Spacecraft Operations

This intensive space course provides the skills and expertise about the process of designing and developing a small satellite space mission for satellite communications and gives you deep insights into business applications. From mission analysis and design to systems engineering, project management, and commercial innovation, the course combines the knowledge from academia and industry with hands-on training.

This course consists of 12 hours of live sessions with industry experts, during which students will learn about the fundamental aspects of the satellite industry. The course covers the mandatory requirements and constraints of fairings and last-mile systems, as well as the conditions that satellites are subjected to during the pre-launch and launch phases. Participants will also learn about the operational conditions that spacecrafts experience while in orbit. The course will provide an overview of systems engineering with a focus on operations, including the products and tools used by satellite operators, how they plan their interaction with spacecraft, and how they validate their procedures. The course will also introduce the communication elements between a space-ground link and will provide examples of actual procedures used during real operations.

On successful completion of this course, the students shall have a good understanding on:

- Pré-Launch and Launch Environment
- Spacecraft Operational Environment
- Spacecraft Operations Phases and Procedures
- Ground Segment Operations
- Telemetry Interpretation
- Real Mission Operations

Cronogram

Module	Schedule (GMT+1 – Lisbon)	Description & Objectives	Lecture
Welcome Day: Introduction & Get to Know	TBD	• Welcome Session • Introduction to projects • Ice Break and intros	TBD
M1: Pré-Launch and Launch Vehicle Environment	TBD	• Acoustic • Vibration • Acceleration • Mechanical Tests	TBD
M2: Spacecraft Operational Environment	TBD	• Solar Radiation Flux and Particle Radiation • Vacuum • Radiation Belts • Gravity and Magnetic Fields • Space Debris	TBD
M3: Systems Engineering and Spacecraft Operations	TBD	• Definition of Systems Engineering. • ECSS and CCSDS Standards for Spacecraft Operations. • Phases of mission operations (LEOP, Commissioning, Routine, Disposal). • Roles and responsibilities during all operational phases (Pre, during, post) • Products and Tools of Spacecraft Operators • Activities, Tasks, Schedule of Operations • Operational Validation Procedures	TBD

M4: Communications Segments	TBD	- Elements of a Space Link - TT&C System- Modulation, Coding, Carrier, Link Budget. - Signal Characteristics - Ground Segment and its Infrastructures (Control Rooms, Deep Space Networks, Ground - Station Networks) - Ground Segment LEOP and Routine Operations (Telemetry, Tracking and Command - Operations, Ranging, Doppler), and In-Orbit Testing - Space Link Extension Services	TBD
M5: Flight Experience Knowledge and Current Challenges	TBD	- Empirical data and failure. - Interpretation of Telemetry. - Mission Example. - Space Debris (Strategies for space debris mitigation) - D-Orbiting and Passivation - On-Orbit Servicing, In Orbit Demonstration and In orbit Validation - Active Debris Removal. - Cloud Computing	TBD

Notes:

1) Modules and lecturers can change depending on the availability of the lecturers collaborating with Spaceway.

* TBD stands for "to be decided".