uOttawa Mini Challenges Eco-Marathon

Hosted by UOE Racing and uOttawa Supermileage

STEM Complex uOttawa

150 Louis Pasteur Private,

Ottawa, Ontario, Canada

April 27, 2019

Official Rules

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1. Organization

Article 1: About the Rules

a) The rules for the uOttawa Mini Eco-Marathon are subject to change at any time with the authority of the organizers.
b) It is the responsibility of the participating team to read and understand the Official Rules.
c) Links are used throughout this document for navigation.
d) In this document, function and roles are defined as follows;
    i. 'Official Rules' - All parts of this document.
    ii. 'Event' - The uOttawa Mini Eco-Marathon.
    iii. 'Organizer' - The organizers of the event, *UOE Racing* and *uOttawa Supermileage* and any of its members.
    iv. 'Student' - An individual currently attending a recognised educational institution, in a program which falls under the Ontario secondary school (grade 9-12) system *or any known equivalent system* proper to the institution's province.
    ii. 'Team' - A group of up to 5 students, with a team name and vehicle, which has been accepted to participate in the uOttawa Mini Eco-Marathon.
    iii. 'Advisor' - A teacher or the legal guardian of one of the team members. The advisor must act as an advisor and be present on the day of the competition.
    iv. 'Race Director' - A person appointed to manage all track events and compliance.
    v. 'Track Marshal' - One of the individuals on the track tasked with ensuring the safety of participants
    vi. 'Technical Director' - A person appointed to oversee and manage the technical portion of the event.
    vii. 'Pits' - A designated area given to each *Team* for working on their vehicle, as outlined in Article 8: Equipment and Materials.
e) Any decision made by the *Organizers* is final, irrespective of whether a rule to justify said decision is explicitly defined in the Official Rules or not.

Article 2: Acceptance

a) Application to enter the competition must be made via online registration on the uOttawa Mini Eco-Marathon website (http://www.uottawaminichallenges.ca/). The registration will be on a first come first serve basis, with a maximum capacity of 30 teams. Teams that register after the capacity has been reached will be waitlisted. Teams will be contacted as soon as a slot opens up to confirm if they are still willing to continue the registration process . Registration is open until April 10th, 2019 at 11:59PM EDT. The *Organizer* reserves the right to invite additional *Teams* from the waitlist who have demonstrated extensive competition spirit prior to the event.

b) For an application to be valid, a *Team* must have a minimum of 1 and a maximum of 5 *Students*, as well as an *Advisor* who will be present at the *event*. *Teams* must be from an institution in Canada. A school can register as many teams as they wish. A single *Advisor* may represent up to 4 *teams* in this particular case.

c) If a *Team* must drop out before the competition, they must do so by informing the *Organizers* by EMail (eco-marathon@uottawaminichallenges.ca) before March 15th, 2019 at 11:59PM EDT. The registration fee is non-refundable.

d) By fact of their entry, *Teams* accept all provisions of the *Official Rules* and agree to abide by all decisions made by the *Organizers*. The *Organizers* reserve the right to add, modify or delete any sub-section of the *Official Rules*. In such an event, all *Teams* will be notified of the change.

e) The *Organizers* reserve the right to modify, postpone or cancel the competition for any reason, not just limited to adverse or extreme weather conditions. No Claim for compensation will be accepted. If the event were to be canceled, registration fees may be refunded.

f) The participants are aware that photo, audio and video recordings will be made throughout the event. By entering the uOttawa Mini Eco-Marathon, participants relinquish all rights with respect to these photo, audio and video recordings, which may be captured by third parties, the *Organizers* or its affiliates. Participants accept that the University of Ottawa may also use photos, audio and video recordings for internal or external communications and presentations including, but not limited to, promotion, advertising, internet presence, TV reports, radio reports and press releases.

Article 3: About the Event

a) The event will be held on April 27th, 2019 from 9AM EDT to 5PM EDT. The event will be held on the main floor of the University of Ottawa STEM Complex (150 Louis-Pasteur Private, Ottawa, Ontario, Canada). There will be an unloading area setup in front of the STEM Complex for competitors to come and unload their projects.
b) All events will be held inside the STEM Complex. Each *Team* will be assigned a *Pits*. *Teams* will be allowed to bring their own basic hand tools to the event as described in Article 8. There will be a seperate area for using power tools under strict supervision.
c) Lunch will be provided to all participants. Participants with dietary restriction are recommended to bring their own lunch.
d) All registration fees are non-refundable.
e) All participants must bring a completed and signed waiver form to the event, which is available on the uOttawa Mini Eco-Marathon website.
f) A detailed schedule of the event will be posted on the website closer to the event date.

2. Safety

Article 4: Safety Rules

a) Safety is a key factor in all engineering endeavours. These rules are to protect the participants and observers.
b) While in the *Pits*, no food is allowed.
c) There will be a designated area for the use of power tools and soldering under strict supervision of the organizers.
d) *Teams* are required to use safe work practices at all times
e) The *Race Director* has the final authority in determining event safety.
f) Any unsafe behaviour will addressed and provided a warning. Persistent unsafe behaviour may lead to the participant being asked to leave the event or the *Team* being disqualified.
g) Non-Compliance of any part of these rules may lead to disqualification from the competition.

Article 5: Access to the track and test lap

a) Vehicles must pass technical inspection, prior to accessing the track for practice and official runs. A safety sticker will be affixed to the vehicle once the vehicle has passed the inspection.
b) Only vehicles that have passed technical inspection will be allowed to compete.
c) The *Organizers* will allow an opportunity for Drivers to walk the track before any vehicle is allowed on the track.
d) If a team is in line to access the track, they must be ready to run in 2 minutes.
e) Only 2 members per *Team* are allowed on the track any given moment.
f) It is forbidden to drive in reverse or to drive against the direction of the track.

Article 6: Breakdowns and Other Incidents

a) Intentional stopping is strictly forbidden on any part of the track.
b) A driver is allowed 15 seconds to reset their vehicle after an incident. The timer is started after the *Track Marshal* allow participants on the track.
c) If a vehicle breaks down the driver must immediately attempt to move the vehicle to the inside of the track and wait for the *Track Marshal* to arrive.
d) It is forbidden to carry out repairs on the track.

Article 7: Off-Track Movements

a) When not on the track, all vehicles must be carried and cannot be operated.
b) If the vehicle's propulsion system must be tested, it should be done such a way that the vehicle remains stationary.

Article 8: Equipment and materials

a) *Team* are required to provide and use the following items at the event:
    i) Safety glasses for all participants.
    ii) Duct tape to secure cords or cables lying on the floors.
    iii) Tools and materials:
        1) Only hand tools such as screwdrivers, pliers and wrenches are allowed in the *Pits*.

2) All tools that are used for cutting are not allowed in the *Pits*. There will be a seperate area designated for cutting and drilling at the event under strict supervision.

iv) If lithium batteries are used, a battery charging bag must be used while charging the battery.

v) Electrical Safety:

1) All electrical equipment must be plugged into a fused powerbar which must be supplied by the *Team*.
2) Electrical cables must be in good condition and appropriate for the equipment being used.

3. Vehicle Design

Article 9: Dimension

a) The vehicle must have a maximum height of 250mm.
b) The vehicle must have a maximum width of 300mm.
c) The vehicle must have a maximum length of 600mm.
d) The vehicle must have at least one point of contact on the track at all times.

Article 10: Additional Inspections

a) After passing technical inspection, any alterations to the vehicle must be re-approved by the *Technical Director*
b) After any significant incident, the vehicle must be re-inspected.
c) At their discretion, the *Organizers* reserve the right to inspect vehicles.

Article 11: Track Contact Surface

a) If the vehicle's tires have the potential to damage the track running surface, *Teams* will be asked to modify their design or risk being disqualified from the event.
b) All team will be running on a smooth concrete surface.

Article 12: Turning Radius and Steering

a) Vehicles should be able to perform a minimum 1m radius turn measured from the outside wheel. This will be verified during technical inspection.

Article 13: Braking

a) All vehicles should be able to hold vehicle stationary, on a 20 degree slope for 5 seconds. This will be verified during technical inspection.
b) Vehicles are allowed to use the reversing capability of their motor to hold them on the slope.

4. Vehicle Propulsion

Article 14: Energy Type

a) All team are limited to using one battery power source for the entire vehicle.
b) The wireless device used to control the vehicle, and which cannot be physically attached to the vehicle, can use it own power source.
c) The minimum allowable vehicle power source voltage is 6 VDC nominal. The maximum allowable vehicle power source voltage is 48 VDC nominal.
d) The maximum capacity for a battery pack should not exceed 500 Wh. For batteries not rated in Wh, the Wh rating can be calculated by multiplying the Amp-hour rating of the battery by its nominal voltage.
e) If a lithium based battery is used, it must be accompanied by a BMS (Battery Management System) made for that battery. Printed manufacturer's documentation for the lithium based battery and associated BMS must be presented to the technical inspection team at the time of inspection.
f) All batteries should be used with an appropriate charger. This charger will be inspected at technical inspection.
g) Supercapacitors are strictly forbidden.

Article 15: Efficiency Calculations

a) The electrical efficiency of each vehicle will be calculated as meters per watt-hour (m/Wh) and will be determined by a joulemeter provided by the organizer at the start each track run.
b) Efficiency will be calculated based on the use of the vehicle's entire electrical system.
c) For an official run to count, *Teams* must complete 5 laps of the track in 120 seconds or less.
d) The track is a rounded rectangle measuring approximately 15 meters by 5 meters with 1 meter radius corners. Detailed track information will be posted on the uOttawa Mini Eco-Marathon website prior to the event.

Article 16: Speed Challenge

a) A *Team* will be judged on how fast they finish the straight track. This run will be timed using a run timer made by the *Organizer*.
b) The *Team* with the fastest time will be announced as the winner of this challenge.

Article 17: Joulmeters

a) Joulmeters are to be setup between the battery and the electrical systems. All electrical system should be fused to maximum 50 Amperes from the joulemeter to the electrical systems.
b) The joulemeter should be easily accessible by the judges and will be affixed to the top of vehicle (50mm by 50mm of flat surface) using velcro tape. The velcro tape and crimp connectors will be provided by the judging committee.
c) The location and placement of the joulemeter will be verified at technical inspection.

Article 18: Vehicle Electrical Systems

a) All vehicles must be radio controlled using a 2.4 GHz frequency. If a team wishes to use another frequency, the team must get it approved by the technical team. The technical team reserves the right to refuse any request.
b) All subsystems must be appropriately fused using correct gauge of wires.
c) All subsystems must be rated for their respective function.

d) All electrical/electronic enclosures purchased or built by the teams must be made of transparent material which allows technical inspectors to view the contents. Team could also use a clear access flap for their electronics.
e) Electrical wiring must be in good condition, neat, clearly labelled, secured and not close to moving parts. All wiring connections and terminations must be visible and easily accessible. Splices are strictly forbidden. All wiring must be traceable by using a different colour for each circuit.
f) Spaghetti wiring is strictly forbidden.

Article 19: Technical Documentation

a) *Teams* must have printed documentation available at the time of inspection describing specific technical aspects of the vehicle at the time of inspection. The printed documents must be bound and divided into the following sections:
    i) Energy Supply Diagram (electrical schematic)
    ii) Propulsion System Diagram (flow chart)
    iii) Battery/BMS (if lithium based batteries are used)
    iv) Motor/Motor Controller (manufacturer documentation)
b) The minimal contents of each of the above required sections are defined below:
    i) Energy Supply Diagram: Provide a vehicle level schematic showing all vehicle wiring and associated components.
    ii) Propulsion System Diagram: Provide a flow chart that illustrates how power is transferred from the motor to the ground. This diagram should include all gear/sprockets used in the system.
    iii) Battery/BMS: Provide documentation indicating the appropriate charger for the chosen vehicle battery. If a *Team* wishes to use a lithium based battery, the *Team* must also provide a BMS (Battery Management System) recommended by the manufacturer of the chosen battery, along with associated documentation.
    iv) Motor/Motor Controller: Provide manufacturer documentation for the motor and motor controller if a custom motor is used. This document can be the description of the motor from a manufacturers website.

5. Awards and Prizes

Article 20: uOttawa Mini Eco-Marathon Champions

a) This award will be given to the *Team* who demonstrates the most well rounded effort by accumulating the most points across all the event categories.

b) Officially registered winning *Team* members will receive University of Ottawa - Faculty of Engineering scholarships.

c) The scholarships will be applied at the time of admission into any University of Ottawa - Faculty of Engineering programs.

Article 21: On-Track Awards

uOttawa Mini Eco-Marathon On-Track Award	Prize	Points
Efficiency Winner	Trophy, medals for all winners, On-stage Winners ceremony	15
Efficiency Runner-up	Plaque	13
Efficiency 3rd place	Plaque	10
Speed Challenge Winner	Trophy, medals for all winners, On-stage Winners ceremony	10
Speed Challenge Runner-up	Plaque	7
Speed Challenge 3rd place	Plaque	5

Article 22: Off-Track Awards

a) Participating teams may apply for all off-track awards.

b) Creativity, Presentation and Spirit of the Event awards will be decided by a judging committee.

c) Details for each off-track award can be found in the Articles below.

uOttawa Mini Eco-Marathon Off-Track Award	Prize	Points
Communication Award	Trophy, On-stage Winners ceremony	5
Engineering Design Award	Trophy, On-stage Winners ceremony	5
Safety Award	Trophy, On-stage Winners ceremony	5
Visual Creativity Award	Trophy, On-stage Winners ceremony	5

Article 23: Communication Award

a) The communications award is the social media competition. Teams must publish content relevant to the competition on multiple medias such as; Instagram, Facebook and Twitter. All social media accounts must be made public. The competition requires teams to use the following hashtags: *#ShellEcoMarathon* and *#uOttawaMiniEcoMarathon* when posting. Teams are also required to tag and follow these accounts: @UOERacing @UOSupermileage @UOCEED

b) All of the criteria required to win this competition are in the rubric.

Article 24: Engineering Design Award

a) This award recognizes an innovative approach to the design of an efficient remote controlled vehicle in terms of propulsion system, material selection and efficiency design considerations.

b) This award will be given based on *Team* presentations on the day of the event. *Teams* will be given 5 minutes to present one PowerPoint slide providing details and justifications for their vehicle's engineering design. Teams are encouraged to get creative with the presentation and slide.

c) The PowerPoint slide will need to be provided to the *Organizers* by April 26th, 2019, by 11:59 PM. This has to be done using the Form on uOttawa Eco-Marathon Website. This form will be made available on April 10th, 2019.

d) A presentation schedule will be provided on the day of the event, during registration process.

Article 25: Safety Award

a) This award recognizes the effort made by a *Team* to ensure their own safety, as well as the safety of those around them during the event.
b) This award will be given based on observations made by the *Organizers* on the day of the event.

Article 26: Visual Creativity Award

a) This prize recognizes the *Team* who designs a vehicle with the greatest visual appeal (colours, shape, etc.).
b) This award will be chosen by a silent vote of all participating *Team* members on the day of the event. *Team* members cannot vote for their own vehicle.