Course guides
205067 - 205067 - Advanced Cubesat Mission Design

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 205 - ESEIAAT - Terrassa School of Industrial, Aerospace and Audiovisual Engineering.
Degree: MASTER'S DEGREE IN AERONAUTICAL ENGINEERING (Syllabus 2014). (Optional subject).
MASTER'S DEGREE IN SPACE AND AERONAUTICAL ENGINEERING (Syllabus 2016). (Optional subject).
Academic year: 2021  ECTS Credits: 3.0  Languages: English

LECTURER

Coordinating lecturer: Miquel Sureda
Others: David González
        Manel Soria
        David de la Torre

PRIOR SKILLS

The student must have a good understanding of programming, mechanics (rigid-body dynamics), basics spacecraft design and orbital mechanics (two-body problem, Keplerian orbits, Hohmann transfer, basic impulsive maneuvers, launch geometry).

TEACHING METHODOLOGY

The course aims to address the design and construction of CubeSats in detail. Therefore, almost all the lessons are developed in a workshop like format, with students distributed in groups to work in a group project.

LEARNING OBJECTIVES OF THE SUBJECT

This course aims to give advanced knowledge of nano-satellites design, with particular emphasis on the design process and construction of CubeSats. As final outcome of the course, each group will define a CubeSat mission and will build and test its payload.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Hours large group</td>
<td>27,0</td>
<td>36.00</td>
</tr>
<tr>
<td>Self study</td>
<td>48,0</td>
<td>64.00</td>
</tr>
</tbody>
</table>

Total learning time: 75 h
## Advanced CubeSat Mission Design

**Description:**
Common Examples.

**Related activities:**
- Theory lessons.

**Full-or-part-time:** 12h
- Theory classes: 4h
- Self study: 8h

## CubeSat Mission Definition

**Description:**
Mission Concept: Defining a payload and a CubeSat platform.
Mission Timeline: Design, production, test campaigns, launch, deployment and operations.

**Related activities:**
- Theory lessons.
- Workshop.

**Full-or-part-time:** 12h
- Theory classes: 4h
- Self study: 8h

## Advanced Subsystems Design

**Description:**
- Mechanical Design: Frameworks and structures, stress analysis, loads and stiffness, elastic instabilities, vibration, materials selection, structural analysis.
- Thermal Design: Thermal sources and transport mechanisms in space, thermal balance, thermal control elements, thermal design and implementation.
- Comms and Data Handling Design: Tracking, telemetry and command systems. RF link, data handling, OBCs.

**Related activities:**
- Theory lessons.
- Workshop.

**Full-or-part-time:** 30h
- Theory classes: 15h
- Self study: 15h
Payload Design

Description:

Related activities:
- Theory lessons.
- Workshop.

Full-or-part-time: 21h
Theory classes: 4h
Self study: 17h

GRADING SYSTEM

The course will be graded based on:

- Individual exercises: 30%
- Final group project: 70%

In case of being unable to hand the individual exercises or not passing them, the student will have a second opportunity.

BIBLIOGRAPHY

Basic:

Complementary:

RESOURCES

Other resources:
Due to the characteristics of this course relevant web-based material and scientific publications are a very important source of information.