at Manhattan Beach Middle School.

Team History

Team History: Beach Cities Robotics has been a participant in the *FIRST* robotics program since late 1996, when we joined with Hope Chapel Academy, Hawthorne High School, Mira Costa High School (MCHS), and Redondo Union High School (RUHS) to form one of the first two Southern California teams, Team 61—"Circuit Breakers". Several individuals (Dr. Beverly Rohrer, K.G. Englehardt, Rob Steele, and Pat Hosken) were instrumental in bringing that original team together, with lots of support from ADTECH, the consortium behind the team's formation. In 1998, Hope Chapel split off to form their own team, Team 330—"Beach 'Bots". Hawthorne, RUHS, and MCHS stayed together, were sponsored by TRW and ADTECH, and were called the Vultures. In 1999, Hawthorne split off to become Team 207—"Metal Crafters and RUHS and MCHS became Team 294—"Beach Cities Robotics". In Spring, 2002, Beach Cities Robotics became a year-round program.

Awards: We are proud of our history of achievement, which includes recognition from *FIRST*. Team awards include:

FRC: 2001 National Champions, 2001 Newton Division Champions, 2001 Southern California Regional Champions, 2001 Southern California Regional Image Award, 2003 Arizona Regional Engineering Inspiration Award, 2003 Southern California Regional Johnson and Johnson Sportsmanship Award, 2003 Southern California Regional Finalists, 2004 Arizona Regional Team Spirit Award, 2004 Southern California Regional Chairman's Award, 2005 Radio Shack Innovation in Control Award, 2005 Southern California Regional Engineering Inspiration Award, 2005 Southern California Regional Woodie Flowers Award, 2006 Arizona Regional Innovation in Technology Award, 2007 San Diego Regional Second Place, 2008 San Diego FRC Regional First Place Alliance, 2008 Los Angeles FRC Regional Second Place Alliance, 2008 *FIRST* Website Excellence Award, 2009 *FIRST* Website Excellence Award, 2010 San Diego FRC Regional Winner, 2010 Los Angeles FRC Regional Finalist, 2010 Los Angeles FRC Regional Innovation in Design Award, 2010 Newton Division Championship Winner, 2010 *FIRST* Robotics Competition Championship Winner.

FTC: 2007 San Diego Regional Winning Alliance, 2007 World Championship Winning Alliance.

VRC: 2008 Robodox/SMI VEX Competition Excellence Award, 2008 SMI/Mount San Antonio VEX Competition Championship Award, 2009 Beach Cities Robotics/SMI VEX Robotics Competition Programming Skills Champion.

FLL: 2008 Manhattan Beach LEGO Qualifying Tournament Teamwork Award, 2008 Northrop Grumman Local Tournament Champion's Award.

Community Description: Beach Cities Robotics meets in the beautiful city of Redondo Beach, one of three beach cities that form the "South Bay" area of Los Angeles county. Located just 20 miles from downtown Los Angeles, the South Bay is an economically and ethnically mixed

population of over 200,000. Residents and businesses enjoy excellence throughout all components of the community, which is known for beautiful piers, fine restaurants, a shopper's paradise, excellent schools, and the production home to a number of popular television programs. Surfing was introduced to the U.S. through the South Bay in 1907 when, for the first time, a surfboard was used for surf-and-ocean rescue work, creating the initial step in the incredible story of the Southern California Lifeguard Services.

Sponsors: Our primary sponsor is Northrop Grumman Space Technology, which encourages mentors to participate in our team and provides fabrication and financial support. Other sponsors include individuals and organizations that assist us with meals, materials, and financial donations. Their support is acknowledged on our website. Sponsors are acknowledged by thank you letters, invitations to our activities and competitions, and listing on team shirts.

Public Awareness: We present a year round robotics curriculum. We document our past activities and new season plans on our website to enable parents, interested community members and students to see what is happening at Beach Cities Robotics. We are featured in newspaper articles, school bulletins, and directories and yearbooks for each school. Our team members actively mentor LEGO League and other FRC teams around the South Bay. We provide information about our team, robotics, and *FIRST* through demonstrations at schools and at corporate events.

Team Mission Statement

Our team is focused on inspiring science and technology in our community. We create a vessel for growth and knowledge by allowing students to actively participate in all aspects of running a successful *FIRST* robotics team. Members learn to design, build and program sophisticated, fully functioning robots in a fun and safe environment. Beach Cities Robotics emphasizes leadership and gracious professionalism in all aspects of life. Our members work cooperatively; students provide the energy and ideas that drive our team and mentors provide the experience, guidance and direction to achieve team goals.

Team Goals

- For students to learn and benefit from the robotics experience

- To bond together as a team to maximize effectiveness

- To boldly go where no other robotics team has gone before

- To gain the support of the community and further encourage involvement in robotics

- To be a model of gracious professionalism

- To attract and train new members

- To inspire younger community members through public demonstrations and mentoring *FIRST* LEGO League teams

- To expand involvement in the *FIRST* program at all levels: students, parents, mentors, teachers, administrators, sponsors and community members

- To improve the performance of our robots and their subsystems each and every year

- To mentor new teams and provide a role model for other FIRST teams

- To assure that each student has the motivation and support to graduate from high school and go on to college

Team Membership

Membership in Beach Cities Robotics is open to all students in good standing at Mira Costa High School and Redondo Union High School. Participation by students of other schools may be considered upon request of a parent/guardian and submittal of a recommendation from their school counselor to the team Steering Committee. We understand that each person has unique qualities to bring to the team, and expect each person to do their gracious and professional best at all times.

Team Roles and Responsibilities

Beach Cities Robotics is a student driven team, with students providing the energy and ideas to drive the team, working with mentor guidance and direction to successfully accomplish team tasks. Each individual who comes to the team brings unique talents and abilities to the team that add to the dynamic mix that is Beach Cities Robotics. To help our members succeed, following is an outline of roles and responsibilities for each of our supporting groups.

Students:

Being part of a *FIRST* team requires more hours than most other school activities. The team meets weekly throughout the year, but time requirements increase dramatically during team builds, particularly the six-week FRC build period in January and February. Work hours are recorded by signing in and out at the Robotics Lab. If team meetings are missed, students need to stay up-to-date with activities and progress so they can fully contribute. We expect students to embrace the robotics experience as much as they can without sacrificing academic success. Bringing homework is encouraged so student can utilize their time more effectively during slower periods.

As a member of this team, students must work cooperatively with other students, mentors, and volunteers in order to have a more cohesive, safe, and fun environment. Students are expected to keep the Robotics Lab clean and their work areas neat. Gracious professionalism should be exemplified at all times. Specific roles and responsibilities include:

- To learn about all systems of the robot

- To learn and practice safety and proper use of tools and equipment

- To design, construct, test the robot used in competition

- To participate in fundraising for the team

- To read and respond to team e-mail communications as required

- To recruit new members

- To demonstrate gracious professionalism at all times

- To respect and utilize the expertise of the mentors and volunteers

- To show enthusiasm about our team's involvement in *FIRST* events

- To present our team's accomplishments through video, writing, art and public events

- To be role models for other teams

- To move beyond our team successfully when they graduate from high school and apply the lessons learned with our team to their college and professional pursuits

Mentors:

Mentors are experienced individuals who actively share their knowledge and experiences with the team to foster intellectual growth. They show simple concepts of team building and cooperation they have learned through job experiences as well as their knowledge of specific, perhaps complicated engineering expertise. Specific mentor roles and responsibilities include:

- To inspire students to pursue education and careers in science and technology

- To instruct and guide students in their area of expertise

- To aid and supervise the construction of machined materials

- To make sure that students use tools and materials safely and effectively

- To read and respond to team e-mail communications as required

- To help recruit new members

- To provide a role model of gracious professionalism

- To respect and utilize the expertise of the students and volunteers

- To aid and supervise the making of video, written, or art related to team accomplishments

Parents:

Parents are an integral part of our team and are very important to our continued success. Parents are also a key factor in the motivation and dedication of their students. Supporting your students in all aspects of their team involvement is a key to helping them get the most out of the program. Parent roles and responsibilities include:

- To encourage students to be active participants in the team, assist with team work days, attend team meetings, and arrive at meetings, work sessions and events on time

- To participate in team activities as much as possible

- To read and respond to team e-mail communications as required

- To provide transportation to, and act as chaperones at local events

- To assist with fundraising and pursue any possible sponsors with which they may have contact in the community

- To provide accurate family contact information and to keep the team informed of all changes

- To provide food for team work days

- To attend parent meetings when requested

- To provide spending money as appropriate when we attend events or competitions

- To help recruit new members

- To demonstrate gracious professionalism at all times

- To chaperone team travel, outreach events, and builds

- To respect and utilize the expertise of the students and mentors

Team Organization

Beach Cities Robotics encourages students, mentors, and parents to explore the many opportunities our team offers. Following is an outline of our team organization, members are not limited to supporting one role or area, but are encouraged to participate in as many as possible. Each subteam will be assigned an adult mentor who will work with a student subteam leader elected by team students. The role of team leaders is to guide the team in the right direction. Team concerns are dealt with through the team leaders, starting with student subteam leaders (see "Conflict Resolution" for an outline of this).

Steering Committee

Responsible for overall operation and long range planning for team. Steering Committee members work closely with one another to plan and prepare activities for the team.

Team Coordinator— Coordinate team needs with school districts and high schools. Maintain team communications, team roster, e-mail lists, and attendance records. Collect release forms and permission slips.

Treasurer—Develop, prepare and submit for approval annual team budget and monthly treasurer's reports. Advise on grant applications for team. Collect receipts and student fees. Reimburse authorized expenses. Work closely with Business & Marketing Team Mentor.

Secretary—Take notes at Steering Committee and team meetings. Save copies of all handouts and design documents.

NGST Liaison—Focal point for communication with, and mentor recruiting from Northrop Grumman.

Technical Team Mentor—Coordinate technical activities. Communicate mentor

support needs to NGST Liaison and team mentors. Work closely with Technical Team Captain.

Business & Marketing Team Mentor— Coordinate public outreach activities, grant applications, local fundraising, proper acknowledgment of team sponsors and supporting parties, and organize team award and social events. Place and track orders for team tools, parts, materials and supplies. Work closely with Business & Marketing Team Captain.

LEGO League Lead Mentor—Provide leadership, inspiration, and technical guidance for LEGO League team.

Safety Mentor—Assure safe practices are followed, team members are trained in proper use of power tools, and that first aid and safety equipment are available and up to date. Supervise student use of power tools.

Organize safety items for use at competitions and outreach events. Provide input to Safety Award entries.

Team Parent—Focal point for communication with, and recruitment of volunteers from team parents.

Technical Team Captain (Student)—Work closely with Technical Team Mentor. Coordinate student involvement. Focal point for communication of Technical Team needs to team students.

Business & Marketing Team Captain (Student)—Work closely with Business & Marketing Team Mentor. Coordinate student involvement. Focal point for communication of Business & Marketing Team needs to team students.

Business & Marketing Team

Responsible for public image and outreach of team.

Writers/Public Relations—Develop and distribute press releases, event and competition flyers, and display materials.

Recruitment—Recruit additional students, mentors and sponsors.

Art—Design/update team logo and artwork. Maintain photo and video record of team progress. Work with Web team to update photos on team website.

Fundraising—Develop team fundraising packet for team fundraising. Prepare grant applications. Organize fundraising events. Assure proper acknowledgment of major sponsors and other team supporters.

Spirit—Order and distribute shirts and promotional merchandise and team awards.

Awards—Develop and submit award applications. Represent the team at award interviews.

Community Outreach—Organize public presentations such as open houses and demonstrations to local schools.

Special Events—Organize special team celebrations such as year-end awards night, end-of-build season celebrations, and team socials.

Website—Design, maintain, and update team website and submit award applications.

Technical Team

Systems

Strategy—Master the rules. Analyze the game and develop winning strategies. Maintain two copies of game manuals, documentation and updates. Monitor message boards such as Chief Delphi. Train robot drivers, operators, human players and coaches.

Project Management—Develop and maintain task lists, project schedules and resource allocations from kickoff through the final competition. Identify critical path

tasks and keep team informed of progress. Reallocate resources to critical path tasks as needed.

System Integration—Develop plans to integrate and test hardware and software subsystems and to demonstrate the full functionality of the robot.

Tools & Parts—Inventory, organize, label, control and maintain tools and kit parts in the robotics room and at competitions. Provide lists of tools, parts, materials, and supplies needed to Business & Marketing

Team Mentor for ordering. Train all team members to return tools and parts to their proper locations.

Hardware

Base & Control System—Design, build and test the robot chassis, drive system and control system.

Arms & Manipulators—Design, build and test any arms or manipulators needed to play the game.

Sensors & Electronics—Design, build and test any sensors or special electronics needed to control the robot or to play the game.

Operator Control Board—Design and build the operator console to control the robot.

Fabrication—Machine and/or weld metal parts per detailed design drawings.

Field, Crate & Booth—Design and build the playing field, shipping crate and booth for competition pit area.

Software

CAD—Computer aided design of the robot

and hardware subsystems using Autodesk Inventor. Maintain design records and documentation for Inventor award.

Programming—Design, develop and test programs to control all robot functions under operator control. Design, develop and test autonomous mode programs.

Competition

Crate Crew—Pack and unpack crate.

Pit Crew—Maintain, repair and upgrade robot. Help other teams whenever the opportunity arises.

Safety Crew— Keep pit area clean and safe.

Public Relations Crew—Set up and take down booth in pit area. Answer questions from visitors and judges.

Field Crew—Robot drivers, manipulator operators, human players and coaches. Answer questions from visitors and judges.

Scouting—Monitor all matches. Scout robots and strategies of other teams. Report to Field Crew prior to scheduled matches.

Team Schedule

Our team works year round, coming together on weekends to complete team activities. For 2008-09, the Robotics Lab is open for FRC and FTC work on Sundays from noon to 6:00 p.m., and for FLL activities on Saturdays from 3:30 to 5:30 p.m. Additional work time may be scheduled as needs arise.

In addition to our regular work sessions, team meetings are held bi-weekly at noon on Sundays. These meetings are intended to keep team members abreast of current and planned team activities. Notices and agendas for, and notes from team meetings are published with the weekly team updates sent by e-mail to current team members. All team members are responsible for checking their e-mail regularly to keep themselves up to date on team news, particularly if you miss a team work session.

FRC Build/Competition Schedule

In January of each year, Beach Cities Robotics switches to a seven-day schedule for the six-week FRC build. During this period, our team typically meets from 5:00 p.m. to 9:00 p.m. every week day and 9:00 a.m. to 9:00 p.m. on weekends. These hours may vary, especially as we approach

the ship date. Food is provided during team work days. A typical FRC schedule is as follows:

Kick-Off Weekend (1st weekend in January)

- Game & rules announced via NASA webcast
- Review game, rules and kit of parts
- Select game strategy & form project teams

Week One: Overall Design

- Project teams develop preliminary design ideas
- Select overall design works best for selected game strategy
- Design review for overall design and robot base

Week Two: Subsystem Design

- Procure parts and fabricate components for robot base
- Project teams design systems and components
- Complete system designs, component drawings and parts list
- Design reviews for each subsystem

Week Three: Procure/Fabricate Components

- Assemble robot base, including chassis, drive system and control system
- Procure parts and fabricate components for all subsystems

Week Four: Assemble Robot Subsystems

- Project teams assemble and test robot subsystems

Week Five: Integrate and Test

- Autodesk Visualization Award paperwork due by FIRST deadline
- Integrate subsystems and test robot
- Complete development and testing
- Evaluate performance of robot

Week Six: Practice and Revisions

- Work on Autodesk Visualization Award
- Train field crews and practice game strategy
- Correct robot performance problems and refine game strategy
- Pre-ship scrimmage

Week Seven: Ship/Submit Award Entries

- Prepare robot and ship robot
- Submit Yearbook Page info

- Submit Chairman's, Woodie Flowers, Website Design, Dean's List Award Entries

Weeks Eight and Nine

- Submit Autodesk Inventor forms and Award
- Review design/competition needs/competition project teams
- Finish display materials and prepare packets for judges

Weeks Ten and Eleven

- Submit Autodesk Inventor Award
- Review design/competition needs/competition project teams
- Update display materials and packets for judges

Regional Competition(s)

- Travel to and from competition(s)
- Unpack robot and set up booth in pit area
- Practice Thursday, qualifying rounds Friday, finals Saturday afternoon
- Repair robot as required
- Chairman's Award interview
- Repack and ship robot

Championship Event (if eligible)

- Travel to and from Atlanta by airplane and stay in hotel
- Unpack robot and set up booth in pit area
- Practice Thursday, qualifying rounds Friday, finals Saturday afternoon
- Repair robot as required
- Chairman's Award interview
- Repack and ship robot

Behavior

General

Public

The behavior exemplified by students and mentors reflects the integrity and quality of Beach Cities Robotics. Everyone is to be on their best behavior. Kindness, consideration, and *respect for everyone* shall be shown at all times. Be aware of how you present yourself publicly, noting body language, attitude, tone of voice, and word choice.

We are a very close family conflicts may arise as a result. Team members should refrain from rumors, he-said-she-said, and negative comments about one another. If a problem arises with

another student, speak to a student team leader immediately (see section on Conflict Resolution for guidance). Unruly, disrespectful, and inappropriate behavior is not acceptable. Team members will act maturely regardless of personal issues that may arise. Failure of a student to act as a proper young adult requires discipline as per school rules. Final resolution of discipline problems resides with the Steering Committee.

Cooperation

Students are expected to cooperate with one another and team mentors at all times. This means that if you are requested to do something, you will comply to the best of your ability. Ignoring the direction or request of a mentor is not in the team's best interest. If you feel a request is out of order, you are encouraged to bring the matter to the attention of the Technical or Business & Marketing Team Mentor. In the event of a conflict with the Technical or Business & Marketing Team Mentor, the matter should be brought to the attention of the Team Coordinator.

Computer Usage

Computer use is a privilege that can be revoked at any time if you do not follow acceptable use as defined below. If you bring a laptop to team functions, you agree to use it for team business, not personal use (personal e-mail, games, etc.) while you are at the function, and you must follow the Acceptable Use Policy defined below while using it.

Acceptable Use Policy:

1. Tasks must be pertinent to current team activities;

2. No games (either on computer or Internet);

3. No food or beverages in the computer room.

Inappropriate Behavior

Inappropriate behavior includes but is not limited to the following:

- Physical or verbal intimidation
- Running in the Robotics Lab, hotel hallways, or at competition venues
- Pushing or shoving
- Name calling
- Making messes
- Fighting
- Swearing
- Stealing
- All other activities that reflect negatively on the team

Boyfriend/Girlfriend

Couples are members of the team and should appear as part of the team at all times. Couples may not wander off or sit alone. Hand holding, hugging, kissing and other excess expressions of affection are not allowed. Common sense should prevail.

Graduation

Our team is a high school robotics team whose end goal is to assure that each student has the motivation and support to graduate from high school and go on to college. Our mentors share

their professional and educational experiences with our students to help them prepare for successful transition to college. We encourage students to pursue community college classes, internships, and scholarships to help them prepare for life after high school. Once they graduate from high school (whether through receipt of a GED or progression through the traditional graduation cycle), our students are expected to move on to college to further develop their skills for their professional careers and return to the team to talk to students about their experiences.

We recognize that the transition from high school to college can be a difficult one for students as they move out of the familiar world of high school and family to the larger world of college and career. It can be particularly challenging for those leaving home to travel some distance to college, but it is one that we fully support as an essential part of their emotional and social growth. To help with the transition, we encourage them to seek out other robotics teams to mentor. This provides the dual benefit of a familiar framework in which they can share what they have learned at Beach Cities Robotics while learning what the teams they are mentoring have to teach. We hope that our alumni will bring their combined college, professional and extra-BCR mentoring experiences back to our team in future years to help us grow as well.

Conflict Resolution

It is recognized that conflicts do arise whenever groups of people come together. Most conflicts can be resolved by individuals communicating with one another. Sometimes this is not possible, so the following steps to settling conflicts within the team are provided to help resolve differences in the most graciously professional manner possible:

1. Work out problems with those directly concerned.

2. If unable to work problems out directly, bring to attention of student subteam leader.

3. If unable to resolve with student subteam leader, bring to attention of subteam mentor.

4. If unable to resolve with subteam mentor, bring to attention of student team captain.

5. If unable to resolve with student team captain, bring to attention of Lead Mentor.

6. If unable to resolve with Lead Mentor, bring to attention of Team Coordinator.

Conflicts will be handled on a case by case basis. Team leaders will first attempt to work out conflicts with the individual(s) involved. If a problem persists, and involves a student, a parent/student/leader meeting may be called. If the problem continues following such a meeting, or involves an adult team member, the matter may be brought to a meeting of the Steering Committee for final resolution. In the event behavior is disruptive to the team or harmful to other team members, the individual may be suspended from team involvement.

Lab Safety

1. All team members are required to complete formal, documented equipment safety training before using any piece of power equipment in the Lab. All students will notify a skilled adult mentor before operating a piece of equipment or machinery. No student is to be in the team machine room or operate team machinery or equipment without a skilled adult mentor present unless explicitly authorized by a qualified adult mentor for each case.

2. Keep our work area clean and orderly; neatly arrange equipment and material. Do not allow parts, metal, wires, scrap or other material to accumulate on Lab floors or in work areas.

Place drink cups, cans, bottles, paper, lunch scraps, etc., in the waste receptacles located throughout the facility. Return tools to their appropriate storage location when you are done with them.

3. Report any injury to the mentor in charge immediately, no matter how slight or insignificant the injury may seem.

4. Report any unsafe conditions to the mentor in charge immediately.

5. Horseplay is forbidden. Do not disturb other team members or interfere with their tasks.

6. Be certain all safety guards are in place before operating any machine or equipment. Guards must be replaced as soon as repair or service on a machine has been completed and before the machine is put into operation.

7. Verify the safety of everyone before activating or operating any equipment.

8. All equipment must be disconnected from any power source prior to any repairs or maintenance. Never attempt to activate or operate any equipment that is under repair.

9. When a machine is turned off and disconnected for the purpose of changing setup or making minor adjustments, the operator must turn off the switch controlling this machine, and then disconnect the power from the wall. This will allow the equipment to come to a complete stop, enabling the operator to begin adjustments.

10. Never tie down, block out or otherwise make inoperative any type of safety device, attachment, method or guard.

11. Never oil, remove guards or attempt to repair machinery while it is in motion. Do not climb on machinery while oiling or greasing. Repair of machinery must only be made by authorized personnel or manufacturer's representatives.

12. Do not use electrical equipment while standing on damp or wet surfaces or when your hands are wet.

13. Only electricians or authorized personnel are permitted to perform electrical work. Do not use electric cable, weld leads, extension cords, etc., unless they are properly grounded and insulated.

14. Personal protective equipment is required in the Lab, and must be worn as specified. Every team member is expected to own and wear ANSI-rated safety glasses in the Lab and at competitions. Team members shall wear ear protection when operating heavy/noisy equipment in Lab.

15. Gloves should not be worn when operating drills, lathes or other types of machinery that contain rotating spindles or cutting tools.

16. Wear clothes that are suitable for work. Long-sleeve shirts must be worn when burning, welding, grinding or performing other types of work where sparks or hot metal are present or where the work involves the use of acids or similar substances. Do not wear synthetic fabrics.

17. Closed shoes (toe and heel) must be worn while in the Lab.

18. Do not wear neckties, rings, watches and loose or ragged clothing while operating drills, lathes or other rotating or moving equipment or machinery.

19. Immediately wipe up oil, grease, paint or any other slippery substance found on the floor.

20. Store flammable liquids such as gasoline, solvents, and thinners in approved safety cans with flame arresters.

21. Be familiar with the locations and operation of fire extinguishers. In case of a fire, sound an alarm and, if possible, get help to extinguish the fire. Report all fires to adult in charge.

22. Never stack material or product so that it obstructs safety equipment, aisles, ladders, steps, electric boxes, etc. Always pile large or heavy material on the bottom and smaller material on top.

23. Clamp or secure equipment or material to prevent it from shifting or rotating when drilling, grinding, operating a lathe, etc.

24. Long hair must be tied back so it won't be caught in any rotating machinery or parts.

It is essential that you understand what tools are available and how they are used. Appendix A includes a checklist of equipment that is in our Lab. Feel free to take notes and record what you know, what you don't know and what you are confused about. Do not be afraid to ask questions.

All students, mentors, and adult volunteers are required to complete safety training on power equipment and machinery prior to using same. A list of approved operators will be posted in the Robotics Lab to confirm those who are authorized to use equipment. No power equipment will be used except under the supervision of an authorized adult mentor unless explicitly approved by an authorized adult mentor.

Fundraising & Donations

Students pay a fee to participate in the team each year. The fee is due when the student joins the team, along with the completed Team Registration, Student Contract, and Beach Cities Robotics Release. Participation fees help fund team activities, but are not sufficient to cover all team costs. Therefore, each student is expected to help raise funds and solicit donations to support team activities and travel.

There are many ways individuals and businesses can support our team:

- **Tools, Equipment, Materials and Supplies—**Donations of good quality power tools and robust desktop or laptop computers and software are appreciated and needed.

- **Time**—We need adult mentors and chaperones. Needs include: design engineer, welder, machinist, graphic artist, financial wiz, media consultant, chaperones for work days and at public events, drivers for public events.

- **Monetary Donations**—We need funds to buy tools, equipment, materials and supplies to design our robots; to replace and maintain team computers; to pay for travel to regional and international competitions (approximately $800 per team member per away trip); to pay team registration fees for competitions (these range from $75 to $5,000); to print display materials and give out spirit items at competitions; to help fund teams we mentor.

  How we recognize donations:

Partner:	$20,000	Inclusion in *FIRST* competition team name plus everything below
Platinum:	$10,000	Plaque plus everything below
Gold:	$5,000	Business name on team FRC robot plus everything below
Silver:	$1,000	Business name on team shirts plus everything below

| Bronze: | $500 | Posting on team Web page plus framed letter with team picture |
| Donor: | $100 | Thank you letter with picture of our team |

The Redondo Beach Education Foundation handles all of our donations and is a 501(c)(3) non-profit-charitable organization, Tax ID #33-0470935. All donations are tax deductible.

All fundraising will be coordinated with the fundraising mentor. If you plan to contact a potential sponsor, personally know someone connected to a business, or live near a business that might sponsor the team, let the fundraising mentor know so we do not duplicate effort.

Donations of money and/or anything on the team's wish list (Appendix C) will be greatly appreciated. A 'credit line' could work for a hardware store. Remember *Gracious Professionalism*. Prospective donors probably will not write a check on the spot. Always say, "Thank you," and leave a Beach Cities Robotics brochure so they will remember us.

Be creative in seeking team sponsors. Contact local businesses that you support on a regular basis; check local Chambers of Commerce for their lists of member organizations. No business is too small or too large to contact. Communicate with them early—ask our team treasurer for a sample letter to give to prospective donors. Appendix B provides a list of recent team sponsors.

Competitions

Our team typically competes in five to ten local, regional and international competitions each year. To participate in competitions with our team, all team members must submit current *FIRST* release forms and team release forms, be current on team fees, and have participated fully in team activities. Competitions in which we participate include the following:

- FTC Regional Competitions, November and December (one local, one away)

- FLL Regional Competitions, November and December

- FRC Pre-ship Scrimmage, late February

- FRC Regional Competitions, March (one local, one away)

- FRC, FTC, and FLL Championship Events, April (if qualify)

During competitions every attending member (students, mentors and parents alike) has an assigned role to fulfill to contribute to the success of the team as a whole. Each member is expected to fulfill his/her responsibility during the competition as the remainder of the team relies upon it. Typical team roles include, but are not limited to, the following:

- Drive Team
  - Driver
  - Co-driver
  - Human Player
  - Coach

- Pit Crew
  - Battery Charging
  - Mechanical Repair
  - Electrical Repair
  - Programming

- o Safety

- Scouting Team
  - o Captain
  - o Scout

- Outreach/Spirit

- Food Coordinator

- Schedule Coordinator

Responsibility Designation: Prior to competitions (typically 1-2 weeks), the team will meet to discuss the various roles required. At this time students, mentors and parents alike will have the opportunity to volunteer for the roles they wish to fulfill and to state their reasons for seeking those roles to the team. Members may volunteer for multiple roles, but should indicate their preference. To be eligible to be a part of a competition drive team, students must commit to be present for all days of the competition.

Team captains will record the requested roles and deliberate with team mentors to compile options where all the roles are filled without overlapping conflict. As there are often multiple volunteers for some roles, not all volunteers may get to participate in their first requested role. Once compiled, the team captains will present various options to the team and the floor will be opened to individuals to discuss their reasoning to endorse one option over the next. After this, each student team member will submit his/her closed ballot vote indicating his/her preferred option. Ballots will be counted in front of the assembled team members. The option that receives the most votes will determine the roles that members will perform at the competition. In the event of a tie, team mentors will make the final selection. The result of this vote/selection is final.

Curfews and Rules: All team members must honor curfews and rules at competitions. Those unwilling to actively support the team at competitions and work the entire time requested will not be allowed to travel to away competitions. If, after arriving at competitions, you do not honor the curfews and rules, or if you do not work the entire time requested, you may be sent home at your own or your parents' expense.

Safety Glasses: Every team member is expected to provide his/her own ANSI-rated safety glasses and wear them in competition venue pits and fields.

Team Shirts: Every team member is expected to wear current year Beach Cities Robotics team shirts at competitions.

Volunteers: Competitions are generally run with the extensive aid of volunteers. This is a great opportunity to learn more about the competitions, meet other individuals and teams involved in robotics programs, show our team support of *FIRST* and do a little public outreach. All team members are expected to respond to calls for volunteers at competitions if they are not already assigned to a Beach Cities Robotics team task.

Cheering: Cheering is more than yelling at the top of your lungs. It is participating fully in the event and celebrating the excitement of the moment. Organization is the key to this being a powerful tool. Team spirit leaders will lead this activity. You are not expected to be cheering 100% of the time. However, when we are cheering, all team members are expected to stand and cheer. Sitting in the stands looking bored or disgruntled, carrying on personal conversations, or

playing games while others are cheering is not respectful to our team or those for whom we are cheering and is strongly discouraged.

Award Ceremonies: During award ceremonies we will applaud the teams that are receiving awards and stand to show our respect for what the recipients have accomplished.

Greeting: At competitions, we welcome all visitors to our pit area and in the competition venue. When asked to assist or offered advice by other teams or by officials, we listen respectfully and graciously comply with their requests to the best of our ability.

Cleanliness: Each student will make an effort to keep the arena clean at all times. If you see messes or trash, do your best to pick them up even if it is not yours.

Other Competitions and Exhibitions: Our team is often invited to off-season competitions and exhibitions. Our involvement in these activities will depend on timing, cost, and the availability of team members. Most of these events are local and will not involve organized travel other than carpools, as they are one-day events.

These are opportunities for our "Rookies" to get the feel of real competition before the season starts, and enable us to increase team exposure by volunteering to assist with competitions, summer camps, and robot demonstrations. These events can also give our drive team chances to practice, and rookie drivers to learn what robotics competitions are all about.

Travel

Traveling as a team is very exciting and rewarding, and often the highlight of a student's memories. Travel can be an educational and cultural experience over and above the basic competition.

All team members who are in good standing with the team and their respective schools are eligible to travel to team events. To qualify to for out-of-town trips, students are expected to pursue the projects they can do for the team, get them done, and make sure their time is documented on Beach Cities Robotics log sheets. Team members are responsible for clearing absences from school or work with their respective organizations. If documentation is required from the team, requests should be submitted as far ahead of time as possible (recommend at least two weeks before the planned absence).

Air Travel: Traveling on aircraft can be fun and exciting. However, there are special procedures we must follow to assure safe and efficient travel.

- Each team member must carry enough cash to pay for his/her meals and incidentals during travel and have paid the team for his/her air and/or hotel costs prior to traveling.

- Each team member must carry a current school identification card or driver's license when traveling.

- Each team member must wear a Beach Cities Robotics shirt while traveling.

- Each team member is expected to arrive at the airport at the time established by the team.

- Once inside the airport, team members must stay with the team in the designated area until everyone has checked in. Each individual is responsible for maintaining control over his/her luggage at all times.

Packing: Pack efficiently. Bring only the clothes and items that are necessary and required. You are only allowed one suitcase, and one approved carry-on. All luggage must be identified with your name and address on a tag attached to your bag prior to entering the airport. Each team member must carry his/her own luggage in the airport.

Tickets/Boarding Passes: The travel chaperone will issue e-tickets either before or after you arrive at the airport. This will vary depending on airline safety rules at the time of travel. All travelers are expected to arrive at the airport by the time stated at the pre-travel meeting so we can check in together. At the airport, you will check in and receive your boarding pass, then proceed with the team through security checkpoints. When you receive your boarding pass, do not put it away; keep it and your ID ready for security checks.

Security Checks: After all team members' luggage has been processed, the team will proceed through the security checkpoints. All metal items including change, cell phones, pagers and keys should be placed in your carry-on item. Form a single line, placing items on the conveyer when appropriate. Wait to be directed through the detector by the security person and follow all security directions. After you have passed through the detector, collect all personal items and wait at designated area with the group, to one side out of the traffic area. Keep talking to a minimum and wait for directions. Once we have all gone through security, we will proceed to the gate. Do not stop at the bathrooms, get a snack or wander away from the group. Permission will be given later if time permits.

At the Gate: At the gate, stay with our group, keep your carry-on item with you, and wait for further instructions. If time allows, you will be permitted to go to the bathroom or to get a snack with a buddy. NOTE: We travel in groups of three or more at all times and keep our carry-on items with us.

Plane Entry: Directions will be given for you to board the plane. When entering the aircraft, please go to your assigned seat. Locate an empty spot overhead to store your carry-on item or place it under the seat. Once seated, follow all directions as given.

Plane Exit: After we land, exit in a safe manner. Be courteous to others as you exit. Remember to gather all your carry-on items and other materials before exiting the plane. After exiting the plane, the team will gather near the gate, out of traffic. Listen and watch for the directions of the travel chaperone.

Ground Transportation: If traveling by bus, we will store luggage in lower compartments or on another bus if needed. If traveling by car or van, wait for the driver's directions to stow your luggage. Do not open windows without permission. If having a snack or drink, dispose of your mess when finished. When leaving the bus, car, or van, check the vehicle to make sure all belongings are accounted for.

Local Travel: Parents, mentors, teachers or administrators will often transport students to different events. Those receiving rides are expected to help pay for fuel. At all times, all drivers and passengers must wear seatbelts and have a current release form on record with the team.

Appendix A - *Lab Safety, Equipment, and Skills Checklists*

Safety:	Description	Trained
Lab Safety Rules		
First Aid		
Safety Glasses		
Ear Protectors		

Equipment:	Description	Trained
Horizontal Band saw—Metal		
Vertical Band saw—Wood/Metal		
Circular Saw		
Jigsaw		
Saber Saw		
Hacksaw		
Drill Press		
Hand Drill, Corded and Cordless		
Rotary Tool		
Mill and Lathe		
Wheel Grinder		
Disk and Belt Sander		
Files		
Sheet Metal Break and Sheer		
Tig Welder		
Cutting Torch		
Soldering Iron		
Wire Stripping and Crimping Tools		
Battery Chargers		
Multimeter		
CNC Router		
Tie-downs		

Skills:	Description	Trained
Drill and Tap for Threads		
Material Identification		
Screw and Bolt Identification		

Control System Identification		
Motor and Wire Identification		
Pneumatics Identification		
Sensor and Electronics Identification		
Reading Engineering Drawings		
Creating Engineering Drawings		
CAD 3D Modeling		
Animation		
Control System Programming		
Analytical Evaluation		
Graphic Design		
Strategic Game Planning		
Marketing		
Journalism and Publications		

Appendix B - *Recent Sponsors (in alpha order)*

Sponsor	Partner	Facilities	Mentors	Cash	Food	Materials/Services
Albertson's						Product
Best Buy				$200		Gift certificate
Boeing			X			Surplus equipment
Bristol Farms					X	
Buca di Beppo					X	
Burger King					X	
California Pizza Kitchen					X	
Coyote Cantina					X	
Chicago For Ribs					X	
Chik-Fil-A					X	
Domino's Pizza					X	
Eat At Joe's					X	
El Pollo Loco					X	
Engines						Product
Fox First Aid Supply Co.						Product
Fry's Electronics						Product
GKN Aerospace Corp.			X			Product
Hector's Place					X	
Home Depot						Shop vac, crate materials
Kincaid's					X	
Little Caesar's					X	
Lunchstop.com			X		X	
Lupita's					X	
Manhattan Beach Unified School District	X					
McDonald's					X	
Mira Costa High School	X					
Northrop Grumman	X	X	X	$25,000	X	Surplus equipment, FRC Kickoff venue
Paisano's					X	
Panda Express					X	

Papa John's					X	
Party City						Product
Pita Pit					X	
Raytheon			X			Tools
Ralph's					X	
RadioShack				$300		
Redondo Beach Education Foundation	X					
Redondo Beach Unified School District	X	X	X			
Redondo Union High School	X	X	X			
Round Table					X	
Signal Electronics				$500		
Trader Joe's					X	
Von's					X	
Western Bagel					X	
Westchester Medical Group				$250		

Appendix C – Team Wish List

Our most critical needs:

- New computer systems

- New software and licenses (Windows, Word, Excel, Publisher, etc.)

- Flat panel monitors

- Laptops for programmers to take to competitions

- Trained machinists to teach and supervise team members in proper usage of power machines

Tools:

- TIG welder
- Complete set of twist drills
- Hacksaw blades
- Bandsaw blades
- Soldering tools

- Various hand tools
- Airbrush with tools
- Various sizes of paint brushes
- Wire brushes
- Flashlights

Materials:

- Aluminum stock – sheet plate, blocks, extrusions

Safety Equipment:

- Gloves
- Aprons

- Masks
- Welding masks

Electronics:

- Components
- Multimeter

- Gears, gear box parts

General Equipment:

- Carts for transporting robots and equipment at competitions and outreach events

Office Supplies:

- Paper
- Easel pads
- Printer ink

- Trash bags
- Water

Miscellaneous - *these are our big, wild dream wishes:*

- A chartered bus for local competitions
- A trailer to transport robots and equipment to competitions and outreach events

- Free parking for trailer

Appendix D – FLL Student Handbook