Course guide
240733 - 240733 - Numerical Methods in Engineering

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 749 - MAT - Department of Mathematics.
Degree: BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGIES AND ECONOMIC ANALYSIS (Syllabus 2018). (Compulsory subject).
Academic year: 2022  ECTS Credits: 6.0  Languages: English

LECTURER
Coordinating lecturer: Antonio Susín Sánchez
Others:

TEACHING METHODOLOGY

LEARNING OBJECTIVES OF THE SUBJECT
The main goal of the course is to provide the numerical expertise for dealing with the problems one can face in the orbit of engineering and economics.
This course is mainly devoted to differential equations, which model the majority of the engineering processes. We will use the mathematical background introduced in the previous semesters to study both the analytical and numerical properties of the differential equations.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours medium group</td>
<td>30,0</td>
<td>20.00</td>
</tr>
<tr>
<td>Self study</td>
<td>90,0</td>
<td>60.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>30,0</td>
<td>20.00</td>
</tr>
</tbody>
</table>

Total learning time: 150 h

CONTENTS

Interpolation

Description:
1D and 2D interpolation. Shape functions. Applications of the interpolation.

Full-or-part-time: 20h
Theory classes: 4h
Practical classes: 4h
Self study : 12h
**Iteration**

**Description:**

**Full-or-part-time:** 20h
- Theory classes: 4h
- Practical classes: 4h
- Self study: 12h

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**Ordinary Differential Equations**

**Description:**
Boundary and Initial value problems. Stability and Classification of constant coefficients linear systems.

**Specific objectives:**

**Full-or-part-time:** 40h
- Theory classes: 8h
- Practical classes: 8h
- Self study: 24h

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**Partial Differential Equations**

**Description:**

**Full-or-part-time:** 40h
- Theory classes: 8h
- Practical classes: 8h
- Self study: 24h

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**GRADING SYSTEM**

The final mark will be computed by means of,

\[ FM = 0.1 \times MA + 0.3 \times MT + 0.6 \times FE \]

where MA is the resulting mark of the exams of Matlab, MT is the mark of the mid term exam and FE is the mark of the final exam.

The reevaluation will consist in an exam including all the contents and scheduled by the School. In case of reevaluation, the final mark will be computed by means of:

\[ FM = 0.1 \times MA + 0.9 \times RM \]
BIBLIOGRAPHY

Basic:

RESOURCES

Audiovisual material:
- Nom recurs. Resource