

AGENCY

Human Space Physiology Training Course goes fully online for 2020 edition

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ESA's [Education Office](#) and [Space Medicine Team](#) have successfully adapted ESA Academy's Human Space Physiology Training Course to run online due to the COVID-19 pandemic. From 12 – 23 October 2020, 53 university students from 16 different [ESA Member States](#), [Slovenia](#) and [Canada](#) learned about life in space and the physiological adaptations associated with it.

18 experts from ESA and research institutes across Europe, including several universities, highlighted how current human spaceflight and Earth-based analogues such as long-term bed-rest and over-wintering in Antarctica are used to investigate underlying physiological changes. Understanding these changes is critical to help plan humanity's future exploration of the Solar System.

— Tutor session to discuss the group project

A Spanish student from Autonomous University of Madrid reported: "In spite of the challenges posed by the online format, this was much more than a course: it was a learning

experience where we could meet top-tier experts, and moreover, get to know students from diverse backgrounds with shared interests about life in space. After these two weeks, I know for sure that space medicine is not sci-fi anymore – thank you ESA for broadening our horizons!"

The course began with students learning about the fascinating history of human spaceflight. This led onto how the environment of space differs from life on Earth, presenting novel challenges for space exploration. Physiological systems were discussed, examining how underlying mechanisms respond to being in space. The field of human spaceflight is supported by many other areas of expertise, so students received a grounding in how nutrition, exercise, and psychology all play a role in supporting crew during their space missions. Two additional elements trialled on the course last year and retained after positive student feedback were: adaptation of the immune system in space, and operational space medicine delivered by an experienced ESA flight surgeon.

This solid foundation of knowledge propelled the students into the second week, which was spent working on a group project. Working remotely in teams of five or six, the students

— Students presenting the outcome of their group project

were tasked with investigating the challenges of human spaceflight in future missions beyond the International Space Station.

The teams were assigned a topic from a wide range of complex problems and, with the support of expert tutors, asked to consider approaches including identifying knowledge gaps and devising innovative solutions. The groups then presented their findings to their fellow students and experts on the final day. The topics included:

- **One-size-fits-all:** Evaluate the operational impact of imposing crewmember size restrictions for the Lunar Gateway, a planned mini-space station.
- **A Sense of Perspective:** Evaluate potential orientation, hand-eye coordination and decision-making issues that arise from living and working in micro-gravity, and approaches to support safe and productive operation of vehicles on the Lunar surface.
- **Doing the Lunar Locomotion:** Evaluate approaches that could enable safe and productive Lunar Extra Vehicular Activities.
- **Research Rocks!:** Evaluate the challenges, risks and considerations for surface geological / biological sampling selection and collection.
- **Beyond Van Allen:** Evaluate the risks and approaches to limit the effects of radiation exposure for one-year missions to the Lunar Surface.

— Expert lecture about physical exercise and reconditioning in spaceflight

Some student groups also took on an optional creative challenge: designing their own team badge! This is common among teams working in the space sector, and helped the