



Luxembourg



# SPACE AND SCIENCE FOR SCHOOLS

Secondary



Training, school projects and inspiring educational resources to use in the classroom



# INSPIRING TRAININGS

As an educational network, ESERO supports you in integrating science into your teaching in a fun and interactive way.

Our training courses provide practical tools to engage your students, involve them actively in their learning and spark their scientific curiosity.

Each year, we offer continuing professional development courses specially designed for teachers and educators. Held in Luxembourgish, French and English, all trainings are accredited by IFEN.

Free IFEN training courses at your school during your pedagogical days !



[contact@esero.lu](mailto:contact@esero.lu)





# OUR TRAINING CATALOGUE

## **Chemistry and Space**

Study of lunar water: filtration, distillation, states of matter, phase transitions, combustion reactions.  
Lunar energy: solar power, voltaic cells, electrolysis and fuel cells.

## **Space Biology**

Origin of life on Earth, possibly via comets and the study and observation of extremophiles such as tardigrades (water bears).

## **Coding with Astro Pi**

Teach the basics of coding by sending a message to the International Space Station.

## **Space Particles and Light**

Observe and study the electromagnetic spectrum by exploring infrared radiation and its use through satellite imagery. Build a cloud chamber to observe high-energy cosmic particles and a spectroscope to analyze the composition of exoplanets.

## **Space Physics: Forces**

Use educational resources to illustrate the physical forces involved in astronomy and space exploration.

## **CanSat – Build a Satellite in a Can**

Learn how to support your students in taking part in the CanSat project.

## **Astro Pi Mission Space Lab – Measure the Speed of the ISS!**

Learn how to take part in this project with your students. Your mission: create a program capable of calculating the ISS's speed using the onboard sensors and camera.

## **Biology – Small Creatures, Big Wonders!**

This activity highlights microorganisms such as flatworms and tardigrades, which can survive in extreme conditions. By studying them, you'll discover how some living organisms can inspire adaptation to the space environment.

## **How to Talk About Climate Change with Students**

This training helps educators convey the scientific foundations of climate change to young people, raising awareness and encouraging them to take action. It also focuses on effective communication strategies for addressing this complex topic and engaging students in decarbonization and sustainable actions.



# PROJECTS



## CLIMATE DETECTIVE TEENS

Are your students interested in environmental issues? This project allows them to conduct research on a topic of their choice with support from recognized experts. Ready-to-use materials can be provided free of charge.



## CANSAT

Your students will build a mini satellite the size of a soda can and get the chance to launch it on a real rocket! The challenge is to equip this mini satellite with the necessary systems, such as sensors and radio communication, so that it can carry out scientific experiments and safely land back on Earth after a 1,000-meter descent by parachute.



## ASTROPI MISSION SPACE LAB

This project invites students to take on an exciting challenge: following a tutorial to write a Python program capable of, among other things, calculating the speed of the International Space Station (ISS) by taking their own photos from space!

# MOTIVATING SCHOOL ACTIVITIES

## MOON CAMP

Through creative activities and hands-on projects, your students will dive into the world of space exploration and imagine what life would be like for an astronaut on the Moon or on Mars.

By becoming true space architects, your students will discover the challenges and key issues of space science in a fun and engaging way.



## WATER ROCKET CHALLENGE

This project involves building and launching a rocket powered by water, aiming to land as close as possible to a target located 70 meters from the starting point. In teams of 2 to 4, participants build their own water rocket with the help of our educational guides and launch it three times, adjusting different variables each time.





# CLIMATE DETECTIVES TEENS



Age group : 14 -19 years

Timeline : September to April



Free

This project invites your students to explore and protect the environment by acting as researchers. They will analyze Earth observation data or carry out field measurements to propose solutions to environmental challenges, with support from recognized experts in the field. Participants may receive, free of charge, a weather station, a high-quality rain gauge or a complete water quality testing kit.

## ☀ Why participate?

By taking part in the Climate Detectives project, your students will come to understand that Earth's environment is a complex and ever-changing system and they will learn the importance of respecting it.

Students will also have the opportunity to learn from scientists and Earth observation experts through videos, webinars and other nationally organized events.

## 👤 How to participate ?

Our Climate Detectives guide offers a series of steps and approaches that you can use with your students to ensure that participation in the project reflects the scientific method.

The teacher guide is divided into three phases, each corresponding to a stage of the project:

- Phase 1 – Teams identify an environmental or climate-related problem.
- Phase 2 – Teams investigate the issue using real satellite images or their own ground-based measurements.
- Phase 3 – Teams propose actions to "make a difference" and share their findings.

Climate Detectives is a project-based activity designed to be carried out during the school year, from September to April.

### Practical informations:

- Free of charge
- ESA certificate of participation
- €400 budget provided to each team
- The best project will have the chance to visit the European Space Research Institute (ESRIN) in Italy.
- The second-place project will win a nature photography workshop with a professional photographer.
- The third-place project will receive tickets to the Butterfly Garden in Grevenmacher.

For more information, visit <https://climatedetectives.esa.int/>



[www.esero.lu](http://www.esero.lu)

[contact@esero.lu](mailto:contact@esero.lu)



# CANSAT



Age group : 15 -19 years

Timeline : From September to May



A CanSat is a "satellite" the size of a soft drink can, developed, built and programmed by student teams. This mini-satellite is launched to an altitude of 1 km by a rocket and then descends to the ground using a parachute. During its descent, the satellite performs measurements and other tasks it was designed for.

## Primary Mission

The satellite will measure air pressure and temperature. Based on atmospheric pressure variations, it will determine altitude and descent speed.

## Secondary Mission

The satellite performs a mission defined by the student teams themselves. This is a chance to unleash their scientific and technical creativity.

## ☀ Why participate?

This project offers students a wide range of learning opportunities:

1. Hands-on experience in scientific and technical subjects
2. Teamwork and collaboration
3. Introduction to the theme of space exploration
4. Creativity and innovation
5. Data analysis skills
6. Development of soft skills such as project management and public speaking, preparing students for professional life
7. Fun and inspiration
8. Career opportunities in the Luxembourg space sector

## 😊 How to participate ?

To take part in the CanSat Challenge, simply register online before the end of October at [www.cansat.lu](http://www.cansat.lu)

## Practical informations:

- Free basic CanSat kit
- €500 budget granted to each team
- Participation certificate for all students
- Many prizes to win (goodies, bracelet, cap, mug...)
- The best team will be invited for a 2-day visit to the European Space Research and Technology Centre (ESTEC) in Amsterdam

For more informations, visit [www.cansat.lu](http://www.cansat.lu)



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# ASTRO PI - MISSION SPACE LAB



Age group : 12-19 years

Timeline : Septembrer - April



Astro Pi Mission Space Lab invites young people to take on an exciting challenge: write a Python program to calculate the speed of the International Space Station (ISS) using their own photos taken from space!

This educational project offers a hands-on experience in STEM (science, technology, engineering, and mathematics), encouraging creativity, problem-solving and teamwork.

Submitted programs will be executed in space and each team will receive the data collected along with an official certificate, recognizing their contribution to space research.

## ☀ Why participate ?

Mission Space Lab invites young people to run their own code on the International Space Station (ISS), giving them an unforgettable opportunity to conduct real science in space. Teams write a Python program that captures sensor data from Raspberry Pi computers on board the ISS to use in their very own space science projects.

Through this project, students develop skills in programming, data analysis and problem-solving, while exploring scientific concepts related to motion and orbital mechanics.

Programs will be executed on the ISS and participants will receive certificates along with the data collected from space.

Mission Space Lab is a unique educational experience that allows young people to conduct a real scientific mission and discover the technologies used in space exploration.

### Practical informations:

- Free participation
- Participation certificate emailed to each student
- Many prizes to win (e.g. a motor glider flight)

For more information, feel free to contact us.



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# MOONCAMP



Age group :12 - 16 years

Timeline : September to end of July



Free

Join the Moon Camp and bring space into your classroom!

Take on a new role as space adventurers with your students and imagine your own lunar or Martian base. You can, for example, draw or design a habitat on the Moon's surface or go beyond the Moon and explore other worlds in our solar system.

Choose the topic and format that best suit your class and let your creativity shine!

## ☀ Why participate ?

Space is a highly motivating topic for students. Moon Camp offers an open format, with no restrictions on the tools or design techniques used. Moreover, Moon Camp fits into the primary school curriculum, covering subjects such as art & design, science discovery, and human biology.

## 😊 How to participate ?

In the future, to allow astronauts to stay on the Moon or other planets for extended periods, new infrastructures will need to be developed to tackle major challenges. These include protection from radiation and meteorites, energy production, water extraction and recycling, food production and much more.

Your project can be presented in the format of your choice:

- A lunar or Martian base in the form of a drawing
- A lunar or Martian base built with LEGO
- A lunar or Martian base using augmented reality

### Practical informations:

- Completely free activity
- We can come and do the activities with you in your classroom.
- Each participating student receives:
  - a Moon Camp sticker
  - a certificate of participation

For more information, feel free to contact us.



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# WATER ROCKET CHALLENGE



Age group : 12 - 19 years

Timeline : From September to May



This project involves building and launching a rocket using water as a propellant, aiming to get as close as possible to a target located 70 meters from the starting point. In teams of 2 to 4, participants build their own water rocket with the help of our educational guides and launch it three times, adjusting various variables such as air pressure, the amount of water or the launch angle to get as close as possible to the 70-meter target.

## ☀ Why participate ?

Water rockets are an excellent educational tool that combines fun with scientific learning.

Building and launching them allows students to explore key scientific concepts such as:

- *Physics and motion:* A hands-on illustration of Newton's third law (action-reaction) and the forces (thrust, drag, gravity) that influence a rocket's trajectory.
- *Aerodynamics:* The impact of fins, the nose cone and overall shape on stability and air resistance.
- *Experimentation and problem-solving:* Developing critical thinking through observation, data analysis and prototype improvement.
- *Teamwork:* Collaborating and exchanging ideas to design, test and optimise rockets.

This interactive project sparks curiosity and promotes science learning in a playful and engaging way for all ages.

## 😊 How to participate?

The following conditions must be met for a team's registration to be accepted:

- Teams must consist of 2 to 4 students aged 8 to 19.
- Teams must be made up of students attending a primary or secondary school in Luxembourg.
- Each team must be supervised by an adult mentor.

Team members do not need to attend the same school. The mentor must accompany the students on launch day.

You can register directly online on our website: <https://www.esero.lu/projets-scolaires/water-rocket-challenge/>

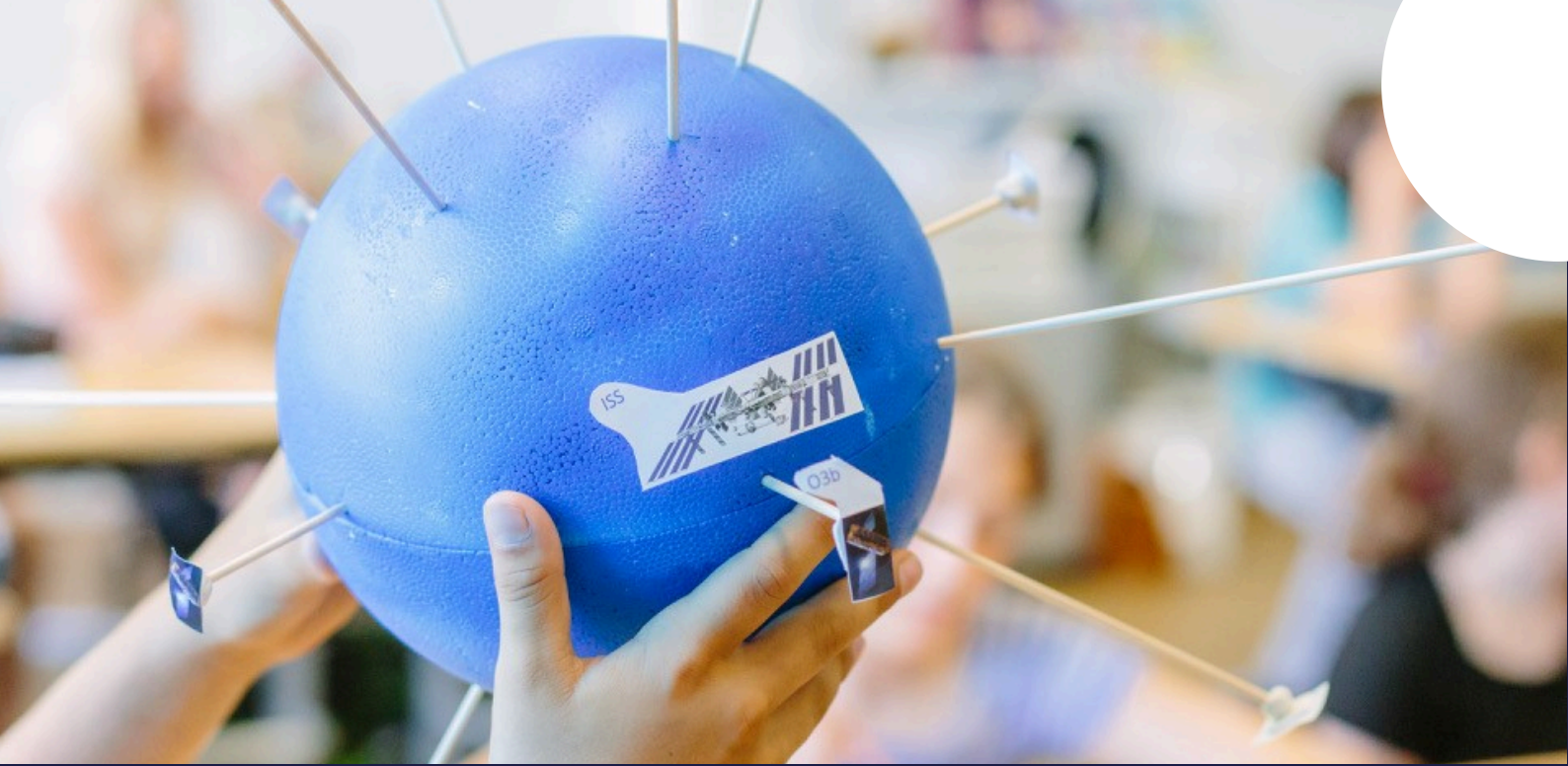
## Practical informations:

- Completely free activity
- Equipment provided to teams: a bottle nozzle, a rocket launcher and a bike pump
- Attractive rewards:
  - Trophy for the top 3 teams
  - ESA stickers
  - The winning team will receive a water rocket launcher worth €100

For more information, feel free to contact us.



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# SPACE GOES TO SCHOOL

In the ever-evolving world of aerospace, a constellation of exciting careers awaits exploration. Whether you're drawn to engineering, science, health or the technical side of things, the aerospace sector offers a galaxy of opportunities.

Welcome to Space Goes to School your gateway to the cosmos!

Imagine inviting an experienced aerospace expert into your classroom, someone whose passion for space knows no bounds. Through an interactive lesson, they will spark students' curiosity and shine a light on the fascinating world of space-related careers. It's an invitation to go beyond the ordinary and step into the extraordinary.

Age group: 12 - 19

Duration: 50 minutes or 100 minutes

Date: To be arranged according to your availability

Languages: LU, FR, DE, EN

Price: Free of charge

For more information, visit [esero.lu/sgtsen](https://esero.lu/sgtsen)



[www.esero.lu](https://www.esero.lu)



# ABOUT ESERO LUXEMBOURG



ESERO Luxembourg is a project by the Luxembourg Science Center, funded by the European Space Agency (ESA), the Luxembourg Space Agency and the Ministry of National Education, Children and Youth.

Our mission is to spark students' interest in science and technology by using space as an engaging and inspiring learning context. In this way, space becomes more than just a source of fascination it becomes an integral part of their daily lives and educational journey.



## CONTACT US !



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