EE-585

Space mission design and operations

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Cursus	Sem.	Type
Electrical and Electronical Engineering	MA1, MA3	Opt.
Mechanical engineering	MA1, MA3	Opt.
Microtechnics	MA1, MA3	Opt.
Robotics	MA1, MA3	Opt.
Space technologies minor	H	Opt.

Language of teaching	English
Credits	2
Session	Winter
Semester	Fall
Exam	Oral
Workload	60h
Weeks	14
Hours	**2 weekly**
Courses	2 weekly
Number of positions	

Summary

This course is a "concepts" course. It introduces a variety of concepts to design and operate a space mission. These concepts cover orbital mechanics, spacecraft operation phases and critical subsystems.

Content

- Brief review of the fundamental laws of mechanics
- Types of space missions and their objectives
- The space environment
- Applied orbital mechanics, including interplanetary trajectories
- Rendez-vous and proximity operations
- Propulsion modules
- Attitude determination and control
- Satellite and constellation operations
- Launch and early orbit phase
- Human spaceflight and extravehicular activities
- Risks of spacecraft operations & sustainability
- Future trends in spacecraft operations

Keywords

- Orbital mechanics
- Spacecraft operations
- Space environment
- Space exploration

Learning Prerequisites

Required courses

- Bachelor level courses in physics, vector analysis, and calculus

Learning Outcomes

By the end of the course, the student must be able to:

- Design a space mission
- Analyze the requirements of the operations
- Characterize the necessary different segments and subsystems

Transversal skills

- Communicate effectively with professionals from other disciplines.
- Communicate effectively, being understood, including across different languages and cultures.

Teaching methods

Ex cathedra and exercices supervised in classroom

Expected student activities

Actively participate in the course and exercise sessions

Resources

Bibliography

Will be provided in the course introduction
A few exemples of interesting books available from the library:

- Space mission analysis and design
- Orbital Mechanics and Astrodynamics: Techniques and Tools for Space Missions

Ressources en bibliothèque

- Space Mission analysis and Design / Larson
- Orbital Mechanics and Astrodynamics: Techniques and Tools for Space Missions / Hintz

Notes/Handbook

Course notes available before each course on Moodle

Moodle Link

- https://go.epfl.ch/EE-585