

AGENCY

Ladybird Guide to Spacecraft Communications Training Course gets students thinking like spacecraft operators

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30 university students from 12 different [ESA Member States](#) have successfully completed the latest Ladybird Guide to Spacecraft Communications Training Course. Running from 5 – 8 February 2019, and hosted at ESA Academy's Training and Learning Facility, ESEC-Galaxia in Belgium, the course was delivered by a senior ESA engineer from the Advanced Concepts and Management Support Office of the [Operations Department](#).

This course was the fourth edition of ESA Academy's Ladybird Guide to Spacecraft Communications Training Course. The tried-and-tested aim remained: acquaint students with the fundamental concepts of spacecraft telecommunications. The "Ladybird approach" was used throughout, meaning that lectures avoided excessive mathematical and analytical detail, and were furnished with a wealth of real-life examples supplemented with easy to understand diagrams.

"When I arrived, I didn't know anything about communication systems in general," admitted a German student from the University of Stuttgart. "I enjoyed gaining so much knowledge through the lectures, the implementation in the simulation exercise, and the visit of a real ground station in ESEC-Redu, with so many interesting people from all over Europe. The combination of theory and application of spacecraft make this course incredibly fun and educational."

A secondary course aim was to "fill the gap" between spacecraft operators and telecommunications designers. Traditionally, designers cannot think "as operators", and this course offered participants an opportunity to use the "spacecraft operator point of view" when designing a ground station or a telecommunications subsystem of a spacecraft.

— Each team's understanding of spacecraft communications was challenged

The trainer has many years of experience with spacecraft operations, and as a result the teaching approach was filled with actual examples from spacecraft missions. . Students were challenged with real operational scenarios to bring them as close as possible to what the actual problems are during a real spacecraft mission.

Throughout the course students were introduced to various spacecraft telecommunications topics, including:

- Signal modulation and demodulation
- Channel coding
- Communication protocols
- Transmission
- Link budget for signal reception
- Ground stations

With a foundation of knowledge under their belts, the trainer turned up the heat with a challenging group exercise! The students were split into three teams: Taurus, Minos, and Step Safe. In these groups they had to produce a "Ladybird design" of a spacecraft. On the course's final day, they operated their craft in a virtual spacecraft communications scenario! Each team performed well in this simulation, putting into practice the lessons they had learned during the earlier lectures.

— The students visited ESEC-Redu

"This course is an unparalleled opportunity to learn about spacecraft communications," enthused a Spanish student from the University of Oviedo. "It is the perfect mixture of

education and entertainment in an exceptional environment."