Last update: 04-11-2015

250432 - ENGGESCOST - Coastal Engineering and Management

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, English

Teaching staff

Coordinator: MANEL ESPINO INFANTES

Others: MANEL ESPINO INFANTES, JOSE ANTONIO JIMENEZ QUINTANA

Opening hours

Timetable: Wednesday 14:00 to 15:00

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 3 hours per week of classroom activity

2,2 hours are devoted to theoretical lectures, in which the teacher presents the basic concepts and topics of the subject, shows examples and solves exercises.

0,8 hours 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.

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.

The objective of this course is to train students in the fields of dynamics, water quality and sediment transport in coastal

250432 - ENGGESCOST - Coastal Engineering and Management

areas, as well as in engineering and management activities in that area.

In particular, it is intended that students acquire an advanced knowledge of the agents and processes that act in the coastal zone (coastal dynamics, water quality and sediment transport). This training will focus mainly on training the student in the quantification of the processes which present the main methods, models and estimation techniques, emphasizing the range of application and validity.

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%

Last update: 04-11-2015

250432 - ENGGESCOST - Coastal Engineering and Management

Content

introduction

Learning time: 7h 11m

Theory classes: 3h
Self study : 4h 11m

Description:
Presentation and course structure.
The coastal area. Delimitation and components.
Applications, resources, ecosystem functions and services. Processes, responses, pressures, impacts and issues in the coastal zone

Specific objectives:
Approach of the course objectives and course development. Concepts of time and space scales to define processes, problems and solutions.
Basic types of coastal problems.
Sustainability.

Hydrodynamic modeling in coastal environments

Learning time: 21h 36m

Theory classes: 6h
Practical classes: 3h
Self study : 12h 36m

Description:
Basics waves. Spectral wave models. Waves in coastal areas. Introduction to SWAN model
Practical exercises with computer about the SWAN model
Types of currents at sea. Observation and representation of oceanographic variables. Modeling ocean currents. Examples of Operational Oceanography.

Specific objectives:
To familiarize students with the mathematical description of waves costaneras relevant from the perspective of civil engineering
To familiarize students with the model of wave generation and propagation SWAN
To familiarize students with the mathematical description and numerical ocean currents relevant from the perspective of civil engineering.

250432 - ENGGESCOST - Coastal Engineering and Management

Dispersion of pollutants in coastal areas and estuaries

Learning time: 14h 23m

Theory classes: 3h
Practical classes: 3h
Self study : 8h 23m

Description:
Molecular and turbulent diffusion.
Dispersion in coastal and estuarine areas.
Numerical models and field measurements

Statistics spills.
Physical and chemical characteristics of oil.
Environmental conditions.
Processes and algorithms.
Spills submarines.
Dispersants.
Models and applications

Work experience with GNOME and ADIOS models from NOAA

Specific objectives:
Study of the physical and mathematical models related to the dispersion and transport of pollutants in the coastal zone
To familiarize the student with the problematic of oil spills at sea and the subsequent arrival of fuel stains on the coast, driven by currents, waves and wind.
To familiarize students with oil spill models GNOME and ADIOS from NOAA

Evaluation

Learning time: 12h

Laboratory classes: 5h
Self study : 7h

Last update: 04-11-2015

250432 - ENGGESCOST - Coastal Engineering and Management

Sediment transport and coastal evolution

Learning time: 14h 23m

Theory classes: 4h
Practical classes: 2h
Self study : 8h 23m

Description:
Initiation of motion.
Transport mechanism
Issues and actions typical in the coastal area based on an approach from the mechanics of transport
Role of beach protection
Assessment of storm erosion.
Profile evolution models.

Proceedings before the impact of coastal storms

Design and impact of coastal works and activities

Learning time: 16h 48m

Theory classes: 4h
Practical classes: 3h
Self study : 9h 48m

Description:
Problems caused by gradients in the transport.
Affected functions.
Evaluation of gradient evolution.
Models in plant evolution.

Coastal actions to gradient-induced problems in transport along the coast
Artificial beaches.
Systems breakwaters.

Sand extraction

Planning and management of the coastal system

Learning time: 7h 11m

Theory classes: 3h
Self study : 4h 11m

Description:
Integrated Coastal Zone Management.
Coastal vulnerability to erosion and flooding.
Coastal vulnerability to toxic dumping.

250432 - ENGGESCOST - Coastal Engineering and Management

Qualification system

The mark of the course is obtained from the qualifications of the tutored course work (30%) and two specific evaluation tests (35% each one).

Course work is directed to develop a maritime engineering analysis to a real problem of the Spanish coast. Requires teamwork, preparation of a written report and a final presentation in front of the class.

Specific evaluation tests consist of a part with questions on concepts associated with the learning objectives of the course in terms of knowledge or understanding, and a set of application exercises.

Regulations for carrying out activities

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Marks will range between 10 (maximum score) to 0 (minimum score)

The specific evaluation test will give approximate equal weight to the conceptual questions and to the application exercises. The tutores course work will be evaluated from the written report and the oral presentation. Different marks may be given to different members of the team, based on their respective contributions to the team work.

Last update: 04-11-2015

250432 - ENGGESCOST - Coastal Engineering and Management

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Complementary:

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