

Mechathlon 2018 Trial Event Rules
Updated 1/22/18

1. **DESCRIPTION:** Prior to the competition, the contestants will design and build a mechatlete, mechanical athlete, capable of performing 5 physical tasks.

A TEAM OF UP TO: 2

IMPOUND: Yes

APPROXIMATE TIME: 35 minutes

2. **CONSTRUCTION PARAMETERS:**

- a. The mechatlete may be made of any material, have a mass not to exceed 1.5 kg, and fit into a box with inside dimensions of 30 cm x 30 cm x 30 cm at the start of each task. The mechatlete must not modify or damage the event surface.
- b. Commercial batteries, not exceeding 14.4 volts as labeled, may be used to energize each of the mechatlete electrical circuits. Multiple batteries may be connected in series or parallel as long as the expected voltage output across any points does not exceed 14.4 volts as calculated using their labeled voltage. Teams must be able to show the Event Supervisors the labeled voltage. While batteries containing lithium or lead are prohibited, NiCad and NiMH batteries which may contain small amounts of lithium are still permitted for use. Battery use must follow the Battery Policy at www.soinc.org.
- c. Brushless motors, unless they are an integral part of or embedded into commercially available fans used for cooling electronics or computers, and compressed air are not permitted as components of the mechatlete.
- d. Components may be purchased or made by the team members. Electronic components are allowed.
- e. Modifications or adjustments may be made to the mechatletes between different tasks. Components and functions of the mechatlete may be disconnected, or disabled, for tasks in which they are not used; however, no parts may be physical removed or taken off the mechatlete. Additionally, no parts maybe be added to the mechatlete. All parts of the mechatlete **attached** at Impound must **remain attached** as the mechatlete completes all tasks. **No new parts may be added after Impound. Any parts that fall off the mechatlete once the competition starts will be considered a competition violation.**
- f. The mechatlete may not be remote, or externally, controlled. Microcontrollers (i.e. TI Innovator, Raspberry Pi, Arduino, LEGO® Brick), are permitted but mechatlete size and weight requirements still apply. The device maybe connected to a laptop, or other handheld device, powered by battery that functions as a display or programming interface device
- g. The mechatlete, and any associated elements, must function on an independent power supply. No element can be plugged into an electrical outlet at any time during the competition.
- h. The participants must initiate each task by actuating some sort of switch/release mechanism on the mechatlete in a manner that does not contribute energy to assist in performing the task. Relying on inserting batteries or twisting wires together to start is not allowed. A stopping system is recommended.

3. **THE COMPETITION:**

- a. The Tasks required to be performed by the mechatlete are:
 - i. **Weight Lift:** The mechatlete must lift a 500-gm weight to height of between 50 cm and 80 cm and hold it for at least 5 seconds but no longer than 10 seconds. The mechatlete must then return the mass safely to the ground. **Any mass dropped uncontrolled to the ground will be considered a competition violation.** The places will be awarded based on the maximum height and duration of the lift.
 - ii. **Sprint:** The mechatlete from a standing start must travel down a 10 m long and 2 m wide track in the shortest time possible. Additionally, the mechatlete must on its own come to a complete and full stop within **3 m** of the 10-m end line. **A mechatlete traveling more than 3 m past the end line will be considered a competition violation.** The places will be determined based on the shortest timed run.

- iii. Hill Climb: The mechatathlete from a standing start must climb a **2-m long “hill”** with a pitch of 40 degrees and stop upon reaching the top; **or else go over the edge**. The places will be determined based on the height of the hill that the mechatathletes are able to reach with the time it takes to reach the maximum height used as a tie breaker. **Any mechatathlete going over the edge will be considered a competition violation.**
 - iv. Shot Putt: The mechatathlete must use an elastic solid to propel a shot putt (i.e., standard racquet ball) supplied by the event supervisor as far as possible. The places will be determined by the distanced traveled by the shot putt. **The shot putt must stay within the marked boundary, an arc of 45 degrees. Any shot traveling outside of this arc will be considered a competition violation.**
 - v. Long Jump: **The mechatathlete will be placed 1 m in front of the launch ramp with its front against a 2x4 placed on edge. Once the mechatathlete is positioned the 2x4 will be removed by the event supervisor. Then the mechatathlete may be activated and being its run towards and up a 1-m ramp set at 20 degrees to make its jump.** The mechatathlete must come to a complete stop within 1 m upon landing. **A mechatathlete traveling more than 1 m after landing will be considered a competition violation.** The places will be determined based on the straight-line distance from end of the ramp to where the mechatathlete initially lands.
- b. The tasks may be attempted **once** in any order.
 - c. Regional and State tournaments may offer fewer than 5 tasks or permit multiple attempts for each task. Teams must be notified before the tournament of the approach that will be taken at the given tournament.
 - d. **Participants** may leave the competition area between **tasks**, but their mechatathlete must remain in the area once they have started to compete.
4. **SCORING:**
- a. Task Scoring:
 - i. Teams will be awarded points for each task equal to their place in that task.
 - ii. Teams that are tied for a task, **after all tie breakers have been applied**, will receive points equal to the place for which they are tied and the next place(s) will be skipped.
 - iii. **Teams that receive a competition violation for any task will be ranked behind those that receive no competition violations for that task regardless of their overall performance.**
 - iv. **The scoring of teams with competition violations for a task will be based on a given team’s performance compared against the performance of other teams with competition violations.**
 - v. If a mechatathlete attempts, but is unable to complete a task, the team will be awarded points equal to the number of teams that attempted the task plus 1.
 - vi. Teams that do not attempt a task will receive points equal to the number of teams that participated in the event plus 1.
 - b. Event Scoring:
 - i. The teams overall score for the event will be the sum of the scores for the individual tasks.
 - ii. The lowest score wins.
 - iii. **Ties will be broken as follows:**
 - (1) **by comparing the number of competition violations between teams;**
 - (2) **by comparing individual task scores (e.g.; team with more 1st places than 2nd places); and,**
 - (3) **by comparing the task scores will in the order in which they are listed in the rules.**