

EE-585

Space mission design and operations

Nicollier Claude

Cursus	Sem.	Type
Electrical and Electronical Engineering	MA2, MA4	Opt.
Mechanical engineering	MA2, MA4	Opt.
Microtechnics	MA2, MA4	Opt.
Space technologies minor	E	Opt.

Language of teaching	English
Credits	2
Session	Summer
Semester	Spring
Exam	Oral
Workload	60h
Weeks	14
Hours	2 weekly
Lecture	2 weekly
Number of positions	

Summary

This course is a "concepts" course. It introduces a variety of concepts in use in the design of a space mission, manned or unmanned, and in space operations. It is partly based on the practical space experience of the lecturer.

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 in space.
- Space propulsion.
- Attitude determination and control.
- On board systems.
- Space vehicles: Space Shuttle, International Space Station, , Falcon 9, Dragon and Crew Dragon capsules, Starship, Hubble and James Webb Space Telescopes.
- Human Spaceflight, Extravehicular Activities and Space Robotics.

- Space sustainability.
- Future programs.

Keywords

- Space systems
- Space research
- Space exploration
- Space engineering
- Space operations

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 space mission with a given objective

Transversal skills

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

Teaching methods

Course dates (2024), all in ELA1, Mondays from 17:15 to 19:00:

February 19 (course introduction)
February 26
March 4
March 11
March 18

March 25
April 1 No course (Easter Monday)
April 8
April 15
April 22
April 29
May 6
May 13
May 20 No course (Pentecost Monday)
May 27

An extra 2-hours course session will be scheduled to give us a complete 28-hours course. Date TBD

An optional course review will be organized in early June 2024. Date TBD

Expected student activities

actively participate in the course and exercise sessions

Assessment methods

oral examination

Supervision

Office hours	Yes
Assistants	Yes
Forum	Yes

Resources

Bibliography

provided in the course introduction

Notes/Handbook

Course notes available before each course on Moodle

Websites

- <http://www.nasa.gov>
- <http://www.esa.int>

Moodle Link

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