



THE 2018 SOUTH CAROLINA
**4-H ENGINEERING
CHALLENGE**

LEGO Robotics Challenge

Challenge Description:

Each team will have two hours to build, program, test, and modify a LEGO robot to carry out as many missions as possible in a 3-minute table run. The missions and field will be revealed at the event.

Team Requirements:

- 2-4 students per team.
- Age Range: Junior (age 9-13) and Senior (age 14-19)

Materials Needed:

- Official, unmodified Lego Mindstorm EV3 or NXT Core Set and Expansion Sets (optional)
- Laptop with appropriate software loaded
- Power strips and extension cords

Challenge Instructions:

Teams will arrive with a specified robot base and have two hours to develop a program and robot that will complete missions revealed on the day of the event. Upon arrival, teams will be issued numbers and "pit" areas. Building will not be allowed until after the reveal. Any questions should be made a designated team member to event staff. Teams will then use their robot to compete in 3-minute matches to determine who has the fastest, most accurate, and most efficient solutions to the LEGO Robotics Challenge course.

Challenge Rules:

1. All robots must conform to the building design on pages 7 – 38 of the Lego Education Mindstorms EV3 resource guide provided in the core set materials box. No alterations or modifications will be allowed until the official challenge is revealed. Teams in violation will receive a 5-point reduction in scoring. {The robot must not exceed 10" (front to back) X 8" (side to side) X 10" (height)}
2. Only one processor "brick" (EV3, NXT, RCS) per robot may be used.
3. Teams may only use official, unmodified Lego Mindstorm Core Set and Expansion Set pieces in their robot design.
4. Teams are limited to the 3 motors (2 large motors, 1 medium motor) provided in the Mindstorm kit.
5. Teams may use any or all of the sensors provided in the Mindstorm kit. (light, touch, ultrasonic, color)
6. The robot must be completely autonomous.
7. During the competition, students may not handle or otherwise tamper with the robot of another team.
8. Teams will demonstrate the First Lego League's expectation of Gracious Professionalism and embrace the concept of coopertition throughout the competition. If violations are observed, teams in violation will be penalized. Repeated violations will result in disqualification. (Chapter 4, page



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28 of the FLL Coaches' handbook. To access the official FLL Coaches Handbook, visit:

<https://www.firstinspires.org/resource-library/fl/coaches-handbook>

9. Only 2 team members may be present at the competition table during the team's performance. Coaches and other mentors are not allowed at the competition table during the team performances.
10. Any discrepancies or questions during the competition must be discussed by the team captain and the event official only. **Adults are not allowed to intervene. The ruling of the official is final.**
11. Upon arriving on campus, teams must check in at the registration table.
12. **Only team members, coaches, and mentors are allowed in the "Pit" area.** Other visitors may wait for youth outside the classrooms in the hallway or seating areas. During competitions, parents may enter the room but remain behind the taped area for viewing.
13. While working, in the "pit" or at the competition table, judges will be making notes on the core values each team exhibits for the overall Core Value Award recipient. (Chapter 4 of the FLL Coaches Handbook)
14. **The robot design and programming must be the work of the team members.** Adult coaches and mentors should refrain from cuing the team, directing the team's programming decisions, or prompting the students during the competition events. If judges recognize an overabundance of adult participation, the adult may be asked to leave the area. Students will not be penalized for the actions of an overzealous adult.
15. Teams will complete a qualifier run prior to the start of competition. Any robot that is unable to complete at least one mission effectively will be eliminated from further competition.
16. Teams will compete in 3 rounds (3 minutes each) for a cumulative score to determine the overall winner of the game.

Preparation Instructions:

Teams should have an understanding of how to program a Lego Mindstorm EV3 or NXT robot for pushing, pulling, transporting to another location, lifting, and gathering items.

To familiarize your team with FLL scoring rubrics, visit: <https://www.firstinspires.org/resource-library/fl/judging-rubrics>

To learn about FLL rules, visit: <https://www.first-lego-league.org/en/2017/robotgame/rules.html#2>
Teams should be familiar with scoring rules and definitions.

To access the official FLL Coaches Handbook, visit: <https://www.firstinspires.org/resource-library/fl/coaches-handbook>

No matter who is winning, everyone should have fun!

Judging:

Official FLL Core Values and Robot Design rubrics will be used for scoring. Judges will be monitoring students during the building and programming time to determine the winner of the Core Values Award. Points will be awarded based on mission to calculate the Table Competition winner.



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Awards will be given for the following categories: Demonstration of Best Core Values, Robot Design, Table Competition Winner, and the Grand Champion. The Grand Champion will be the team with the highest combined score in Core Values, Robot Design, and Table Competition Score. It is possible for the Table Competition winner to also be the Grand Champion. In the event of a tie, the team with the highest table score will be declared the winner.

