Course guide
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: 2023 ECTS Credits: 6.0 Languages: Catalan

LECTURER

Coordinating lecturer: Consultar aquí / See here:
https://telecos.upc.edu/ca/estudis/curs-actual/professorat-responsables-coordinadors/responsables-assignatura

Others: Consultar aquí / See here:
https://telecos.upc.edu/ca/estudis/curs-actual/professorat-responsables-coordinadors/professorat-assignat-idioma

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.

Generical:
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.
- Spectral theorem and Singular value decomposition
STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours large group</td>
<td>65.0</td>
<td>43.33</td>
</tr>
<tr>
<td>Self study</td>
<td>85.0</td>
<td>56.67</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:
Eigenvectors and eigenvalues. Characteristic polynomial. Diagonalization criterion. Applications

Full-or-part-time: 30h
Theory classes: 8h
Practical classes: 5h
Guided activities: 4h
Self study: 13h
4. Euclidian 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 a delivery or a short test at Problem sessions (P). The Final Exam (EF) contains both practical exercises and theoretical problems.

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

The Final Exam (EF) is reassessable. The other two parts (EP and P) are not.

EXAMINATION RULES.

In the exams (partial and final) the student cannot take any type of material or notes.

BIBLIOGRAPHY

Basic:

Complementary: