IS440 - Space surveillance

From the Advanced Master TAS ASTRO (Space Systems Engineering)

Key elements

Period: **Late January to Mid-March**

Estimated duration: **20 hours**

For whom:
recent graduates, jobseekers and experienced employees

Location:
ISAE-SUPAERO, Toulouse

Language: **English**

Highlights

- Space surveillance
- Space debris proliferation & risks
- Collision risk management

The objective of this course is to give an overview about the emergence and importance of Space Surveillance, with special care on the consequences of space debris proliferation. To guarantee the safety of space missions, it is fundamental to understand the space environment. Space debris poses several risks: in-orbit with the possibility of collisions and on-ground with the uncontrolled reentries.
For that, the maintenance of a catalogue of resident space objects is crucial in order to be able to provide the services to prevent those risks. Collision risk management and reentry assessment is among those services.

Learning objectives

At the end of the course, a clear view on the space debris cataloguing process and the service provision is acquired.

Prerequisites

- Basics on space mechanics

Information and registration

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Course content

A general overview on space debris (origin, sources, risks, evolution) is given including the concepts about Space Surveillance and Tracking (SST).
Details on the different techniques used:

- Initial Orbit Determination: including the derivation of classical methods like Gauss,
- Orbit Determination: introduction to the filtering process, including the derivation of the Extended Kalman Filter,
- Observation-to-Objet association problem,
- Collision Risk Management: used of filters to reduce the complexity of the problem, computation of the Time of Closest Approach (TCA), computation of the Probability of Collision (PoC) with a short-encounter method,

Reentry: point of impact, importance of the uncertainties in the assessment.

Teaching methods

Teaching methods	Yes
Lectures / tutorial	X
Collaborative learning	
Flipped classroom	
Blended learning (online and face to face)	
Learning by doing	X
Project-based	
Simulation	
Case study	X

Assessment

- Report on the five workshops