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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 (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.

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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

Study load

Total learning time: 125h	Theory classes:	19h 30m	15.60%
	Practical classes:	9h 45m	7.80%
	Laboratory classes:	9h 45m	7.80%
	Guided activities:	6h	4.80%
	Self study:	80h	64.00%

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Content

Introduction to the port and port management

Learning time: 4h 48m

Theory classes: 2h
Self study : 2h 48m

Description:
Port. Functions. A brief history. Types of ports. Areas of influence. Types of boats. Types and classification of goods. Contracts for transportation and port organization.

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

Port Planning

Learning time: 4h 48m

Theory classes: 2h
Self study : 2h 48m

Description:
Port planning. Types of plans. Estimation of capacity. A cost / benefit. Applicable law.

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

Port terminals

Learning time: 16h 48m

Theory classes: 3h
Practical classes: 1h
Laboratory classes: 3h
Self study : 9h 48m

Description:
Terminal solid jets. Terminals of liquid jets. Container terminals. general cargo terminals. Ro-ro terminals. Multipurpose terminals.
T
Practical exercise on designing a port terminal.

Specific objectives:
Description of different types of port terminals.
T
Being able to design, broadly speaking, a port terminal and its main characteristics.

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

Description:
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.

Specific objectives:
The environmental review to consider in the design of port and
Being able to apply different methods of calculation of maritime works.

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

Description:
Types of works. Docks. Jetties. Dolfina

Specific objectives:
Understanding the different kinds and types of maritime works inside the ports.

Wave interaction / structure	Learning time: 7h 11m Theory classes: 1h Laboratory classes: 2h Self study : 4h 11m

Description:
Run-up
Visit the Maritime Engineering Laboratory tests to monitor different processes of interaction of waves - structure.

Specific objectives:
To study the phenomena
Observed in laboratory

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The currents in the port engineering	Learning time: 4h 48m Practical classes: 2h Self study : 2h 48m

Description:
The currents in the port area. Influence of currents on the maneuverability. Influence of currents on the dispersion of pollutants. Numerical models of currents. Predicted operational currents.

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

Interaction port / sediment	Learning time: 2h 24m Practical classes: 1h Self study : 1h 24m

Description:
Interaction port / coast. Silting. Dredging. Dredging equipment. Characterization of dredged materials. Zones of discharge.

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

Water quality in ports	Learning time: 7h 11m Theory classes: 2h Practical classes: 1h Self study : 4h 11m

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.

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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
Lashing systems. Lay-out. Construction methods. Materials. Foundations. Design of subsea pipelines

Specific objectives:
Know that is a different structure and existing offshore.
Review, a practical way, the different calculation methods of OFFSHORE estrcutures
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

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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:

Cur/Ciria. Manual on the use of rock in coastal and shoreline engineering. Gouda/Londres: Ciria Special publication, 1991.

Goda, Y. Random seas and design of maritime structures. 3rd ed. World Scientific, 2000. ISBN 9789814282406.

Herbich, J.B. (Ed.). Handbook of coastal engineering. New York: McGraw Hill, 2000. ISBN 0071344020.

Tsinker, J.P.. Handbook of Port and Harbour Engineering. Geotechnical and structural aspects. Chapman & Hall, 1997.

Coastal Engineering Manual (CEM). US Army Corps of Engineers, 2000.

Puertos del Estado. ROM 3.1-99. Recomendaciones para el proyecto y construcción de áreas de flotación. Ministerio de Fomento, 1999.

Lun, Y.H.V., Lai, K.H. y Cheng, T.C.E.. Shipping and logistics management. Springer, 2010.

Headland, J.R.. Port planning and engineering. Amer Inst of Chemical Engineers, 2012.

El-Reedy, M.A.. Offshore structures: design, construction and maintenance. Gulf Profesional Publishing, 2012.

Multon, B.. Marine renewable energy handbook (ISTE). Wiley-ISTE, 2012.

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 E stado. ROM 0.0. Procedimiento general y basesalculo en el proyecto de obras marítimas y portuarias. Ministerio de Fomento, 2000.

Brunn, P. (eds.). Design and construction of mounds for breakwaters and coastal protection. Amsterdam: Elsevier, 1985. ISBN 0444423915.