

AGENCY

ESA Academy's Ladybird Guide to Spacecraft Communications Training Course 2020 gives students new perspectives

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30 Bachelor, Master and PhD students from 11 different ESA Member and Canada have successfully completed the fifth edition of ESA Academy's Ladybird Guide to Spacecraft Communications Training Course. Taking place between 18 – 21 February 2020, and hosted at [ESA Academy's Training and Learning Centre](#), ESEC-Galaxia in Belgium, the course was delivered by a senior ESA engineer from the [Operations Department](#) of [ESOC](#).

Also attending were 20 students who were unable to be present in person, but rather participated via Livestream. Explained one of these, a Spanish student from ISAE-SUPAERO, *"this course has been not only a hugely educational experience with the impressively good trainer, but also a really interesting and challenging one that has allowed me to meet some truly interesting people. The fact that the course was livestreamed did not detract at all from its usefulness or my enjoyment of it, and one can only hope to be involved in similar activities in the future."*

— ESA trainer introducing some traps to avoid when operating a spacecraft

getting lost in details, with mathematical and analytical perspectives kept to a minimum. The course was peppered with easily understandable examples and accessible diagrams. A secondary objective was to "fill the gap" between spacecraft operators and telecommunications designers. Often designers have difficulty considering the operators' points of view, which is a challenge that needs to be addressed when designing a ground station or telecommunications subsystem of a spacecraft.

Content was split into six key spacecraft telecommunications topics:

- Signal modulation and demodulation
- Channel coding
- Communication protocols
- Transmission
- Signal reception
- An overview of some real ground stations

The trainer has many years of experience with spacecraft operations, and was able to supply ample real-life examples of spacecraft missions and operational scenarios, bringing students close to the actual problems that may be

The course's objective was to familiarise students with the fundamental concepts that lie at the heart of spacecraft communications. The "Ladybird approach" was taken, meaning that lectures took an overview of topics rather than

— Team Atlas presenting their first ideas for the design of a communication chain for a hypothetical satellite mission.