280813 - Disseny de Plataformes y Artefactes Oceànics

Unitat responsable: 280 - FNB - Facultat de Nàutica de Barcelona
Unitat que imparteix: 742 - CEN - Departament de Ciència i Enginyeria Nàutiques
Curs: 2019
Titulació: MASTER UNIVERSITARI EN ENGINYERIA NAVAL I OCEÀNICA (Pla 2017). (Unitat docent Obligatòria)
Crèdits ECTS: 5

Idiomes docència: Anglès

Responsable: ALEIX CUBELLS BARCELÓ

Competències de la titulació a les quals contribueix l’assignatura

Bàsiques:
CB6. Posseir i comprendre coneixements que aportin una base o oportunitat de ser originals en el desenvolupament i/o aplicació d’ides, sovint en un context d’investigació.
CB7. Que els estudiants sapiguïen aplicar els coneixements adquirits i la seva capacitat de resolució de problemes en entorns nous o poc coneguts dins de contextos més amplis (o multidisciplinaris) relacionats amb la seva àrea d’estudi.
CB8. Que els estudiants siguin capaços d’integrar coneixements i enfrontar-se a la complexitat de formular judicis a partir d’una informació que, sent incompleta o limitada, inclogui reflexions sobre les responsabilitats socials i ètiques vinculades a l’aplicació dels seus coneixements i judicis.
CB9. Que els estudiants sapiguïen comunicar les seves conclusions i els coneixements i raons últimes que les sustenen a públics especialitzats i no especialitzats d’una manera clara i sense ambigüïtats.
CB10. Que els estudiants tinguin les habilitats d’aprenentatge que els permetin continuar estudiant d’una manera que haurà de ser en gran mesura autodirigit o autònom.

Específiques:
CE9. Capacidad para organizar y dirigir la construcción de plataformas y artefactos oceánicos.

CE7. Capacidad para proyectar plataformas y artefactos oceánicos.

CE1. Capacidad para proyectar buques adecuados a las necesidades del transporte marítimo de personas y mercancías, y a las de la defensa y seguridad marítimas.

CTFM. Capacidad para la realización, presentación y defensa de un ejercicio original realizado individualmente ante un tribunal universitario, consistente en un proyecto integral de Ingeniería Naval y Oceánica de naturaleza profesional en el que se sinteticen las competencias adquiridas en las enseñanzas.

CEE2-8. Capacidad de proyecto de distintos sistemas de fondeo de estructuras offshore.

CEE2-1. Capacidad de análisis hidrodinámico, estabilidad y comportamiento en la mar de plataformas y otras estructuras offshore.
The main learning objectives of the course are:

1. Understanding the functions of each type of offshore structures
2. Understanding and application of basic principles for the design of offshore structures
3. Becoming familiar with the standards and codes of common use in the industry
4. Understanding the design spiral for offshore structures
5. Becoming familiar with the use of key design tools offshore engineering
6. Understanding the key issues and trade-off principles

Activities will be carried out so that the students know how to apply their knowledge to their work or vocation in a professional way and possess the necessary skills through the elaboration and defense of arguments and problem solving within their area of study, aiming at acquiring the following capabilities:

1. Being responsible for self-learning, and being able to learn independently and continuously, being self-demanding and knowing how to define achievable goals.
2. Be able to analyze the current state of a discipline.
3. Develop critical and self-critical skills.
4. Acquire habits and skills to work responsibly in a team, possess negotiation and leadership skills, and be able to propose constructive solutions to potential conflicts.
5. Be able to weigh and manage information effectively, and know how to apply information and communication technologies to your management and analysis.
6. To be fluent in oral and written communication.

Objectius d’aprenentatge de l’assignatura

The main learning objectives of the course are:

1. Understanding the functions of each type of offshore structures
2. Understanding and application of basic principles for the design of offshore structures
3. Becoming familiar with the standards and codes of common use in the industry
4. Understanding the design spiral for offshore structures
5. Becoming familiar with the use of key design tools offshore engineering
6. Understanding the key issues and trade-off principles
7. Understanding issues for detail design, considering fabrication, transportation and installation
8. Becoming familiar with general procedures and issues in fabrication, manufacture, and installation
9. Developing effective communication and presentation skills for the final report

<table>
<thead>
<tr>
<th>Hores totals de dedicació de l'estudiantat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dedicació total: 45h</td>
</tr>
<tr>
<td>Hores grup gran: 45h</td>
</tr>
<tr>
<td>100.00%</td>
</tr>
</tbody>
</table>
# Continguts

<table>
<thead>
<tr>
<th>Part 1. Offshore Industry Overview</th>
<th>Dedicació: 5h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grup gran/Teòria: 5h</td>
</tr>
<tr>
<td></td>
<td>Grup mitjà/Pràctiques: 0h</td>
</tr>
<tr>
<td></td>
<td>Grup petit/Laboratori: 0h</td>
</tr>
<tr>
<td></td>
<td>Activitats dirigides: 0h</td>
</tr>
</tbody>
</table>

**Descripció:**

<table>
<thead>
<tr>
<th>Part 2. Basics of Design</th>
<th>Dedicació: 10h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grup gran/Teòria: 5h</td>
</tr>
<tr>
<td></td>
<td>Grup mitjà/Pràctiques: 0h</td>
</tr>
<tr>
<td></td>
<td>Grup petit/Laboratori: 0h</td>
</tr>
<tr>
<td></td>
<td>Activitats dirigides: 5h</td>
</tr>
</tbody>
</table>

**Descripció:**
Lecture will cover the following topics: General concepts for structural Design. Calculation of tubular and plate capacity. Approach of Allowable Stresses based on WSD and LRFD. Review on API, AISC, ASME, DNV for design in offshore environment, welding design, special design considerations, Lift loads, padeye design, rigging design, transporation forces, barge and seastate, stability of barges, grillage and seafastening. Tubular Joint Connections. Elastic design vs Plastic Design. Codes for Plastic Design. Review on FEA packages used for design Offshore. Review of Pipeline Design.
Part 3. Development of Detail Design Project

Dedicació: 30h
Grup gran/Teoria: 5h
Grup mitjà/Pràctiques: 20h
Grup petit/Laboratori: 0h
Activitats dirigides: 5h

Descripció:
Students will carry out the design of a subsea structure. For this project, a framework will be provided with regards to functional requirements from the “client”, the standards and codes that apply to the project, the requirements for construction, the functional limitations for transport and installation, and the restraints of cost and time from the “project manager”. Study case will be presented alongside with the development of the project, and challenges will be posed to students while the design is being progressed.

Design Premise, Pressure Piping, T&I, Strength, Weight calculation, Cathodic protection, Drawings, Fabrication, Flexible Jumper Connection, Miscellaneous Items, Structural Frame, Bend Stiffener, Subsea Connector, Top Assembly, Bottom Assembly

Sistema de qualificació

Final mark will be the summation of the following parts:

\[ N_{\text{final}} = 0.0 \cdot N_{\text{Part 1}} + 0.3 \cdot N_{\text{Part 2}} + 0.4 \cdot N_{\text{Part 3} \_GR} + 0.3 \cdot N_{\text{Part 3} \_IN} \]

N_Part 1: Do not account for final mark
N_Part 2: Mark from Examn on Part 2
N_Part 3_GR: Mark from Project part 3 as group (continuous evaluation)
N_Part 3_IN: Mark from Project part 3 as individual (continuous evaluation)
Normes de realització de les activitats

Theory classes
These classes will cover an overview and outlook of the offshore industry, and the theoretical concepts on the design of offshore structures. The main objective of these classes is to provide a general understanding of the industry, and to understand the structural concepts and will be necessary for the students to deal with the development of the project in groups.

Directed Activities
During the classes there will be resolution of typical engineering problems related with the design of offshore structures. Students will have to learn them so to be able to resolve as practical exercises during the exam.

FEA tools workshop
Industry software provider will give a session about FEA tools used in the industry for the design of offshore structures. Software provider will hand out attendance certificates to the attendees. This session will be necessary for the students to be able to progress with the development of the project of the third part of the structure.

Development of a Detail Design Project
Students will be asked to carry out the detail design of an offshore structure. For that, they will be working in groups. The project will have to be developed based on specific functional requirements from the “client”, the standards and codes that apply to the project, the requirements for construction, the functional limitations for transport and installation, and the restrictions of cost and time from the “project manager”. For the project, students will be asked to do hand calculations, as well as use software tools such as spreadsheets and FEA packages.

Tutorials
The tutorial action will be carried out offering availability through e-mail.

Exams
There will be an exam, in the middle of the quartermaster, that will cover the second part of the course (Basics of Structural Design). Students that don’t pass the exam will have the opportunity to repeat the exam during the exam period at the end of the quartermaster. Those who do not attend any of the two exams, will be classified as not presented.

Bibliografia

Bàsica:

Altres recursos: