Degree competences to which the subject contributes

Basic:
CB6. Possess knowledge and understanding that provide a basis or opportunity to be original in the development and / or application of ideas, often in a research context.
CB7. That the students can apply their knowledge and ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their study area.
CB8. Students should be able to integrate knowledge and handle the complexity of making judgments based on information that, being incomplete or limited, includes reflections on the responsibilities social and ethical linked to the application of their knowledge and judgments.
280821 - Marine Foundations

social and ethical linked to the application of their knowledge and judgments.
CB9. That students can communicate their conclusions and the knowledge and
Latest rationale underpinning to specialists and non
Specialty clearly and unambiguously
CB10. Students must possess the learning skills that enable them
continue studying in a way that will be largely
self-directed or autonomous.

Specific:
CEE2-6. (ENG) Capacidad para el diseño y proyecto de plataformas para aerogeneradores marinos
CEE2-7. Conocimientos y capacidad de proyecto de las distintas tipologías de cimentaciones de estructuras offshore. Conocimientos de la capacidad resistente de suelos

Transversal:
CT3. TEAMWORK: Ability to work as a member of an interdisciplinary team, either as a member or performing
management tasks, with the aim of contributing to projects pragmatically and sense of responsibility, assuming
commitments considering the resources available.
CT4. EFFECTIVE USE OF INFORMATION RESOURCES: Manage the acquisition, structuring, analysis and visualization
of data and information in the field of specialty, and critically evaluate the results of this management.
CT5. THIRD LANGUAGE Learning a third language, preferably English, with adequate oral and written and in line with
the future needs of the graduates.

Teaching methodology

4 different type of face-to-face sessions are included in the unit:
1. Theoretical session (T). In which the information relevant to the different topics covered in the syllabus is exposed and
discussed in the classroom
2. Exercise session (P). Dedicated to solve application exercises in the classroom
3. Laboratory session (L). Taken place in the soil mechanics laboratory where the class is divided in teams to perform
simple soil mechanics tests.
4. Personal work presentation (E). The students present the results of their own research work at the classroom.
The students are expected to
1. Study the contents of the theoretical and exercise sessions
2. Attend the laboratory sessions and report back on their activity during them
3. Hand back a design exercise assigned by groups. The exercise typically consists on the evaluation of some foundation
design problem with help from commercial “ad hoc” software (OPILE)
4. Hand back ad present a short research assignment which is distributed in the classroom (individually or to two persons,
depending on its difficulty and length)

Learning objectives of the subject

Familiarity with basic soil mechanics principles relevant for offshore foundation design

Familiarity with offsite geotechnical site investigation procedures and instruments. Awareness of main geohazards
affecting offshore developments.

Familiarity with pile design procedures relevant for the offshore environment. Knowledge of alternative offshore
foundation types
# Study load

| **Total learning time:** 45h | Hours large group: | 45h | 100.00% |
# 280821 - Marine Foundations

## Content

### Introduction

**Learning time:** 3h  
Theory classes: 3h

**Description:**  
- Offshore foundations: tipology.  
- The offshore geotechnical environment.  
- Geohazards  
- Normatives

### Soil mechanics

**Learning time:** 12h  
Theory classes: 6h  
Laboratory classes: 6h

**Description:**  
- Soil description and classification.  
- Groundwater flow and permeability.  
- Soil strength  
- Soil stiffness

**Related activities:**  
- Laboratory 1: identification of soils  
- Laboratory 2: flux of water through soils

**Specific objectives:**  
- Familiarize the student with the fundamental concepts of soil mechanics relevant for the offshore environment

### Offshore site investigations

**Learning time:** 4h 30m  
Theory classes: 4h 30m

**Description:**  
- Geophysics  
- Probing: the CPTu. Other probes  
- Sampling techniques  
- Laboratory testing

**Related activities:**  
Some topics may be developed through individual research work

**Specific objectives:**  
- Gain familiarity with the techniques of geotechnical investigation relevant for the offshore environment
### Offshore pile foundations

<table>
<thead>
<tr>
<th>Learning time: 12h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes: 6h</td>
</tr>
<tr>
<td>Practical classes: 6h</td>
</tr>
</tbody>
</table>

**Description:**
- Types of piles
- Pile installation
- Axial capacity
- Lateral capacity
- Effect of cyclic loading

**Related activities:**
- Team design work with OPILE code

### Direct foundations for offshore structures

<table>
<thead>
<tr>
<th>Learning time: 12h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes: 6h</td>
</tr>
<tr>
<td>Practical classes: 6h</td>
</tr>
</tbody>
</table>

**Description:**
- Gravity base
- Suction caissons
- Jack up

### Qualification system

The final grade (0-10) is obtained as a weighted average of the following items:
1. Laboratory (attendance) 10%
2. Laboratory (reports) 10%
3. Group design exercise (15%)
4. Research report and presentation (15%)
5. Final exam (50%)

The final exam typically includes an exercise and several theoretical questions.
Bibliography

**Basic:**


**Others resources:**

OPILE (Software for pile design oriented to offshore structures)