

EE-584

Spacecraft design and system engineering

Richard Muriel

Cursus	Sem.	Type
Electrical and Electronical Engineering	MA1, MA3	Opt.
Space technologies minor	H	Opt.
Systems Engineering minor	H	Opt.

Language of teaching	English
Credits	4
Session	Winter
Semester	Fall
Exam	Written
Workload	120h
Weeks	14
Hours	4 weekly
Courses	2 weekly
TP	2 weekly
Number of positions	

Summary

The main objective of the course is to introduce the concept of space system design and engineering. The course will describe the various subsystems involved in the design of a satellite. It will also describe the techniques of systems engineering that are used to obtain a coherent satellite design.

Content**Introduction**

Highlights of space mission organization and engineering. Mission objectives, science objectives, mission architectures.

Conception and Design of spacecraft

General description of the space environment and survivability, and spacecraft subsystems including: science instruments, telecommunications, power management and distribution, command and data handling, thermal control, propulsion, structures and mechanisms, configuration, end-to-end information system, flight software.

System Engineering Techniques

Presentation of the major system engineering techniques: functional analysis, block diagrams, design trade-offs, design budgets, interface management, tradable parameters.

Introduction to Project Engineering

Other project considerations for a system engineer: requirements definition and tracking, spacecraft integration and test, mission operations, reliability and quality assurance, cost and risk management.

Keywords

satellites, space system, space environment and orbital mechanics

Learning Prerequisites**Required courses**

None.

Recommended courses

Prof. Claude Nicollier's class.

Learning Outcomes

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

- Structure a space project in development phases
- Formulate the tasks and responsibilities of the system engineer
- Dimension the overall system
- Dimension each satellite subsystem
- Elaborate a coherent and consistent system design
- Design a space mission
- Integrate constraints due to the space environment

Transversal skills

- Set objectives and design an action plan to reach those objectives.
- Plan and carry out activities in a way which makes optimal use of available time and other resources.
- Use a work methodology appropriate to the task.
- Access and evaluate appropriate sources of information.
- Write a scientific or technical report.

Expected student activities

Design work every week, mid-term report.

Assessment methods

final report and presentation.

Resources

Bibliography

"Space Mission analysis and Design", by W. Larson and J. Wertz

Ressources en bibliothèque

- [Space Mission analysis and Design / Larson](#)