Course guide

280672 - 280672 - Numerical Calculus of Naval Structures

Unit in charge: Barcelona School of Nautical Studies
Teaching unit: 742 - CEN - Department of Nautical Sciences and Engineering.

Degree: BACHELOR'S DEGREE IN NAVAL SYSTEMS AND TECHNOLOGY ENGINEERING (Syllabus 2010). (Compulsory subject).

Academic year: 2022 ECTS Credits: 4.5 Languages: Spanish, English

LECTURER

Coordinating lecturer: JAVIER MARTINEZ GARCIA

Others:
Segon quadrimestre:
JAVIER MARTINEZ GARCIA - Grup: DT1, Grup: DT2, Grup: GSTN1, Grup: GSTN2
FERMÍN ENRIQUE OTERO GRUER - Grup: DT1, Grup: DT2, Grup: GSTN1, Grup: GSTN2
FRANCESC TURON PUJOL - Grup: DT1, Grup: DT2, Grup: GSTN1, Grup: GSTN2

REQUIREMENTS

To take this course it is required to have approved the course 280669 - Estructures Aplicades a l'Enginyeria Naval

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Transversal:
1. EFFECTIVE USE OF INFORMATION RESOURCES - Level 3. Planning and using the information necessary for an academic assignment (a final thesis, for example) based on a critical appraisal of the information resources used.

TEACHING METHODOLOGY

To acquire, understand and synthesize knowledge
Setting-up and resolution of problems
To carry works out individually and in group
To elaborate technical reports
To analyse results
To relate knowledge among different disciplines

LEARNING OBJECTIVES OF THE SUBJECT

To offer the student a basic knowledge about the theory supporting the linear static analysis using the Finite Element Method (FEM).
To learn to use a professional software for analysis of naval structures using the FEM.
To give mainly practical criteria to analyse a naval structure, as well as to be able to evaluate the correctness of FEM results.
**STUDY LOAD**

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours small group</td>
<td>30,0</td>
<td>26.67</td>
</tr>
<tr>
<td>Hours large group</td>
<td>15,0</td>
<td>13.33</td>
</tr>
<tr>
<td>Self study</td>
<td>67,5</td>
<td>60.00</td>
</tr>
</tbody>
</table>

*Total learning time: 112.5 h*

**CONTENTS**

**Chapter 1. Introduction to matrix structural analysis**

*Description:*

*Full-or-part-time: 3h*
Theory classes: 3h

**Chapter 2. Introduction to the Finite Element Method (FEM)**

*Description:*

*Full-or-part-time: 3h*
Theory classes: 3h

**Chapter 3. Introduction to GiD-Ramseries**

*Description:*
Introduction to the pre/postprocessor system GiD. Geometry creation. Introduction to the structural analysis environment Ramseries. Sections and materials. Boundary conditions.

**Chapter 4. Analysis of beam structures with the FEM**

*Description:*
Analysis of beam structures with the Finite Element Method

**Chapter 5. Analysis of solid structures with the FEM**

**Chapter 6. Analysis of structures composed of plates, shells and beams with the FEM**
Chapter 7. Naval applications of the FEM

GRADING SYSTEM

The final mark will be the weighted average of all the different evaluating activities in the subject:

\[ N_{\text{final}} = 0.20 \cdot N_{\text{ex}} + 0.40 \cdot N_{\text{ec}} + 0.40 \cdot N_{\text{tc}} \]

- \( N_{\text{final}} \): final mark
- \( N_{\text{ex}} \): mark of the partial exam
- \( N_{\text{ec}} \): mark of the different exercises and practices
- \( N_{\text{tc}} \): mark of the final project

The re-evaluation will consist of the solution of a practical assignment defined by the professors. This work will be focused on the aspects of the matter failed by the student. It will be required to deliver a written report on the work at the day of the exam. Furthermore, the student could be asked for an oral presentation on the work.

EXAMINATION RULES.

The student not presenting the proposed final project will be qualified as "not taken"