

## Course guide

### 220143 - 220143 - Uav Hardware & Programming

Last modified: 11/04/2025

**Unit in charge:** Terrassa School of Industrial, Aerospace and Audiovisual Engineering  
**Teaching unit:** 710 - EEL - Department of Electronic Engineering.

**Degree:** BACHELOR'S DEGREE IN AEROSPACE TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).  
BACHELOR'S DEGREE IN AEROSPACE VEHICLE ENGINEERING (Syllabus 2010). (Optional subject).

**Academic year:** 2025 **ECTS Credits:** 3.0 **Languages:** English

#### LECTURER

**Coordinating lecturer:** David Gonzalez

**Others:**

#### TEACHING METHODOLOGY

This is a course "hands-on" oriented. This means that all subject will be delivered in the lab with hardware availability. However, the course will also content some lectures focused in some theoretical issues. Students will be asked to develop some tasks that synthetize several concepts and knowledge acquired in previous or current courses.

#### LEARNING OBJECTIVES OF THE SUBJECT

The goal of this subject is to deliver basic knowledge about electric propulsion, control hardware and programming of GNC tasks. At the end of this subject, student should be able to program GNC algorithms in a given hardware by they own.

#### STUDY LOAD

Type	Hours	Percentage
Hours large group	30,0	40.00
Self study	45,0	60.00

**Total learning time:** 75 h

#### CONTENTS

##### Module 1: General description of UAV architecture

**Description:**

- Description of a UAV architecture from the control hardware point of view.

**Full-or-part-time:** 7h 30m

Theory classes: 3h

Self study : 4h 30m

#### Module 2: Control hardware functionality

**Description:**

- The functionality and capabilities of the experimental platform used in this course will be described. This platform is the MultiWii Pirate control board (Arduino compatible)

**Full-or-part-time:** 7h 30m

Theory classes: 3h

Self study : 4h 30m

#### Module 3: Basics of electric propulsion

**Description:**

- Basic concepts of electric propulsion will be delivered. It will be covered concepts as: power converters (inverters), batteries behavior and modeling, and basics of electric motors

**Full-or-part-time:** 15h

Theory classes: 6h

Self study : 9h

#### Module 4: Implementation of GNC algorithms

**Description:**

**Full-or-part-time:** 30h

Theory classes: 12h

Self study : 18h

#### Module 5: Basics of data storage and data transmission

**Description:**

**Full-or-part-time:** 15h

Theory classes: 6h

Self study : 9h

## GRADING SYSTEM

The grade of the subject is based on 4 individual reports delivered individually by students. Students will be asked to perform a speech presentation of the final report.

$\text{Subject\_Grade} = (0.25 * \text{Report\_1} + 0.25 * \text{Report\_2} + 0.25 * \text{Report\_3} + 0.25 * \text{Report\_4})$

Any student who wishes to improve his grade may try it at the exam planned at the end of the course. The best note is preserved