Course guides
230451 - ALG - Linear Algebra and Geometry

Unit in charge: Barcelona School of Telecommunications Engineering
Teaching unit: 749 - MAT - Department of Mathematics.
Degree: BACHELOR’S DEGREE IN ENGINEERING PHYSICS (Syllabus 2011). (Compulsory subject).
Academic year: 2020  ECTS Credits: 6.0  Languages: Catalan, Spanish

LECTURER

Coordinating lecturer: Barja Yañez, Miguel Angel
Others: Plans Berenguer, Bernat

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. Ability to solve math problems that may arise in engineering. Ability to apply knowledge about linear algebra, geometry, differential geometry, differential and integral calculus, ordinary and partial differential equations, probability and statistics.
2. Ability to select numerical and optimization methods suitable for solving physical and engineering problems. Ability to apply the knowledge of numerical algorithms and optimization.

General:
2. ABILITY TO IDENTIFY, FORMULATE, AND SOLVE PHYSICAL ENGINEERING PROBLEMS. Planning and solving physical engineering problems with initiative, making decisions and with creativity. Developing methods of analysis and problem solving in a systematic and creative way.

Transversal:
1. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 1. Planning oral communication, answering questions properly and writing straightforward texts that are spelt correctly and are grammatically coherent.
3. SELF-DIRECTED LEARNING - Level 1. Completing set tasks within established deadlines. Working with recommended information sources according to the guidelines set by lecturers.

TEACHING METHODOLOGY

We will give 3 hours a week of Theory classes and 2 hours a week of Problem Sessions.

LEARNING OBJECTIVES OF THE SUBJECT

Good knowledge of:
- Vector Spaces.
- Matrix Calculus.
- Linear maps.
- Diagonalization process.
- Scalar products and Euclidean spaces.
- Affine and Euclidean geometry. Linear varieties.
STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self study</td>
<td>85.0</td>
<td>56.67</td>
</tr>
<tr>
<td>Hours large group</td>
<td>65.0</td>
<td>43.33</td>
</tr>
</tbody>
</table>

Total learning time: 150 h

CONTENTS

1. Vector Spaces

Description:

Full-or-part-time: 32h
Theory classes: 7h
Practical classes: 8h
Guided activities: 4h
Self study: 13h

2. Linear maps

Description:

Full-or-part-time: 28h
Theory classes: 7h
Practical classes: 4h
Guided activities: 4h
Self study: 13h

3. Diagonalization

Description:

Full-or-part-time: 30h
Theory classes: 8h
Practical classes: 5h
Guided activities: 4h
Self study: 13h
4. Euclidian and unitary spaces

**Description:**

**Full-or-part-time:** 29h
- Theory classes: 8h
- Practical classes: 4h
- Guided activities: 4h
- Self study: 13h

---

**GRADING SYSTEM**

We will do a mid-term exam (EP) and also evaluate participation at Problem sessions (P). The Final Exam (EF) has 3 parts: exercises, problems and theoretical questions.

$$NF = \max \{ 0.3 \cdot EP + 0.05 \cdot P + 0.65 \cdot EF, EF \}$$

---

**BIBLIOGRAPHY**

**Basic:**

**Complementary:**