Ireland

esero

CANSAT IRELAND COMPETITION GUIDELINES 2025-2026

CANSAT IRELAND

esa

Taighde Éireann Research Ireland

Facilitated by NIAMH SHAW Dream Big.

Table of Contents

1. INTRODUCTION

The European Space Agency (ESA) endorses and supports a range of CanSat activities across its Member States (including Canada, Latvia, Slovenia and Malta), all culminating in a National Final. The CanSat project, aimed at secondary school students, mainly addresses Technology, Physics, and Computer Science curricular subjects. By offering practical experience of working on a small-scale space project, CanSat makes use of these subjects in an interdisciplinary manner and promotes collaboration and teamwork.

The national winning team will be invited by ESA to the *Space Engineer for a Day* celebration event at ESTEC, Netherlands. This non-competitive event aims to celebrate the achievements of the teams, while experiencing what is the day-to-day life of an engineer working at ESA. Students will be able to:

- Explore facilities such as laboratories,
- Hear first-hand from Space experts,
- Present their work to a panel of experts,
- Enjoy social and space-themed activities.
- Network with the other winning teams, benefitting of an international environment.

ESERO Ireland (www.esero.ie) has managed the CanSat Ireland competition since 2012 and in conjunction with Dream Big (Niamh Shaw Ltd, www.niamhshaw.ie) runs the competition for 2025-2026 session.

CanSat Ireland regional competitions will be run by third level colleges from Nov 2025 to April 2026.

The winners of the CanSat Ireland Regional Competitions will go on to the National Finals in April- May 2026. The winners of the CanSat Ireland National competition will be invited by ESA to the Space Engineer for a Day learning & celebration event (at ESTEC) at the end of June 2026!

What is a CanSat?

A CanSat is a simulation of a real satellite, integrated within the volume and shape of a soft drink can. 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, or dropped from a platform, drone or captive balloon. Then its mission begins. This involves carrying out a scientific experiment and/or a technology demonstration, achieving a safe landing, followed by an analysis of the data collected.

Educational value of the CanSat project

Through the CanSat project, the participating student teams experience all the phases of a real space project, from selecting the mission objectives, designing and building 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,
- get acquainted with the inquiry-based methodology that is typical of real-life scientific and technical professions,
- acquire and/or reinforce fundamental technology, physics, and programming curricular concepts,
- understand the importance of coordination and teamwork,
- enhance their communication skills,

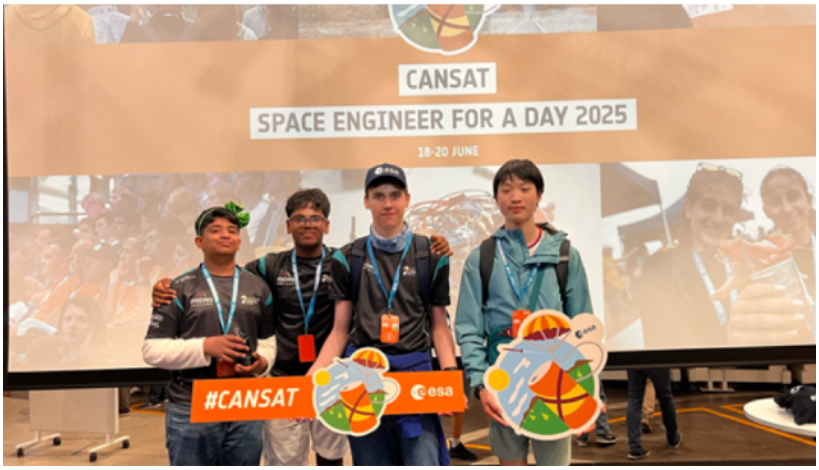
1. 

Figure 1 CanSat Ireland 2025 National Final Winning Team, Confey College, Co. Kildare

2 COMPETITION OVERVIEW

Overview of competition Timeline:

Below is the general timeline for the CanSat program and competitions.

CanSat Ireland Important Dates*	
Activity	**Date**
Contact Schools about participation	September 2025– December 2025
School registration	September 2025– December 2025
Schools participation/workshops	December 2025 – February 2026
CanSat kits sent to partners	December 2025
Regional competitions	March 2026
Critical Design Review report submission	April 2026
National Finals	April 30- May 1 2026
Final Winners visit to ESA	June 17-19, 2026

*Dates are subject to change due to unforeseen circumstances. For the most up to date information please go to https://esero.ie/cansat/ .

CanSat Ireland Regional Partners

The CanSat Ireland competition is run in partnership with 8 third level institutes/TUs:

TU	Contact(s)	Regional Competition Date
Munster Technological University (MTU) - Kerry	Krishna Panduru	TBD
Technological University of the Shannon (TUS) Limerick	David McInerney Barry Fitzgerald	TBD
Maynooth University	Joe Moore	TBD
Technological University Dublin (TUD) Blanchardstown	Mick McKeever	March 11
Technological University of Shannon (TUS) Athlone	Kevin McDermott	March 6
Munster Technological University (TUS) Cork	Martin Hill Fiona Edwards Murphy	March 7
South East Technological University (SETU) Carlow	David Allen Stephen Scully Cathal Nolan Dillon O'Reilly	TBD
Dundalk Institute of Technology	Maryellan Kelledy	TBD

Each institute/TU launches their CanSat Ireland Regional Competition with a Teachers & Mentors workshop in the later months of 2025 or early 2026 (dates may vary for each region).

- CanSat Ireland teams should comprise a ***minimum*** *of* ***3*** *and a* ***maximum*** *of* ***6*** (TY/Senior cycle) full-time enrolled secondary school students assisted by a teacher. Teams of 4 or 5 students are advisable to maximise the learning process.
- Team members may only be part of one team in a competition year.
- A team may participate in the CanSat Ireland Competition only once in a competition year.
- Teams must register using the online registration form in advance of the CanSat Ireland regional / national competition. https://forms.office.com/e/FEbjAXQmVM
- CanSat teams may substitute a maximum of one person on the team if necessary, as long as the new member has not been part of another CanSat team in the same competition year. The total number of the team must not exceed 6 including the substitute.
- At least 50% of the team members must hold the nationality of an ESA Member State[1] or an ESA Associate State.
- The team invited to ESTEC must be the winning team of their 2026 CanSat National Competition.

CanSat Ireland Regional Competitions

Mentors from the partnering institutes/TUs, and from local companies may be assigned to CanSat Ireland teams/school for the competition.

Under the supervision of the regional partners (the institutes/TUs), the student teams carry out technical work on their CanSats and engage in outreach activities.
The CanSat Ireland teams have to perform the following tasks:

- Selection of mission objectives.
- Definition of technical requirements necessary to achieve the objectives.
- Design of CanSat hardware and software.
- Integration and testing of the CanSat.
- Regional launch campaign: Technical & Outreach work.

Schedule of CanSat Ireland Regional Competitions:

Regional CanSat Ireland Competitions are scheduled to take place during March 2026.

Dates will be posted at https://esero.ie/cansat/ as they are confirmed with each host college.

For CanSat Ireland Regional Competitions, CanSat teams should first focus on the Primary Mission which is **mandatory** to attempt. Teams which focus on secondary missions before mastering primary missions at regional competitions will be at a disadvantage. CanSat Ireland teams are expected to receive live data from their CanSat at their ground station. Teams should allocate work between team members to ensure participation by all team members. Instructions for what is expected of each team during the regional competitions will be provided by their TU contact.

Note: While certain elements of the competition will not be graded at a regional level it is advisable that teams design their CanSat with the National Final in mind. For instance, at the CanSat Ireland National Final each CanSat may be launched by rocket, and therefore a parachute will be required. Parachutes are not required at the regional competition but will be required at the National Final, so work on their design and integration should be demonstrated. At all levels of the competition CanSat Ireland teams are expected to demonstrate that their CanSat can receive live data at a ground station, data should be recorded at least once every second.

At the regional competitions, each team's CanSat will be subjected to a controlled ascent and descent. The CanSat must be fitted with an eye bolt to allow for alternative means of deployment. The CanSat must take measurements and send data to the ground station (laptop) as it descends. After collecting and analysing their data, the CanSat teams make a 10-minute presentation to a judging panel, 2 minutes of which can be a pre-recorded video presentation. Students will be expected to demonstrate their workload and that the CanSat is in working order. A further 10 minutes per team will be allocated for Q & A. Teams will be expected to present and explain labelled graphs of the data received from their CanSat tests.

Qualification to National Final

If there are 7 or more teams participating in the CanSat Ireland regional competition (i.e., teams that meet all criteria and make a presentation to the judging panel) then 2 teams from that region will qualify for the CanSat Ireland National Final. If there are 14 or more teams participating at a regional competition, then 3 from that region will progress. For regions with 6 or fewer teams competing in the regional competition 1 team will qualify for the National Final.

For a team to proceed from regional competition to the CanSat Ireland National Final, a minimum of 3 teams must participate in the regional competition i.e., present to judging panel.

CanSat Ireland National Final

The CanSat Ireland National Final will take place over two days at the end of April/start of May at Emo Court, County Laois. On May 1st, presentations will be made at the Killeshin Hotel, Portlaoise, Co Laois.

Between March and May (i.e., after regional competitions and prior to national final) under the supervision of the college mentors, the qualifying teams will carry out technical work on their CanSats applying the procedures used in the typical lifecycle of a real space project, which are:

- Selection of mission objectives;
- Definition of technical requirements necessary to achieve these objectives;
-
- Design of hardware and software;
- Design of ground station/ground telecommunication system;
- Documented Design Reviews, leading to design refinement;
- Integration and testing of the CanSat;
- Reporting

At the CanSat Ireland National Final it is intended that CanSats will be launched via rocket. The parachute **must** fit within the available volume that extends 4.5 cm along the CanSat's radial axis (Height). Parachutes that fail to fit within the allocated volume will not be able to launch. The CanSat **must** also be fitted with an eye bolt to allow it to be tethered in case an alternate launch method is used.

Similar to the regional competitions, each team must analyse their launch data and make a 10 minute presentation with appropriately ***labelled*** graphs to a judging panel. Students may use a video, of up to 2 minutes in length, as part of their presentations but with 15 minutes for judges' questions, and a requirement to increase focus on the secondary mission.

The judges will evaluate the CanSat Ireland teams based on their technical, educational, teamwork and outreach work. Teams competing in the CanSat Ireland National Final will be asked to submit a Critical Design Review (CDR) report in advance of the national final.

What is the Critical Design Review (CDR) report?

The CDR report is a technical document that ensures that the design can meet the stated performance requirements, taking into account all the system constraints. Compiling the CDR report allows student teams to evaluate the detailed design effort, determine readiness for hardware fabrication and for software coding, and establish the final configuration of the secondary mission.

The CanSat CDR report must contain:

- A demonstration that all the requirements stated in the guidelines have been fulfilled.
- Selection of Mission Objectives.
- Definition of technical requirements necessary to achieve these objectives.
- The design specifications needed to fulfil the secondary mission.
- Results of the completed requirements verification tests.
- Show evidence of tests for each aspect of the CanSat and the decisions made based on them.
- Summary of all work done to date (progress report).
- Description of CanSat mission, system and functionalities.
- Detailed budget.
- Outline of project schedule.

Page limits

Maximum page limits for the Critical Design Review report is - 25 pages (plus appendices).

The CDR report must be submitted to david@niamhshaw.ie no later than 5pm IST on 25th April 2026, with the name of the team (in the following example, "TeamA" should be replaced with the team name) and of the document submitted clearly written in the subject line (e.g. "*Team A_ CanSat CDR report*"). The document should be attached in a pdf format with the following file name format: *Team A_ CanSat CDR report.pdf*. The report can be submitted earlier. This report will be submitted to the National Final Judges as part of the Final Competition evaluation.

3 MISSION OVERVIEW

The CanSat Ireland competition is designed to simulate all aspects of a real satellite mission, including design, development, testing, launch, operations, and data analysis, by means of teamwork.
The CanSat must be flight-ready upon arrival at the launch campaign.

The rocket launch

A model rocket may launch the CanSats at the National Final.
Rockets used for CanSat launches can vary in capacity and specifications.

The rocket would deploy its parachute at apogee, which is reached between 8 and 15 seconds after take-off. Just after the apogee (0 – 2 seconds later), the CanSats would separate from the rocket and

descend individually with their own parachutes. The CanSats are usually found within 1 km of the launch site. However, recovery of the CanSats cannot be guaranteed.
During the flight, the rocket can reach a maximum acceleration of 20g.

Drone Launch:
At the CanSat Ireland Regional and National finals CanSats may undergo a controlled ascent/descent via drone. With the exception of the parachute, specifications remain the same.

Primary and Secondary CanSat Ireland missions

Primary mission
The team must build a CanSat and program it to accomplish the following compulsory primary mission:

To measure, on ascent and during descent, the following parameters:

- **Air temperature**
- **Air pressure**
- **Telemetry transmission to the ground station at least once every second.**

During the post-flight analysis, it must be possible for the team to analyse the data obtained (for example, make a calculation of altitude) and display it in ***labelled*** graphs (for example, altitude vs. time and temperature vs. altitude).

The primary mission **must take priority over secondary missions**. Failure to complete the primary mission will incur a significant penalty from the judging panel.

Secondary mission
The secondary mission of the CanSat must be selected by the team. Teams can take ideas from real satellite missions, or collect scientific data for a specific project, make a technology demonstration for a student-designed component, or any other mission that would fit inside the CanSat and show its capabilities.

Teams should brainstorm their own mission objectives, ideas, and constraints in order to try to define their mission. The student teams are free to design a mission of their choice, as long as they can demonstrate it to have some scientific, technological, or innovative value. Teams should also keep in mind the limitations and requirements of the CanSat mission, and consider the feasibility (both technical and administrative in terms of time and budget) of their chosen mission.

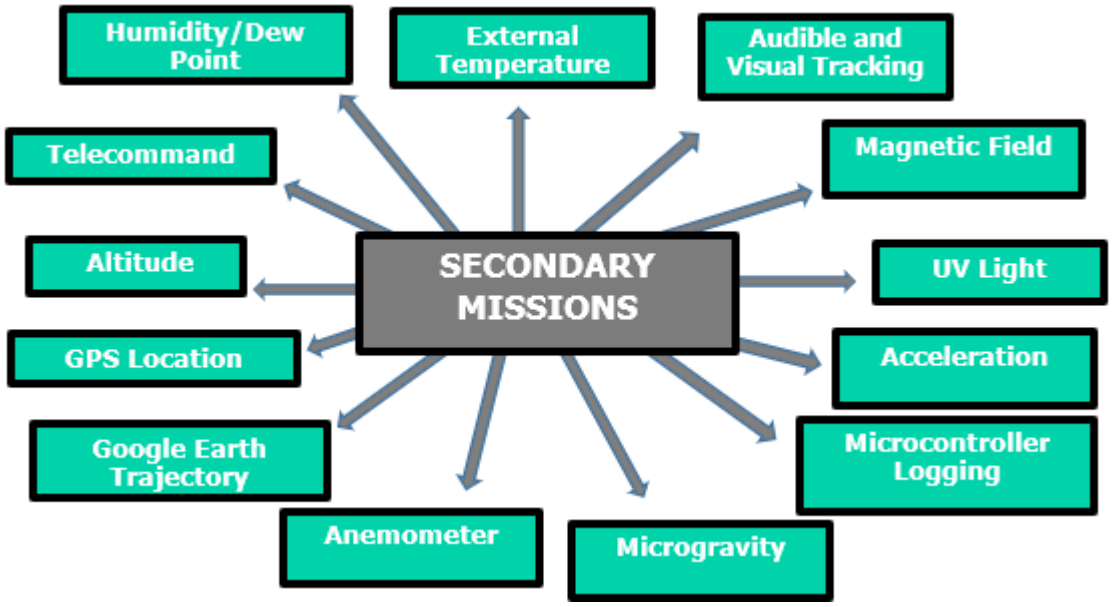


Figure 2 Potential Secondary Mission Options, courtesy of Kevin McDermott, TUS Athlone

Teams are invited to take inspiration from ESA's missions for designing their own secondary missions, which could form the basis of a real space mission.

Some secondary mission examples:

1. **Advanced telemetry**: After release and during descent, the CanSat measures and transmits additional telemetry to that required for the primary mission, for example:
   Acceleration
   GPS location
   Radiation levels

2. **Telecommand**: During descent, commands are sent from the ground to the CanSat to perform an action, such as switching a sensor on and off, changing the frequency of measurements, etc.

3. **Targeted landing**: The CanSat navigates autonomously with a control mechanism that controls a parafoil, for instance. The objective is for the CanSat to land as close as possible to a fixed target point on the ground after it has been released from the rocket. This mission is an advanced telemetry/telecommand mission.

4. **Landing system**: For this mission, an alternative safe landing system for the CanSat would be deployed, such as a bespoke parachute or airbag.

5. **Planetary probe**: A CanSat can simulate an exploration flight to a new planet, taking measurements on the ground after landing. Teams should define their exploration mission

and identify the parameters necessary to accomplish it (e.g. pressure, temperature, samples of the terrain, humidity, etc.).

Figure 3 Student Teams Participating in CanSat National Final Competition 2025

CanSat requirements

The CanSat hardware and mission must be designed following these requirements and constraints

i. **All the components of the CanSat must fit inside a standard soft drink can (115 mm height and 66 mm diameter**), with the exception of the parachute. Radio antennas and GPS antennas can be mounted externally on the top or bottom of the can, depending on the design, but not on the sides.

ii. **The rocket payload area has 4.5 cm of space available per CanSat, along the can's axial dimension (height), which must accommodate all external elements including: parachute, parachute attachment hardware, and any antennas**.

iii. The antennas, transducers and other elements of the CanSat **cannot** extend beyond the can's diameter until it has left the launch vehicle.

iv. The mass of the CanSat must be between 300 grams and 350 grams. CanSats that are lighter must have additional ballast fitted to reach the 300 grams minimum mass limit required.

v. Explosives, detonators, pyrotechnics, and flammable or dangerous materials are strictly forbidden. All materials used must be safe for the personnel, the equipment, the public, and the environment. Safety Data Sheets (SDS) will be requested in case of doubt.

vi. The CanSat must be powered by a battery and/or solar panels. It must be possible for the systems to be switched on for four continuous hours.

vii. **The battery must be easily accessible in case it has to be replaced/recharged**.

viii. **The CanSat must have an easily accessible master power switch.**

ix. Inclusion of a retrieval system (beeper, radio beacon, GPS, etc.) is recommended.

x. For National Finals the CanSat should have a recovery system, such as a parachute, capable of being reused after launch. It is recommended to use bright coloured fabric, which will facilitate recovery of the CanSat after landing.

xi. The parachute connection must be able to withstand up to 500 N of force. The strength of the parachute must be tested, to give confidence that the system will operate nominally. Test results are required for the CDR Report.

xii. For recovery reasons, a maximum flight time of 120 seconds is recommended. If attempting a directed landing, then a maximum of 170 seconds flight time is recommended.

xiii. A descent rate between 8 and 11 m/s is recommended for recovery reasons. However, the CanSat's descent speed must not be lower than 5 m/s or higher than 12 m/s for safety reasons. Additionally, the airfield or weather conditions might determine additional mandatory restrictions on the velocity.

xiv. The CanSat must be able to withstand an acceleration of up to 20 gs. Test results are required for the CDR.

xv. The total budget of the final CanSat model should not exceed €500. The kit as supplied is valued at €125. Ground Stations (GS) and any related non-flying item will not be considered in the budget. More information regarding the penalties in case of exceeding the stated budget can be found in the next section.

xvi. In case of sponsorship, all the items obtained should be specified in the budget with the corresponding costs on the market at that moment.

xvii. The assigned frequency must be respected by all teams in the National Launch Campaign. The range of allowed frequencies and will be communicated in due time. It is recommended that teams pay attention to the design of the CanSat in terms of hardware integration and interconnection, so the radio frequency can be easily modified if necessary. **Teams must be able to demonstrate compliance in real time.**

xviii. The CanSat must be flight-ready upon arrival to the launch campaign. **Delays to the schedule will not be permitted to ensure that all teams are afforded fair time for a launch window and to ensure fairness in respect of other team's energy availability.** A final technical inspection of the CanSats will be done by authorised personnel before insertion into the rocket.

xix. **At finals, teachers/mentors must remain in a designated observation area and may not assist competitors in the field.**

4 EVALUATION AND SCORING

For CanSat Ireland Regional and National competitions, teams will be evaluated based upon the scoring system outlined below. The decision of the judging panel at Regional and National competitions is final. Regional competition winners will compete at the National Final. At the National Finals 1st, 2nd and 3rd place awards will be allocated.

Scoring

A panel of invited judges will select the overall winners from the competing teams. Performance in the following areas will be evaluated: Technical achievement, Scientific Value, Communications and Professional competencies.

Technical achievement

The Judging Panel will take into account how the teams obtained the results, how reliable and robust the CanSat was, and how the CanSat performed. Innovative aspects of the project will be judged (e.g., the tools selected, and the hardware/software used).

The aspects evaluated will be:

- **Mission's technical complexity:** The CanSat's technical level, understanding of the technical concepts and the originality of the engineering aspects of the mission.
- **Performance of the Primary mission:** The CanSat's technical performance in terms of deployment and data collection for the Primary Mission.
- **Performance of the Secondary mission:** The CanSat's technical performance in terms of deployment and data collection for the Secondary Mission (National Final only).

Scientific Value

The scientific value of the teams' missions and the teams' scientific skills will be evaluated. This includes the scientific relevance of the mission, the quality of the technical reporting (both written and oral) and the team's scientific understanding that will be assessed from the team's ability to analyse and interpret results appropriately.

The aspects evaluated will be:

- **Scientific relevance:** Assessment of whether measurements are done with a clear and well-founded scientific purpose, the extent to which the CanSat is used in an original way and if the data collection is appropriate for reaching the objective.
- **Scientific understanding:** Level of understanding of the scientific principles that underlie the project.
- **Technical reporting:** Ability to summarise with clarity and provide a readable and complete Critical Design Review report. The proper labelling of the graphs and use of the correct units and the ability to present scientifically sound data and interpretations during the launch campaign (National Final only).

Professional Competencies

The Judging Panel will assess the team's collaboration and coordination, adaptability and communication skills.

The aspects evaluated will be:

- **Teamwork:** Collaborative effort of the team in order to complete the tasks in the most effective and efficient way.
- **Adaptability:** Attitude towards continual improvement and ability to adapt to new conditions, both from the Regional competition towards the National Final Competition.
- **Communication:** Oral presentation skills, the ability to provide a captivating presentation involving confident speaking skills and a visually appealing presentation.

Communications/Outreach

As with all space missions the CanSat mission will require a supporting communications plan which will identify a target audience (e.g., school, local community, local industry/businesses, local primary schools, parents, peers etc) and a strategy for reaching these audiences. A combination of traditional/social media may be used. Web pages, blogs, presentations, promotional material, competitions, and media coverage will be taken into account.

Marking scheme

The overall balance between the above items to be evaluated is as shown in the table.

1. SCIENCE VALUE	35%
2. TECHNICAL ACHIEVEMENT	35%
3. PROFESSIONAL COMPETENCES	20%
4. OUTREACH / COMMUNICATION	10%
TOTAL	**100%**

Penalties

Teams' final scores will be penalised in the event of late submission of the CanSat Critical Design Review in advance of the National Final. Similarly, penalties will be applied to teams that exceed the CanSat Ireland budget of €500. Note, the kit as supplied is worth €125 leaving a balance of €375 for the team's maximum budget.

5 FUNDING

For the National Final, overnight accommodation and food costs will be covered for a maximum of six students and two teachers per participating team.

Teams are responsible for obtaining alternative sponsorship for any additional CanSat hardware (beyond the kit supplied), as well as the team's travel expenses to and from the CanSat Ireland National Final which will be held in Emo Court (launches) and Killeshin Hotel, Portlaoise (presentations).

For the National winning team attending the learning and celebration event, ESA will sponsor the accommodation, meals and local transportation expenses for up to 6 students and 2 teachers (if justification is provided), including up to 300 euro per person in travel costs.

6 CONTACT

All questions and expressions of interest should be directed to one of the following:

Áine Flood **ESERO Ireland Manager** **Education & Public Engagement** **Research Ireland** Three Park Place, Hatch Street Upper, D02 FX65 Email: aine.flood@researchireland.ie Direct: +353 86 8246125	**Dr. Niamh Shaw Bushman** **Project Manager for CanSat 2025-2026** 201 Ard Easmuinn Dundalk, Co. Louth A91 HN50 Email: niamh@niamhshaw.ie Phone: 086 348 6529

Links to Further information

- ESERO Ireland
- ESA Education CanSat Portal
- CanSat - ESERO | European Space Education Resource Office
- CanSat – European Space Agency
- Ireland – CanSat National Competitions

Team Online Training Modules

- Getting started with CanSat
- Meet Arduino
- Design your parachute – CanSat
- Communicating with radio

- Meet the Experts – Episode 1: Systems Engineering
- Meet the Experts – Episode 2: On-Board Computer
- Meet the Experts – Episode 3: Radio Communication
- Meet the Experts- Episode 4: Parachute Design
- Meet the Experts – Episode 5: Life After CanSat

Social Media:

X/Twitter: @Esero_ie / @Researchirel
Instagram / Facebook / TikTok: @researchireland
Bluesky: @researchireland.ie

Hashtag: #CanSatIrl2026