

AGENCY

Students experience of miniature satellites with CubeSats Hands-On training

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CubeSats are highly versatile satellites built up by 1 or more units measuring just 10cm along each side. Learning how to best use these tools is a valuable skill, so [ESA Academy](#) has hosted the CubeSats Hands-On Training Week 2019. Running from 16 – 20 September 2019 at [ESA Academy's Training and Learning Facility](#), ESEC-Galaxia, Belgium, the event was attended by 26 university students from 15 different [ESA Member States](#) and Canada.

The Training Week had a clear objective: transfer hands-on knowledge to university students who are keen to start their own educational CubeSat initiatives, or who are already at the conceptual or preliminary design stage of a CubeSat project at university. To achieve this aim, ESA Academy assembled a team of experienced tutors to lead the course. These included ESA experts, the [Fly Your Satellite!](#) (ESA's educational CubeSat initiative) team, and two engineers from Theia Space (Universidad Politecnica de Madrid) delivering laboratory sessions with high-grade model CubeSats, called [Educational Satellite models](#) (ESATs).

The first day of the training week acquainted the students with the Fly your Satellite! programme. They were introduced to best practices in Systems Engineering, and then enjoyed their initial lab session during which they developed software code to control ESAT's payload: a thermal experiment carrying a heater and an LED. The exercise evolved from, first of all, being able to blink the LED, all the way to developing a simple controller for the heater.

"From the very beginning this training week far exceeded my expectations," said a Romanian student from the University Politehnica of Bucharest. "The lectures were full of interesting information and I like that we worked with real satellite subsystems. During the week I met a lot of great people and made new friends. I would definitely recommend this experience to anyone interested in starting his/her satellite engineering career."

— Students were introduced to the educational CubeSat opportunities open to them.

Tuesday began with an engrossing lecture on Software Engineering, which focussed on software architecture, development, and testing. Following on from this, a specialist in On-Board Data Handling (OBDH) explained the importance of having good structures in place to handle data, as the OBDH subsystem is responsible for managing the flow of information (data, telemetry, and telecommands) within the satellite. The students then practised applying their recently acquired knowledge by programming the ESAT to be receptive to their own customised telecommands, and to broadcast telemetry packets defined by the students themselves. Rounding off the busy afternoon, the students were able to take a tour of [ESEC](#) and the [PROBA](#) mission operations centre.

— Examining ESAT components.

The Training Week's third day commenced with a lecture on Electrical Power Systems (EPS). He first explained the