

Rules 2011

Savage Soccer: Olympia

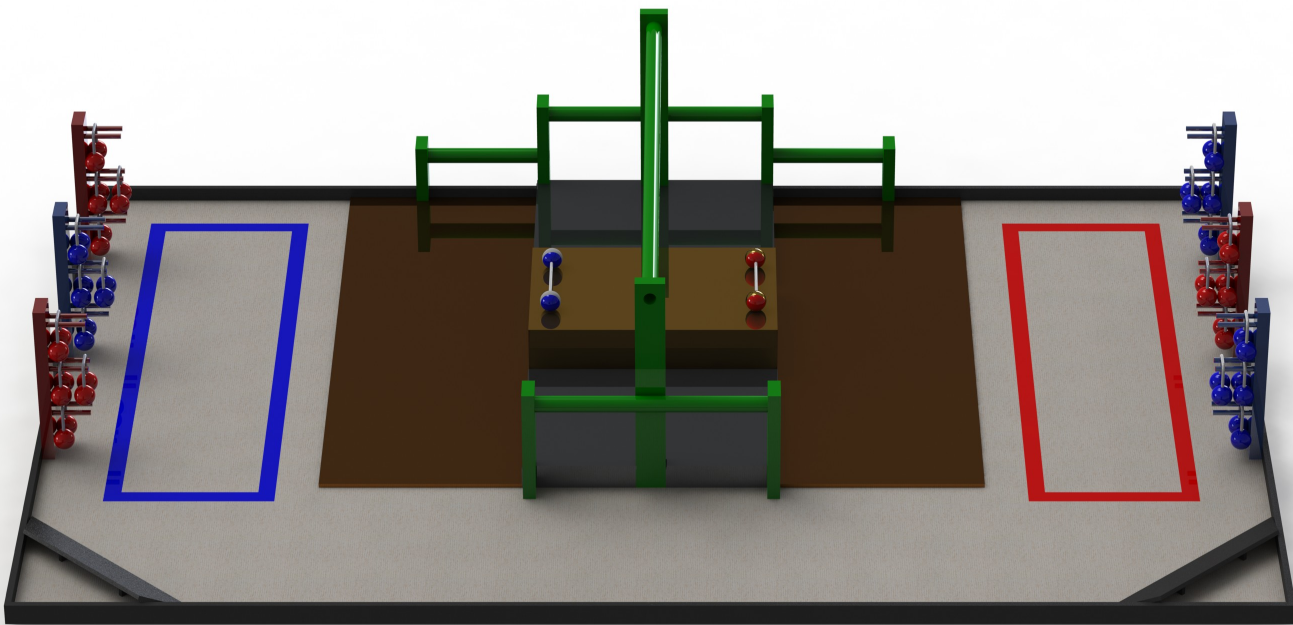
If you have any questions about rules or the event, you may email them to savage@wpi.edu (<mailto:savage@wpi.edu>). All questions will be publicly posted on the forum. All responses will be publicly dispersed on the website under the [Updates](http://users.wpi.edu/~savage/Rules/updates.html) (<http://users.wpi.edu/~savage/Rules/updates.html>) link). Please read the rules and Updates page before asking questions as they may already be answered.

Alternatives for game play for remote competitions with fewer than 12 teams are located at the end of the rules.

1. Objective

To design and build a radio and autonomously-controlled robot that will defeat your opponents in competition.

The winner of the competition is defined as the coalition that wins all best two-of-three rounds in the elimination bracket.



2. The Game

2.1 Definitions:

2.1.1 Coalition: Teams which work together to defeat another coalition in competition. Coalitions are chosen randomly (in qualification rounds) or drafted (in elimination rounds). A coalition's teams always share a color.

2.1.2 Coalition Colonels: The top-ranked teams at the end of the qualifying matches.

2.1.3 Starting Zones: Locations on the field where teams place their robots before the match, designated by the outside edge of a tape box.

2.1.4 Medals: The scoring elements consisting of two tennis balls separated by 6" length of rope.

2.1.5 UberMedals: The two Medals (one per coalition) that can only be obtained during the autonomous phase and will increase the multiplier of the scoring area in/on which it is scored.

2.1.6 Floor bins: Bins on the carpet where Medals and UberMedals are placed to score.

2.1.7 Trophy Cases (TC): The structures on each end of the field that hold the Medals on pegs at the start of the match.

2.1.8 Platforms of Winning (PoW): The tri-leveled structure in the center of the field that robots may climb and traverse during the match. Robots at certain levels at the end of autonomous and the endgame score extra Medals corresponding to their respective level.

2.1.9 Rungs of Scoring (RoS): The horizontal pipes on the PoW from which Medals and UberMedals are hung to score.

2.1.10 Levels of Achievement (LoA): The colors associated with the heights of the various PoW and RoS. In order from lowest to highest, the LoAs are: Bronze, Silver, and Gold.

2.2 Field Description

2.2.1 The field is 8' x 12'. A wooden frame that is approximately 2.5" high and 0.75" thick forms the field wall (the outer boundaries of the playing area).

2.2.2 The surface of the playing area is "high-traffic" carpet that may have minor bumps and surface irregularities.

2.2.3 The PoW is centered on and against the rear field border.

2.2.4 All field dimensions should be considered to be +/- 0.5"

2.2.5 Robots will begin the match in their coalition's Starting Zone. Teams will be designated as either "Red" or "Blue" on a match-by-match basis as noted on the Match List.

2.2.6 Each level of the PoW is elevated in relation to the carpet as follows:

- The Bronze level PoW is 0.5" above the carpet.
- The Silver level PoW is 3" above the carpet.
- The Gold level PoW is 7" above the carpet.

2.2.7 Each RoS is elevated in relation to the carpet as follows:

- The Bronze level RoS is 6.5" from the carpet to the top of the rung
- The Silver level RoS is 12.5" from the carpet to the top of the rung
- The Gold level RoS is 26" from the carpet to the top of the rung.

2.2.8 Three Trophy Cases are located at each of the short ends of the field. Each TC contains four medals of its corresponding coalition color. One UberMedal is placed on each end of the Gold platform, nearest its appropriate coalition starting zone.

2.2.8.1 All Medals, except the ones given to teams at the start (see 2.2.8.3), will be hung on corresponding TCs on the field, as per the field drawing.

2.2.8.2 One UberMedal is centered 2½" from each end of the Gold platform, parallel to the short edge of the field.

2.2.8.3 Each team MUST place one Medal of their own color before the start of the match. They may place the medal anywhere within their starting zone, and may place it in or hang it on their robot.

2.3 Each match will consist of the following time periods:

2.3.1 Autonomous - The first 15 seconds of the match, where robots are not under driver control.

- Teams gain additional Medals by climbing the Platforms of Winning.
- The UberMedals are available, and will be removed at the end of the period if not removed from the Gold level platform or possessed by a robot.

2.3.2 Driver control - A period lasting 2 minutes during which robots are teleoperated.

- Teams can score points by hanging Medals on the Rungs of Scoring or placing them in the Floor bins.
- The higher the RoS on which a Medal is scored, the greater its points multiplier.

2.4 Match Scoring

2.4.1 All scoring will be calculated when all items on the field have come to rest.

2.4.2 At the end of the autonomous period, for each robot which comes to rest on any PoW, two Medals of that robot's coalition color will be placed on the matching RoS.

2.4.3 A robot is considered to have come to rest on a PoW if it is supported entirely by one or more PoWs. A robot is considered to have come to rest on the lowest PoW which it is touching.

2.4.4 At the end of the match, for each robot which comes to rest on any PoW, one Medal of that robot's coalition color will be placed on the matching RoS.

2.4.5 A Medal is considered scored if it is:

- Completely supported by
- the carpet within the floor bin or
- a RoS, and zero or more of the following
 - the Bronze level PoW,
 - another scored Medal, or
 - an opposing coalition robot,
- AND not touching any of the following:
 - the carpet outside the following,
 - any Gold or Silver PoW, or
 - a corresponding Coalition robot.

2.4.6 At the end of the match, each coalition scores points for each scored Medal of its color:

- Scored Medals are worth two points.
- Scored UberMedals are worth zero points (but see 2.4.8).

2.4.7 Each Medal's value is multiplied depending on where it has been scored:

- Floor bins: 1x multiplier
- Bronze level RoS: 2x multiplier
- Silver level RoS: 3x multiplier
- Gold level RoS: 5x multiplier

2.4.8 A scored UberMedal increases the multiplier of the Floor bin or RoS where it has been scored by one.

2.4.9 The winner of the match is the coalition with the higher point total.

2.4.10 Tiebreakers:

2.4.10.1 Robot that comes to rest on the on the highest level PoW at the end of autonomous.

2.4.10.2 If a robot from each Coalition reaches PoWs of the same LoA at the end of autonomous, the Coalition with the next highest robot after autonomous wins.

2.4.10.3 The Coalition with the fewest penalties.

2.4.10.4 The Coalition with the robot on the highest level PoW at the end of the match.

2.4.10.5 If a robot from each Coalition reaches PoWs of the same LoA, the Coalition with the next highest robot at the end of the match wins.

2.4.10.6 The Coalition that obtains an UberMedal during autonomous.

2.4.10.7 Tie.

2.5 Competition Structure

2.5.1 The competition will consist of Qualifying Matches followed by Elimination Matches.

2.5.2 Qualifying Matches

2.5.2.1 All teams will play in the same number of Qualifying Matches. The number of qualifying matches at each event will be determined by the length of the event and the number of teams competing.

2.5.2.1.1 For all teams to have an equal number of official matches, some teams may be required to play an extra match, known as a surrogate match. This match does not count in the official ranking of any surrogate teams participating. Surrogate matches will be indicated on the match list.

2.5.2.2 Teams will be given their schedule of qualification matches no later than the start of the first

match of that day's event.

2.5.2.3 Teams will be randomly assigned to coalitions during qualifying matches. The qualification match schedule will show the match number, the four teams competing in each match, and the color they are assigned for that match.

2.5.3 Ranking: At the end of the qualifying matches, teams will be ranked based on the following:

- Greatest number of wins (a tie is considered half a win), then
- Highest average point total, then
- Flip of a coin (or electronic substitute), heads and tails to be determined by the head referee.

2.5.4 Elimination Matches

2.5.4.1 The number of coalitions participating in elimination matches will be no less than four, but may be increased prior to the start of the event based on the number of teams participating.

2.5.4.2 Coalition Drafting

2.5.4.2.1 At the conclusion of the qualifying matches, the top-ranked teams will be designated as Coalition Colonels. In order of their ranking, each Coalition Colonel will draft one team. An additional drafting round may take place at the discretion of the tournament director, increasing the teams per elimination coalition to 3.

2.5.4.2.2 Coalition Colonels may not draft other teams designated as Coalition Colonels or those already drafted into service for other coalitions.

2.5.4.2.3 If a team declines the draft of any Coalition Colonel, they WILL NOT be allowed to play in the elimination matches.

2.5.4.3 During elimination matches, the #1 ranked coalition will play the lowest ranked coalition entering the elimination matches (i.e. if there are eight coalitions, #1 will play #8). The #2 coalition will play the second-to-lowest ranked coalition and so on.

2.5.4.4 Elimination matches will be a best 2-of-3 format.

2.5.4.5 Each coalition partner must play at least once during the first 2 matches of a best two-of-three round. If a robot becomes seriously damaged, the Coalition Colonel must inform the head referee immediately after the match in which the damage occurred. The head referee will then decide if the robot is exempt from this rule. The damaged robot must be re-inspected by the head referee before each best two-of-three round and must be re-declared inoperable in order to continue receiving the exemption.

2.5.4.6 Ties in elimination matches will be replayed.

2.6 Driver Rotation

2.6.1 During each match, teams will be required to switch their drivers halfway through the driver control period as indicated in Section 2.6. There will be a ten-second period during which the drivers must complete the switch or power will be shut off for the duration of the match.

2.6.2 Teams may choose to have another student operating other non-driving functions of the robot during the match. This optional position is not required to switch during a match.

2.6.3 An ordered list of drivers must be submitted by a team member prior to the start of the first match of the competition. Team members must drive according to this list.

2.6.4 Teams must have at least four different students to rotate through the driver position. In the event that fewer than four students attend the competition, teams must still place four students in the ordered list and forfeit the driving time of the missing student(s).

2.6.5 All four student participants of the team must drive the robot within the first two official matches in which the team places a robot on the field. Once the required team members (per 2.6.4) have driven the robot, teams must continue switching drivers during their matches but are not required to continue in the order shown on the list in 2.6.3.

2.6.6 If it is known in advance that a student will be late to the event, please contact the tournament director at

savage@wpi.edu as soon as possible to discuss possible alternatives.

2.7 Match Sequence

- o Each match is two minutes and 15 seconds long
- o 0-15 seconds - robots enabled under Autonomous Control
- o 15 seconds - The UberMedals not removed from the Gold level starting positions by robots are removed from the field. Medal bonuses are awarded.
- o 15-75 seconds - Robot under first Driver Control
- o 70-80 seconds - Driver switch period
- o 75-135 seconds - Robot under second Driver Control
- o 135 seconds - Match ends, robots disabled. End game Medal bonuses are awarded.

2.8 General Rules

2.8.1 All referee decisions regarding rules of play and judgments are final

2.8.2 Definitions

2.8.2.1 Pinning: A robot is considered pinned when it is being held against a field obstacle or another robot by a robot from an opposing coalition and cannot move in any direction. The closest referee will begin counting the pin from the moment the robot becomes immobilized.

2.8.2.2 Penalty: A deduction of ten points.

2.8.2.3 Disqualification: Robots may be disqualified based on their actions that violate the rules of the game. If a referee calls for a disqualification during a match, power will be shut off to the offending robot immediately. In all cases, the offending robot will receive a loss and zero points. The remaining members of both coalitions will receive the win/loss and their respective point totals in qualification matches. If a team is disqualified during an elimination match the coalition will receive a loss and the opposing coalition will receive a win.

2.8.3 Robot and Field Interaction Rules

2.8.3.1 At the start of the match, teams must place their robot such that it is fully contained within the starting zone corresponding to their coalition color.

2.8.3.2 Any Medal or UberMedal which leaves the playing area during a match will be returned to the carpet in the nearest back corner at the referee's convenience.

2.8.3.3 Robots may not cause any opposing Coalition's legally scored Medal or UberMedal to be removed from a RoS. If a Medal or UberMedal is removed in this manner, the Coalitions whose Medal was removed will receive points as though that Medal were scored. The medal may also be rescored for additional points. Intentionally or repeated removal of opponents legally scored Medal or UberMedal may result in disqualification for the offending team at the discretion of the referees.

2.8.3.4 Robots may not intentionally tip an opposing team's robot. The tipping robot will be disqualified from the match if, in the referee's opinion, they initiated a lifting action that results in tipping. In incidents where the tipped robot initiates the action or both robots are in motion, the involved robots may be disabled.

2.8.3.5 Robots will be disabled for physically interacting with anything outside of the field.

2.8.3.6 If a robot is pinned for five seconds, the pinning team must immediately disengage and move at least 12" away from the pinned robot. Failure to do so will result in an immediate penalty, as well as a penalty for each additional five seconds. Per rule 2.8.5, robots that accumulate multiple pinning penalties in a match are subject to immediate disqualification from the match.

2.8.3.7 All parts of the robot must remain attached to the robot for the duration of the match and must not cause any hazard of entanglement to the other robots. Any infraction of this rule may result in an immediate disqualification. Minor pieces that unintentionally become detached from the robot, do not affect the outcome of the match, or are the result of improper design/construction will not cause a disqualification.

2.8.3.8 Teams are allowed to modify their robots between matches as long as the robot remains compliant with all specifications and rules after the modification. Any significant modification should be brought to the attention of the referees or head inspector prior to the start of the team's next match. Teams may be subject to re-inspection at the discretion of the referees/head inspector. While teams are allowed to modify their robots between matches, multiple robots per team are not allowed.

2.8.4 Safety Rules

2.8.4.1 Team members may interact with their robot during a match only through the transmissions of the radio-controller. Only designated Drivers or Operators may be in contact with the controls during the match.

2.8.4.1.1 Only team members who will be using the controls during the match will be allowed at the field. No coaches are allowed during a match, however team members who have already driven or are waiting to drive may advise the drivers at their discretion.

2.8.4.1.2 All team members who will be driving during the match must stay within their coalition station for the entirety of the match. Repeat violations of this rule may result in disqualification at the discretion of the referees.

2.8.4.1.3 Teams must place their controls at a designated location before the beginning of the match. Team members may only touch these controls during driver control after the referees have signaled the start of driver control.

2.8.4.2 Referees will disqualify any robot they deem to be a safety hazard.

2.8.4.3 Referees may request that teams alter any portion of their robots that are considered safety hazards or damaging to the playing field or scoring objects at any point during the competition. It is the right of the referees to prevent teams from playing in matches until such changes are made to the robot.

2.8.4.4 Damage to the playing field, the objects, or the control system may result in the disabling or disqualification of the robot at the discretion of the referees. If the referee determines that further movement of the robot would result in field damage, it will be disabled. Intentional removal of Medals or UberMedals from the field will be considered field damage.

2.8.4.5 Strategies aimed solely at the destruction of or damage to an opponent's robot or the field are not in the spirit of the competition and will not be allowed. This includes intentionally removing game objects from the field. Repeat violations of this rule may result in disqualification at the discretion of the referees.

2.8.5 Repeated or intentional receiving of penalties will result in a disqualification.

2.8.6 All questions or request for rules clarifications should be submitted via email to savage@wpi.edu. Questions and answers will be publicly posted on the event website

3. The Robot

3.1 Size Restriction

3.1.1 At the start of each match, every part of the robot except for the flag holder (drinking straw, as specified in rule 3.4.4) must fit, unconstrained, in a stable position, within a box 15.25" by 15.25" by 18" in any orientation. The robot must be fully self-supported, in contact only with the horizontal, carpeted (or taped) surface of the playing field.

3.2 Weight Restriction

3.2.1 Each robot's weight must not exceed 8 lbs.

3.2.2 The 8 lb. limit does not include the robot battery, the radio transmitter (i.e. the 75 MHz transmitter or VEXNet Joystick) or the color-designating flag.

3.3 Controls

3.3.1 Teams will each bring and provide their own controls to the competition. Crystals will be provided at the competition at the start of each match. Teams that use VEXNet must provide their own, known working VEXNet Keys.

3.3.2 Radio operation of the robots is not permitted in the pits. Teams should bring their phone cords/tethers for testing and operating in the pits. It is advisable that teams not bring their radio crystals to the competition.

3.4 Construction Rules

3.4.1 A robot must be designed to operate by reacting only against features within the confines of the playing field boundaries.

3.4.2 Gaining traction by use of adhesives or by abrading or breaking the surface of the playing field is not allowed and will be considered field damage and subject to disqualification.

3.4.3 Teams must have their assigned team number clearly marked on their robot such that it is visible from 15' away. The numbers should be at least 3" high, $\frac{1}{4}$ " thickness and be on opposing sides of the robot. Team numbers will be assigned via the Savage Soccer website team list.

3.4.4 Teams must place a standard drinking straw, cut to 6" long, such that the straw is perpendicular to the ground on their robot. The top of the straw must extend above the top of the robot while in its starting configuration. This straw will have a colored flag inserted into the top to designate the coalition color. Prior to each match, teams must place the correct color flag on their robot, as indicated on the match list. Flags will be provided at the start of the match and must be removed from the robot before leaving the playing field. Multiple infractions of this rule may result in a disqualification at the discretion of the referees.

3.4.5 A robot may not intentionally contaminate the playing field or an opponent's robot with lubricants or other debris.

3.4.6 Robots may only be designed and built after the initial kickoff event.

3.5 Building Constraints

3.5.1 Each team will be expected to use parts only from the VEX Kit unless specified below.

3.5.2 Modifications are permitted to the mechanical parts of the kit. Teams may NOT modify any of the kit electronics or motors. Modification of items on the additional materials list is permitted.

3.5.3 Teams may use any 7.2V battery, but only one battery may be used on the robot at a time.

3.5.4 Robots may only use publicly available VEX parts, found at www.vexrobotics.com, and parts listed on the additional materials list.

3.5.5 Robots may only use up to \$50 of materials listed on the Additional Materials List. Robots that utilize materials from the Additional Materials list (see 3.6.2) must provide provide a Bill of Materials with the appropriate retail cost of each item.

3.5.6 Robots may use up to seven VEX motors, and an unlimited number of servos. Of these seven, teams may use a maximum of four VEX 393 Motors.

3.5.7 Teams may purchase pneumatics kits, provided it is equivalent to any kits or portions thereof shown at <http://www.VEXlabs.com/VEX-robotics-pneumatic-parts.shtml> and are within the robot budget per rule 3.5.4. Cost for incomplete VEX Labs pneumatics kits may be adjusted accordingly.

3.6 Materials

3.6.1 Any amount of materials in the Additional Materials List will be allowed provided the total costs of all items on the robot is within the budget specified in 3.5.4 and it does not violate any other rules.

3.6.2 Additional Materials List

3.6.2.1 Plastic sheet, up to 0.25" thick

3.6.2.2 Aluminum or steel sheet, up to 0.125" thick

3.6.2.3 Any aluminum, steel, or plastic round shaft or tubing up to 0.5" diameter

3.6.2.4 Any bearings

3.6.2.5 Plywood or wood up to 0.5" thickness

3.6.2.6 "Foam rubber" up to 0.75" thickness

3.6.2.7 Cardboard or foam-board

3.6.2.8 String or twine

3.6.2.9 Any springs or elastic bands (must be designed to release energy no faster than it was input)

3.6.2.10 Fasteners, washers, and adhesives (used as such). You may not use adhesive tape (duct tape, electrical tape, etc) as a fastener or structural material

3.6.2.11 Lubricants used to reduce friction within parts of your robot

3.6.2.12 Non-functional decorations

3.6.2.13 Paper, plastic-wrap, aluminum foil, fabric or any paper or cloth-like material

3.6.2.14 Any sensors

3.6.3 Materials that are not official VEX materials, or are not listed as approved additional materials must be approved via email to savage@wpi.edu. Responses will be posted publicly.. Robots that attend the competition with unapproved materials on their robot will not be given approval at the event and will not pass inspection until the offending materials have been removed.

3.7 Energy Sources

3.7.1 The energy used by the devices in the competition must come solely from:

3.7.1.1 A change in altitude of the center of gravity of the device

3.7.1.2 Energy stored by deformation of any approved materials.

3.7.1.3 Electrical energy delivered by the battery to the electronics and motors provided with the kit.

3.7.1.4 Pressure stored in the pneumatics system, not to exceed 100 psi.

3.8 Electronics

3.8.1 Teams must keep clear and easy access to their robot controller, specifically the power switch. The indicator lights on the front of the controller must also be clearly visible.

3.8.2 Teams must keep clear and easy access to the crystals in their robot receiver. Crystals will need to be exchanged quickly prior to each match. Inspectors or referees may request a team move the receiver to provide easier access before they are allowed to play.

3.8.3 Prior to each match, teams using the PIC (old) controller will receive a crystal set from the Field Captain. The crystals must be returned before the team leaves the field at the end of the match.

3.8.3.1 Multiple infractions of 3.8.3 may lead to a disqualification at the discretion of the head referee.

3.8.4 All teams are required to program their robot using an appropriate easyC Template. Specifically, VEX Net or Cortex robots must use a WIFI template, while PIC robots must use a timed competition template with a 15 second autonomous mode and a 254 second operator control mode.

4. Alternatives for Game Play

4.1 Play the game without coalitions in a one vs. one format.

4.2 For a less expensive field:

4.2.1 Halve the number of Medals

4.2.2 Take out the Gold platform and make one solid Silver platform.

4.2.3 Replace the ramps to the Floor bins with tape.