Course guide  
220030 - SI - Systems and Instruments

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 220 - ETSEIAT - Terrassa School of Industrial and Aeronautical Engineering.
Degree: BACHELOR'S DEGREE IN AEROSPACE VEHICLE ENGINEERING (Syllabus 2010). (Compulsory subject).
Academic year: 2022 ECTS Credits: 4.5 Languages: Catalan

LECTURER

Coordinating lecturer: - José Luis Romeral Martínez
Others: - José Luis Romeral Martínez
- Joan Montaña Puig

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CE24. GrEVA - An adequate understanding of the following, as applied to engineering: aircraft systems and automatic flight control systems in aerospace vehicles.
CE21. GrEVA - An adequate understanding of the following, as applied to engineering: the basics of the sustainability, maintainability and operability of spacecraft.

TEACHING METHODOLOGY

The methodology combines three complementary activities: 
1. The lectures presented by professors. 
2. Practical exercises at the laboratory. 
3. Additional exercises to develop by the student. PBL methodology will be used.

LEARNING OBJECTIVES OF THE SUBJECT

- To apply the knowledge that students have acquired on basic electricity and electronics on the plane’s electrical systems and its equipments
- To enable the student to design and select of electrical and electronic circuits to aircraft
- To introduce the principles, operation and maintenance of electrical and electronic systems of the airplane.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Hours large group</td>
<td>31,0</td>
<td>27.56</td>
</tr>
<tr>
<td>Self study</td>
<td>67,5</td>
<td>60.00</td>
</tr>
<tr>
<td>Hours medium group</td>
<td>14,0</td>
<td>12.44</td>
</tr>
</tbody>
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Total learning time: 112.5 h
# CONTENTS

## Module 1. Introducing the airplane electrical system
**Description:**

- **Full-or-part-time:** 4h
- Theory classes: 2h
- Self study: 2h

## Module 2. Electric generation in the aircraft
**Description:**

- **Full-or-part-time:** 23h
- Theory classes: 6h
- Practical classes: 5h
- Self study: 12h

## Module 3. Others elements of the electrical system of the aircraft
**Description:**

- **Full-or-part-time:** 9h
- Theory classes: 2h
- Practical classes: 1h
- Self study: 6h

## Module 4. Distribution of electric energy in the aircraft
**Description:**

- **Full-or-part-time:** 9h
- Theory classes: 2h
- Practical classes: 1h
- Self study: 6h

## Module 5. Operation and control of the electrical system
**Description:**

- **Full-or-part-time:** 4h
- Theory classes: 1h
- Self study: 3h

## Module 6. Electric propulsion
**Description:**

- **Full-or-part-time:** 7h
- Theory classes: 2h
- Self study: 5h
## Module 7. Sensors and Instrumentation Systems

**Description:**

**Full-or-part-time:** 12h  
Theory classes: 3h  
Practical classes: 3h  
Self study: 6h

## Module 8. Systems data acquisition and A / D conversion

**Description:**

**Full-or-part-time:** 14h  
Theory classes: 4h  
Practical classes: 2h  
Self study: 8h

## Module 9 Digital computers. Central processing units and peripheral cards

**Description:**

**Full-or-part-time:** 13h  
Theory classes: 3h  
Practical classes: 2h  
Self study: 8h

## Module 10. Digital Communications. Modulations and physical interfaces

**Description:**

**Full-or-part-time:** 8h  
Theory classes: 3h  
Self study: 5h

## Module 11. Onboard computers and flight instruments

**Description:**

**Full-or-part-time:** 9h 30m  
Theory classes: 3h  
Self study: 6h 30m

## ACTIVITIES

### THEORY LESSONS / ELECTRICITY

**Full-or-part-time:** 35h  
Theory classes: 14h  
Self study: 21h
### THEORY LESSONS / ELECTRONIC

**Full-or-part-time:** 35h  
Theory classes: 14h  
Self study: 21h

### ELECTRICAL PROBLEMS

**Full-or-part-time:** 9h  
Practical classes: 5h  
Self study: 4h

### ELECTRONIC PROBLEMS

**Full-or-part-time:** 5h 30m  
Practical classes: 2h 30m  
Self study: 3h

### ELECTRICITY PRACTICES

**Full-or-part-time:** 4h  
Practical classes: 2h  
Self study: 2h

### ELECTRONIC PRACTICE

**Full-or-part-time:** 7h  
Practical classes: 4h  
Self study: 3h

### TEST MODULE 1, ELECTRICITY

**Full-or-part-time:** 8h 30m  
Theory classes: 1h 30m  
Self study: 7h

### TEST MODULE 2, ELECTRONIC

**Full-or-part-time:** 8h 30m  
Theory classes: 1h 30m  
Self study: 7h
GRADING SYSTEM

N_f = 0.35 Theory Mark Part 1 + 0.15 Laboratory Mark Part 1 + 0.35 Theory Mark Part 2 + 0.15 Laboratory Mark Part 2

N_f : Final Mark
Part 1: Electricity block
Part 2: Electronics block

Averaged Part 1 Mark (Electricity, 0.35 Theory Mark Part 1 + 0.15 Laboratory Mark Part 1) can be improved in a final exam. Anyhow, for the calculation of the final mark the highest mark achieved by the student for this Part 1 will prevail.

For those students who meet the requirements and submit to the reevaluation examination, the grade of the reevaluation exam will replace the grades of all the on-site written evaluation acts (tests, midterm and final exams) and the grades obtained during the course for lab practices, works, projects and presentations will be kept.
If the final grade after reevaluation is lower than 5.0, it will replace the initial one only if it is higher. If the final grade after reevaluation is greater or equal to 5.0, the final grade of the subject will be pass 5.0.

BIBLIOGRAPHY

Complementary:

RESOURCES

Audiovisual material:
- Apunts de classe