**Course guides**

**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: 2020  
ECTS Credits: 6.0  
Languages: English

**LENTURER**

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>20,0</td>
<td>13.33</td>
</tr>
<tr>
<td>Hours large group</td>
<td>40,0</td>
<td>26.67</td>
</tr>
<tr>
<td>Self study</td>
<td>90,0</td>
<td>60.00</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,

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

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:

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

Basic:

RESOURCES

Audiovisual material:
- Nom recurs. Resource