AIRBUS FOUNDATION

in partnership with AUTODESK

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MOON CAMP

PIONEERS 2020/21

GUIDELINES

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→ INTRODUCTION

Moon Camp is an education project run in collaboration between ESA and the Airbus Foundation, in partnership with Autodesk. It uses innovative learning technologies to challenge students to design their own Moon settlement with a 3D modelling tool. It features preparatory classroom activities that focus on learning-by-design and science experimentation.

Teams will develop a number of interdisciplinary experiments to explore the extreme environment of space and understand how astronauts could live on the Moon. Afterwards they will 3D design their Moon Camp using Fusion 360 and write a report explaining their project. Their design should be adapted to the Moon environment and make use of local resources and provide protection and/or living and working facilities for the astronauts. Participating teams will compete for the Moon Camp Pioneers prize for best project.

The Moon Camp Challenge is divided into three separate categories featuring different levels of complexity: **Moon Camp Discovery (beginners), Moon Camp Explorers (intermediate) and Moon Camp Pioneers (advanced).**

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→ Overview

In the future, to enable astronauts to stay on the Moon for long periods of time, new infrastructures must be developed to overcome important challenges. Such challenges include protection from radiation and meteorites, energy production, the extraction and recycling of water, food production and much more. The Moon Camp Challenge invites students to explore and decode some of the complexities future astronauts may face.

In Moon Camp Pioneers each team's mission is to design a 3D Moon Camp able to sustain at least 2 astronauts and keep them safe from the hazards and vacuum of space. Teams will also have to submit a report about their project.

The Moon Camp should include:

- Use of local resources (e.g. lunar soil, water ice)
- Technological solutions (e.g. power source, recycling system, food growth chamber)
- Protection (from meteorites and radiation)
- Living and working facilities for the astronauts.

→ Timeline

Registrations are open from 12 January 2021 to 25 March 2021.

→ Evaluation

A jury composed of ESA, Airbus Foundation and Autodesk experts will select the winning teams based on the quality of the design and report submitted. The design should be adapted to and feasible for the lunar environment, making use of natural features. The report must explain the design choices and overall habitability and functionality of the Moon camp. The teams should include their scientific reasoning for the choices presented.

Innovation, creativity and inventiveness (25%): How well does this new design "push the envelope" and enhance user experience?

Software skills (25%): How well does the student design demonstrate technical skills and quality of design based on technical requirements?

Suitability to purpose (25%): How well does the design prove useful and suited to serving its purpose of providing a functional Moon Camp?

Online Form (25%): How well does the report explain the reasoning for design choices and overall habitability of the Moon camp?

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→ Who can participate?

To participate in the Moon Camp Pioneers, teams should be comprised of 2 to 6 students and must be supported by a teacher or educator. The project **must** be submitted by the teacher or educator.

Participation in Moon Camp Pioneers is open **worldwide*** to teams of students aged 15 up to (and including) 19 years old. Students attending a postsecondary/tertiary institution are not eligible to participate.

Students younger than 15 years old are allowed to join a team in Moon Camp Pioneers if at least half of the participants are within the specified age range.

Teams that participated in Moon Camp Discovery are also allowed to submit a project to Moon Camp Pioneers.

There is no limit to the number of teams a school or club can enter, but each student can only enter one team, and each team can submit one entry only.

* Moon Camp Challenge is open worldwide. In the framework of the current collaboration agreement between ESA and Airbus Foundation, if you apply from an ESA Member State*, Slovenia, Canada or Latvia your team will have to fulfill the following extra conditions:

- At least 50% of team members must be citizens of an ESA Member State, Slovenia, Canada or Latvia.
- Each team member must be:
  - Enrolled in a full time primary or secondary school located in an ESA Member State, Slovenia or Canada
  - or, be home-schooled (certified by the National Ministry of Education or delegated authority in an ESA Member State, Slovenia, Canada or Latvia)
  - or, be a member of a club or after-school group, such as Science Club, Scouts or the like.

* ESA Member States in 2020: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland and the United Kingdom.

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→ How to submit the project?

1. The team's 3D model must be created exclusively using Autodesk® Fusion 360. Submissions created in other software programs will not be accepted.

2. Projects must be submitted to the Moon Camp online platform: **www.mooncampchallenge.org**. The deadline is 25 March 2021.

3. By submitting the project, the participant agrees that their project will be shared on the Moon Camp platform. Participants accept that ESA Education, Airbus Foundation and partners have the right to use the entirety or parts of the project for outreach and education purposes.

4. Submissions must include:
   - the team's report explaining the project and design, written in English. The report should follow the online template.
   - at least one rendering or screenshot of the project as a .JPG or .PNG file from Fusion 360.
   - The team's design of their Moon Camp as a Fusion 360 file. Submissions must be submitted as one .F3D file or .F3Z file (maximum file size 50 Mb).

5. Each team must model all individual components of the design. It is not permitted to import existing CAD data into the design, with the exception of any files provided by Autodesk, ESA, or Airbus Foundation.

6. The team must be the sole author/owner of the project and all materials submitted to the Moon Camp Challenge. Projects sponsored or funded by third parties may not be used. No third party (including your school or project sponsors) should have any rights to materials you submit.

7. ESA and Airbus Foundation, at their sole discretion, reserve the right to disqualify submissions that do not follow the guidelines, or that contain messages that are deemed inappropriate or inadequate for the audience.

→ Questions

For any questions, consult the Moon Camp Challenge website **mooncampchallenge.org** or send an email to **moon.camp@esa.int**.

→ Useful links

Moon Camp Challenge platform
https://mooncampchallenge.org/

Fusion 360 – 3D Design tool
https://www.autodesk.com/products/fusion-360/students-teachers-educators

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→ Report template

Please complete your submission in English.

You have just landed on the Moon. It is a very harsh environment. But you discover that there are some natural resources that you can use on different locations on the lunar surface, such as water ice, regolith (lunar soil) and sunlight.

You now have to make some decisions about your Moon Camp.

Section 1 – Your Moon Camp

1.1. Describe your Moon Camp project. Write a short paragraph description of the project.

(maximum 250 words)

Section 2 – Living on the Moon

2.1. Where do you want to build your Moon Camp?Explain your choice.

(maximum 150 words)

2.2. How do you plan to build your Moon Camp? Describe the techniques, materials and your design choices.

(maximum 250 words)

2.3. The environment on the Moon is very dangerous for the astronauts. Explain how your Moon Camp will protect them.

(maximum 150 words per question)

2.4. Explain how your Moon Camp will provide the astronauts with:

(maximum 150 words per question)

a) Water
b) Food
c) Power
d) Air

2.5 Explain what would be the main purpose of your Moon Camp (for example: commercial, scientific, and/or tourist purposes).

(maximum 150 words)

Section 3 – A day on the Moon

3.1. Describe a day on the Moon for your Moon Camp astronaut crew.

(maximum 400 words)

Section 4 – Upload your files

4.1. Upload at least one rendering or screen capture of your team's project as a .JPG or .PNG file.

Because of data protection regulations the pictures should present only the project and not the team members.

4.2. Upload your Fusion 360 model project as one .F3D or .F3Z file

(maximum file size is 50 Mb)