



# The CanSat Design Challenge for Canadian High Schools

## Rules and Requirements



Presented by  
The Canadian Satellite Design Challenge Management Society Inc.

Issue 4, Sept. 23, 2020  
For the school year: 2020-2021



---

# Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
1.1	What is a CanSat?	1
1.2	Benefits of Participating	1
<b>2</b>	<b>General Rules</b>	<b>2</b>
2.1	Eligibility to Participate	2
2.2	Team Advisor	2
2.3	Language of Communication	2
2.4	Registration Fee	2
2.5	Contact Information	2
2.6	How to Apply	2
2.7	Schedule	3
<b>3</b>	<b>Mission and CanSat Requirements</b>	<b>4</b>
3.1	Changes to the ESA Mission Requirements	4
3.2	Changes to the ESA Technical Requirements	4
3.3	Additional Educational Outreach Requirements	4
<b>4</b>	<b>CSDCMS Board of Directors</b>	<b>5</b>

Cover photo: European Space Agency



# 1 Introduction

---

The Canadian CanSat Design Challenge is an educational initiative which requires teams of 4-6 secondary school students to design, build, and launch their own miniature satellite, called a “CanSat”.

## 1.1 What is a CanSat?

A CanSat is a simulation of a real satellite, integrated within the volume and shape of a soft drink can, and weighing between 300 and 350g.



The challenge for the students is to fit all the major subsystems found in a satellite - such as power, sensors, and a communication system - into this minimal volume. The CanSat is then launched by a rocket up to an altitude of approximately one kilometre, or dropped from a drone or airplane. Then its mission begins.

Teams are tasked with an identical primary mission, which involves carrying out a scientific experiment and/or a technology demonstration, achieving a safe landing, and analysing the data collected. Teams must also design and implement their own secondary mission, of which the possibilities are only limited by the creativity of the students!

## 1.2 Benefits of Participating

Through the CanSat project, the participating student teams experience all the phases of a real space project, from selecting the mission objectives, designing their CanSat, integrating the components, testing the system, preparing for launch, and analysing the scientific data obtained.

Throughout this process the students:

- learn by doing;
- acquire and/or reinforce STEM (Science, Technology, Engineering, Math) capabilities;
- understand the importance of coordination and teamwork; and,
- enhance their communications and teamwork skills.



---

## 2 General Rules

---

### 2.1 Eligibility to Participate

Each team must be comprised of a minimum of four, and a maximum of six, students. The team members must either be enrolled full-time in a secondary school, or registered for home-schooling per their provincial requirements.

At least 50% of the students included in a team must be Canadian citizens or Permanent Residents.

A team may not participate in the CanSat Design Challenge more than once, with the exception of the teacher/mentor and at most one student from any former team.

To participate, a team must submit an application (see Appendix A). Due to the time constraints and logistics of holding the launch campaign(s), it is possible that not all teams which apply will be able to be accepted to participate.

### 2.2 Team Advisor

Each team must be supervised by a teacher or mentor responsible for monitoring the team's technical progress, offering help and advice, and acting as the team's point of contact with the CSDC Management.

The Team Advisor must be available to accompany the team to the competition launch campaign.

### 2.3 Language of Communication

Written reports and oral presentations may be given in either English or French. Note that for the European Space Agency's International CanSat Competition, the working language is English.

### 2.4 Registration Fee

There is no fee to enter.

### 2.5 Contact Information

The point-of-contact for the CanSat Design Challenge is:

Lawrence Reeves  
m: +1 778-988-6343  
e: [LReeves@cdscms.ca](mailto:LReeves@cdscms.ca)

### 2.6 How to Apply

Fill in the CSDCMS CanSat-1 Application Form, available at:

[http://www.cdscms.ca/documents/CanSat\\_DC/CSDC\\_CanSat-1\\_Application\\_2020-2021.docx](http://www.cdscms.ca/documents/CanSat_DC/CSDC_CanSat-1_Application_2020-2021.docx)

Email the completed application form to Lawrence Reeves, [LReeves@cdscms.ca](mailto:LReeves@cdscms.ca).



## 2.7 Schedule

The following are the estimated dates for the 2020-21 CanSat Design Challenge. This is a draft, and some dates may be subject to change, particularly in the context of the on-going global pandemic.

<b>Phase 1: Imagine your CanSat</b>	
<b>Activity/Event</b>	<b>Date</b>
Deadline for application from prospective teams	Oct. 16, 2020
Notification of teams selected	Oct. 30, 2020

<b>Phase 2: Design and Build your CanSat</b>	
<b>Activity/Event</b>	<b>Date</b>
CanSat workshop for teachers	Early/Mid Nov., 2020
Preliminary Design Review (PDR) package due from teams	Nov. 27, 2020
PDR review comments given to teams	Dec. 18, 2020
Critical Design Review (CDR) package due from teams	Jan. 29, 2021
CDR review comments given to teams	Feb. 12, 2021

<b>Phase 3: Launch your CanSat</b>	
<b>Activity/Event</b>	<b>Date</b>
Launch competition(s), with Final Design Review documentation	Late April, 2021
Selection of the Canadian representative to the European Space Agency's International CanSat Competition	Early May, 2021

<b>Phase 4: Show The World your CanSat</b>	
<b>Activity/Event</b>	<b>Date</b>
ESA International CanSat Launch Campaign	June, 2021
Submit CanSat Final Report to ESA	Late July, 2021.

Table 2-1. Canadian CanSat Design Challenge Schedule.



---

## 3 Mission and CanSat Requirements

---

Entries into the CSDCMS CanSat Design Challenge must conform to all of the requirements in the European Space Agency's "CANSAT 2020-2021 Guidelines" document. It is available online at:

[https://cansat.esa.int/wp-content/uploads/2020/09/CanSat\\_guidelines\\_2020\\_2021.pdf](https://cansat.esa.int/wp-content/uploads/2020/09/CanSat_guidelines_2020_2021.pdf)

The Canadian CanSat Design Challenge will follow, as closely as possible, the evaluation and scoring of the ESA CanSat competition. At this time, we are not able to state with certainty whether the launch campaign can be held in-person, or whether it will have to be conducted remotely as the ESA competition will be done.

### 3.1 Changes to the ESA Mission Requirements

For the Primary Mission, the CanSats must record the air pressure and temperature at least once per second, and store them on a removable memory card. Past ESA CanSat competitions required the data to be transmitted to the ground; this is optional (not required) for this offering of the Canadian CanSat Design Challenge.

### 3.2 Changes to the ESA Technical Requirements

For requirement #8, any parachute used for the recovery system must be designed and fabricated by the teams (not purchased).

In requirement #12, note that, at the date of writing, €500 is approximately CAD \$780.

### 3.3 Additional Educational Outreach Requirements

In addition to the communications and outreach requirements of the ESA CanSat competition, each team must give at least one presentation to each of the following:

- an elementary school audience;
- a junior high school audience (Grades 8 to 10); and,
- a public audience (e.g., at a school "Open House", a teachers' conference or meeting, etc.)

These presentations can be given any time between when the team's application is successfully accepted for participation, and the launch campaign.



## 4 CSDCMS Board of Directors

The CSDCMS Board of Directors is comprised of professionals from academia, industry, and the not-for-profit research funding sectors, with diverse and relevant experience, and national and international networks. Six of the Directors have been with the CSDCMS Board since its inception.



Liliana Barrios has worked in space industry for almost 15 years, including on RapidEye and RADARSAT Constellation Mission, and ISS robotics software. She is an alumnus of the International Space University.



Wayne Ellis attended the Royal Military College of Canada and served for 20 years in the Canadian military. He is now a space industry consultant, and is the Canadian representative for Analytical Graphics Inc., makers of System Toolkit (STK).



Gary Hagel is a lawyer specialising in Motor Vehicle and Insurance-related matters, Personal Injury, and general litigation. He has appeared as counsel at all levels of Court in British Columbia.



Wendy Keyzer has been a communications manager in Canadian space industry, and is currently the Manager of Strategy and Business Development Operations at Seaspan ULC.



Adnan Khan, P.Eng., is the Vice-President of Strategic Capital at a Vancouver renewable energy company. He is an alumnus of the International Space University.



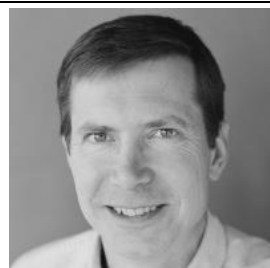
Jaymie Matthews, Ph.D., is a professor of Astronomy at the University of British Columbia, and is the Principal Investigator on Canada's MOST space telescope. He is an Officer of the Order of Canada.



Duncan Phillips (CSDCMS Vice-President) is a Vice-President of Mitacs Inc., the industry-academia funding organisation.



Karen Pooni, C.P.A., C.G.A., (CSDCMS Treasurer) worked at Boeing for 14 years. She is now a Senior Finance and Operations Leader, as well as a long-time space enthusiast.



Lawrence Reeves (CSDCMS President) has over 20 years of experience in Canadian space industry, including on the RADARSAT-2, Sapphire, and NEOSat missions. He is an alumnus of the International Space University.



Michael Unger is the Director of Educational Programmes at the H.R. MacMillan Pacific Space Centre in Vancouver. He is a writer, a performer, and an organiser of Vancouver's "Nerd Night" talks.