250433 - ENGPOROFF - Port and Offshore Engineering

Coordinating unit: 250 - ETSECCPB - Barcelona School of Civil Engineering
Teaching unit: 751 - DECA - Department of Civil and Environmental Engineering
Academic year: 2015
Degree: MASTER'S DEGREE IN CIVIL ENGINEERING (RESEARCH TRACK) (Syllabus 2007). (Teaching unit Optional)
MASTER'S DEGREE IN CIVIL ENGINEERING (PROFESSIONAL TRACK) (Syllabus 2012). (Teaching unit Optional)
MASTER'S DEGREE IN CIVIL ENGINEERING (PROFESSIONAL TRACK) (Syllabus 2012). (Teaching unit Optional)
MASTER'S DEGREE IN CIVIL ENGINEERING (RESEARCH TRACK) (Syllabus 2009). (Teaching unit Optional)
ECTS credits: 5
Teaching languages: Catalan, Spanish

Teaching staff
Coordinator: JUAN PABLO SIERRA PEDRICO
Others: FRANCESC XAVIER GIRONELLA I COBOS, RAMON JUANOLA SUBIRANA, AGUSTIN SANCHEZ-ARCILLA CONEJO, JUAN PABLO SIERRA PEDRICO

Opening hours
Timetable: Schedule a consultation agreed with the teachers of the subject.

Degree competences to which the subject contributes
Specific:
8233. Knowledge of and the ability to understand dynamic phenomena of the coastal ocean and atmosphere and respond to problems encountered in port and coastal areas, including the environmental impact of coastal interventions. The ability to analyse and plan maritime works.

Teaching methodology
The course consists of 1,8 hours per week of classroom activity (large size group) and 0,8 hours weekly with half the students (medium size group).

The 1,8 hours in the large size groups are devoted to theoretical lectures, in which the teacher presents the basic concepts and topics of the subject, shows examples and solves exercises.

The 0,8 hours in the medium size groups is devoted to solving practical problems with greater interaction with the students. The objective of these practical exercises is to consolidate the general and specific learning objectives.

The rest of weekly hours devoted to laboratory practice.

Support material in the form of a detailed teaching plan is provided using the virtual campus ATENEA: content, program of learning and assessment activities conducted and literature.

Learning objectives of the subject
Specialization subject in which knowledge on specific competences is intensified.
Knowledge and skills at specialization level that permit the development and application of techniques and methodologies at advanced level.

Contents of specialization at master level related to research or innovation in the field of engineering.

TEAMWORK - Level 3: Managing and dynamic working groups, resolving their potential conflicts, evaluating the work done with other people and to evaluate the effectiveness of the team and the general presentation of the results

<table>
<thead>
<tr>
<th>Study load</th>
<th>Theory classes:</th>
<th>Practical classes:</th>
<th>Laboratory classes:</th>
<th>Guided activities:</th>
<th>Self study:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total learning time:</strong> 125h</td>
<td>19h 30m</td>
<td>9h 45m</td>
<td>9h 45m</td>
<td>6h</td>
<td>80h</td>
</tr>
<tr>
<td>%</td>
<td>15.60%</td>
<td>7.80%</td>
<td>7.80%</td>
<td>4.80%</td>
<td>64.00%</td>
</tr>
</tbody>
</table>
# Content

<table>
<thead>
<tr>
<th><strong>Introduction to the port and port management</strong></th>
<th><strong>Learning time:</strong> 4h 48m</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Image" /></td>
<td>Theory classes: 2h</td>
</tr>
<tr>
<td><img src="image" alt="Image" /></td>
<td>Self study: 2h 48m</td>
</tr>
</tbody>
</table>

**Description:**

**Specific objectives:**
Describe some basic concepts of port and port activities.

<table>
<thead>
<tr>
<th><strong>Port Planning</strong></th>
<th><strong>Learning time:</strong> 4h 48m</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Image" /></td>
<td>Theory classes: 2h</td>
</tr>
<tr>
<td><img src="image" alt="Image" /></td>
<td>Self study: 2h 48m</td>
</tr>
</tbody>
</table>

**Description:**

**Specific objectives:**
Describe the different types of plans available in the port planning process.

<table>
<thead>
<tr>
<th><strong>Port terminals</strong></th>
<th><strong>Learning time:</strong> 16h 48m</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Image" /></td>
<td>Theory classes: 3h</td>
</tr>
<tr>
<td><img src="image" alt="Image" /></td>
<td>Practical classes: 1h</td>
</tr>
<tr>
<td><img src="image" alt="Image" /></td>
<td>Laboratory classes: 3h</td>
</tr>
<tr>
<td><img src="image" alt="Image" /></td>
<td>Self study: 9h 48m</td>
</tr>
</tbody>
</table>

**Description:**

**Specific objectives:**
Practical exercise on designing a port terminal.

Being able to design, broadly speaking, a port terminal and its main characteristics.
<table>
<thead>
<tr>
<th>Environmental factors</th>
<th>Learning time: 9h 36m</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Description of environmental factors to consider in the design of port. Probabilistic design. Procedures for calculating outer harbor works. Practical application of methods of calculation of maritime structures.</td>
</tr>
<tr>
<td><strong>Specific objectives:</strong></td>
<td>The environmental review to consider in the design of port and Being able to apply different methods of calculation of maritime works.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Works indoors</th>
<th>Learning time: 4h 48m</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Types of works. Docks. Jetties. Dolfina</td>
</tr>
<tr>
<td><strong>Specific objectives:</strong></td>
<td>Understanding the different kinds and types of maritime works inside the ports.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wave interaction / structure</th>
<th>Learning time: 7h 11m</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Run-up</td>
</tr>
<tr>
<td></td>
<td>Visit the Maritime Engineering Laboratory tests to monitor different processes of interaction of waves - structure.</td>
</tr>
<tr>
<td><strong>Specific objectives:</strong></td>
<td>To study the phenomena</td>
</tr>
<tr>
<td></td>
<td>Observed in laboratory</td>
</tr>
</tbody>
</table>
# The currents in the port engineering

**Description:**

**Specific objectives:**
Understanding the currents inside the port area and its influence on engineering port.

<table>
<thead>
<tr>
<th>Learning time</th>
<th>Practical classes</th>
<th>Self study</th>
</tr>
</thead>
<tbody>
<tr>
<td>4h 48m</td>
<td>2h</td>
<td>2h 48m</td>
</tr>
</tbody>
</table>

## Interaction port / sediment

**Description:**

**Specific objectives:**
To determine the influence of sediments in the harbor, which can generate problems and possible solutions.

<table>
<thead>
<tr>
<th>Learning time</th>
<th>Practical classes</th>
<th>Self study</th>
</tr>
</thead>
<tbody>
<tr>
<td>2h 24m</td>
<td>1h</td>
<td>1h 24m</td>
</tr>
</tbody>
</table>

## Water quality in ports

**Description:**
Types of pollutants. Sources of pollution. Processes involved in the dispersion of pollutants. Practice on water quality in port areas or

**Specific objectives:**
Learn about the most common pollutants in port waters and what the processes involved in its dispersal. Applying the theoretical knowledge acquired on water quality in ports.

<table>
<thead>
<tr>
<th>Learning time</th>
<th>Theory classes</th>
<th>Practical classes</th>
<th>Self study</th>
</tr>
</thead>
<tbody>
<tr>
<td>7h 11m</td>
<td>2h</td>
<td>1h</td>
<td>4h 11m</td>
</tr>
</tbody>
</table>
### Climate Change

**Learning time:** 4h 48m  
Theory classes: 2h  
Self study: 2h 48m

**Description:**  
Climate change. Effects of climate change on the sea. Impacts on ports.

**Specific objectives:**  
Know what effects climate change may have on the sea, and the impact these can have effects on the ports.

### Offshore Engineering

**Learning time:** 9h 36m  
Theory classes: 2h  
Practical classes: 2h  
Self study: 5h 36m

**Description:**  
History of offshore structures. Types of offshore structures. Artificial islands  
Solicitations and responses. Probabilistic design. Design of fixed structures. Design of floating structures  

**Specific objectives:**  
Know that is a different structure and existing offshore.  
Review, a practical way, the different calculation methods of OFFSHORE structures  
Understanding the different aspects of the construction of offshore structures.

### Marine renewable energies

**Learning time:** 7h 11m  
Theory classes: 2h  
Practical classes: 1h  
Self study: 4h 11m

**Description:**  
Estimation of energy resources. Systems for obtaining energy from tides, waves and currents  
Analyze a case study of marine wind farm

**Specific objectives:**  
Know that there are different systems for extracting energy from the sea

### Evaluation

**Learning time:** 9h 36m  
Laboratory classes: 4h  
Self study: 5h 36m
Qualification system

The mark of the course is obtained from the ratings of continuous assessment and their corresponding laboratories and/or classroom computers.

Continuous assessment consist in several activities, both individually and in group, of additive and training characteristics, carried out during the year (both in and out of the classroom).

The teachings of the laboratory grade is the average in such activities.

The evaluation tests consist of a part with questions about concepts associated with the learning objectives of the course with regard to knowledge or understanding, and a part with a set of application exercises.

Regulations for carrying out activities

Failure to perform a laboratory or continuous assessment activity in the scheduled period will result in a mark of zero in that activity.

Bibliography

Basic:


Complementary:

- Negro, V, y Varela O.. Diseño de diques rompeolas. Colegio de Ingenieros de Caminos, Canales y Puertos,
- Negro, V., Varela, O., García, J. y López J.S.. Diseño de diques verticales. Colegio de Ingenieros de Caminos, Canales y Puertos,
- Puertos del Estado. ROM 0.0. Procedimiento general y basesalculo en el proyecto de obras marítimas y portuarias. Ministerio de Fomento, 2000.