

EE-584

Spacecraft design and system engineering

Richard Muriel

Cursus	Sem.	Type
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	

Remark

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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](#)