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250408 - ENGAIGUA - Water 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 Compulsory)
MASTER'S DEGREE IN CIVIL ENGINEERING (RESEARCH TRACK) (Syllabus 2009). (Teaching unit Optional)

ECTS credits: 6 Teaching languages: Catalan, Spanish, English

Teaching staff

Coordinator: JAUME PUIGAGUT JUAREZ

Others: ERNEST BLADE CASTELLET, ENRIQUE BONET GIL, MANEL ESPINO INFANTES, VICENTE GRACIA GARCIA, JAUME PUIGAGUT JUAREZ, MARTI SANCHEZ JUNY, ENRICA UGGETTI

Opening hours

Timetable: Friday form 15h00 to 17h00

Degree competences to which the subject contributes

Specific:

8205. The ability to plan and dimension water and wastewater processing and treatment systems.

8230. The ability to plan, dimension, construct and maintain hydraulic works.

8231. The ability to plan, evaluate and regulate the use of surface water and groundwater resources.

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 is based on four hours per week. Th structure of the sessions (2 hours per class) is as follows: 1.- Theoretical concepts (mostly taking about 1.5 hours) and, 2.- numerical exercises (mostly taking about 0.5 hours). This structure will be repeated along the course as long as the addressed concepts allow to combine theoretical concepts and numerical exercises.
Material used for the course will be placed in the ATENEA intranet: contents, evaluation exercises and directed learning as well as literatura.

Learning objectives of the subject

Students will learn to apply their knowledge of hydraulic, maritime and environmental engineering.

Upon completion of the course, students will be able to:

Analyse and establish the requirements of hydraulic infrastructure and understand its environmental impact;

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Plan, dimension, construct and maintain hydraulic infrastructure;
Plan, evaluate and regulate the use of surface and underground water resources;
Analyse and establish the requirements of environmental engineering processes, including regeneration of water for reuse in environmental protection applications;
Plan and dimension water and wastewater processing and treatment systems;
Analyse maritime engineering problems;
Understand dynamic phenomena of the coastal ocean and atmosphere and solve problems encountered in port and coastal areas, including the environmental impact of coastal interventions;
Analyse and plan maritime works.

Planning, dimensioning, construction and maintenance of hydraulic infrastructure; Planning, evaluation and regulation of the use of surface and underground water resources; Planning and dimensioning of water and wastewater processing and treatment systems; Dynamic phenomena of the coastal ocean and atmosphere: Problems encountered in port and coastal areas, including the environmental impact of coastal interventions; Analysis and planning of maritime works.

Study load

Total learning time: 150h	Theory classes:	25h 58,8m	17.32%
	Practical classes:	13h 01,2m	8.68%
	Laboratory classes:	13h 01,2m	8.68%
	Guided activities:	1h 58,8m	1.32%
	Self study:	96h	64.00%

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Content

coastal and estuarine hidrodynamics

Learning time: 16h 48m

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

Description:
treat estuarine and coastal hydrodynamics
dd

Specific objectives:
Familiarize students with the description of physical processes relevant coastal ocean dynamics from the perspective of engineering civil.Familiaritzar
ddd

The water quality in coastal

Learning time: 14h 23m

Theory classes: 6h
Self study : 8h 23m

Description:
Introduction to marine engineering
Concepts of marine pollution
Concepts of dispersion and difussion in marine environment
Describe the monitoring and management tools applied to marine engineering in a coastal town
Describe the submarine emissaries

Specific objectives:
To provide students with the basics to follow the course
To provide students with the concepts of pollution at sea
To provide students with the knowledge to understand the dispersion and difussion processes
To provide students with the knowledge to manage and control processes
To provide the knowledge to measure alunme an outfall

Case Study I - Maritime

Learning time: 2h 24m

Practical classes: 1h
Self study : 1h 24m

Description:
Case study on water quality in coastal

Specific objectives:
Put into practice the knowledge acquired and integrated

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Case Study II - Maritime	Learning time: 2h 24m Practical classes: 1h Self study : 1h 24m

Description:
Case Study II

evaluation	Learning time: 12h Laboratory classes: 5h Self study : 7h

Introduction to variable flow regime in water. Equations.	Learning time: 4h 48m Theory classes: 2h Self study : 2h 48m

Description:
Variable interest regime
1D Saint Venant equations

Resolution methods of equations of the system variable 1D. Numerical schemes	Learning time: 4h 48m Theory classes: 2h Self study : 2h 48m

Description:
Finite difference methods
The scheme Preissman

Analysis of the flood hazard -Hec-GeoRas-I	Learning time: 4h 48m Laboratory classes: 2h Self study : 2h 48m

Description:
Getting geometries using GIS tools

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Analysis of flood-hazard Hec-GeoRas_II	Learning time: 4h 48m Laboratory classes: 2h Self study : 2h 48m

Description:
Simulations
Analysis of results

The regime variable in torrential channels. Concepts, equations and numerical schemes	Learning time: 4h 48m Theory classes: 2h Self study : 2h 48m

Description:
The finite volume method
Schemes descentrats

Dimensional modeling of flow in rivers	Learning time: 4h 48m Laboratory classes: 2h Self study : 2h 48m

Description:
Introduction to model Iber
Applying the analysis of a flood in a river avenue

The physical modeling in hydraulic engineering and fluvial dynamics	Learning time: 4h 48m Theory classes: 2h Self study : 2h 48m

Description:
Similarity theory, types of scale models and scale effects

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Modeling and analysis of the danger of flooding in urban areas	Learning time: 4h 48m Theory classes: 1h Laboratory classes: 1h Self study : 2h 48m

Description:
Sources of information
Special urban drainage modeling and its

case study hydraulic	Learning time: 2h 24m Theory classes: 1h Self study : 1h 24m

Description:
Exercises in groups of 2

Water quality parameters (microbiological and physical-chemical)	Learning time: 2h 24m Theory classes: 1h Self study : 1h 24m

Description:
Microbiological quality parameters

characteristics of the wastewater	Learning time: 4h 48m Theory classes: 1h Practical classes: 1h Self study : 2h 48m

Description:
Characteristics of wastewater
exercises

regulations	Learning time: 2h 24m Theory classes: 1h Self study : 1h 24m

Description:
Reuse Regulations

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

Description:
conventional treatment
Treatments II
exercises

Fate of water	Learning time: 4h 48m Theory classes: 2h Self study : 2h 48m

Description:
Management and Reuse

unconventional treatment systems	Learning time: 12h Theory classes: 2h Practical classes: 3h Self study : 7h

Description:
Management of wastewater in the city of the future
bioelectrochemistry systems
calculation of electricity production with bio-electrochemical systems

Qualification system

The evaluation of the course is carried out by means of the continuous evaluation method.
Continous evaluation consists of carrying out different activities, either individually or in group, of additive caracter, carried out along the course. More precisely, activities that will be subjected to evaluation will be: a) one examen for each part of the cours (three in total, one for the part of environmental engineering, one for the maritime engineering and one for the hydraulic engineering) and b) the evaluation of different case studies

Regulations for carrying out activities

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

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Basic:

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Wood, I.R., Bell, R.G. and Wilkinson, D.L.. Ocean disposal of wastewater. Pergamon Press, 1992.

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Tolmazin, D.. Elements of dynamics oceanography. 1985.

Knauss, J.A.. Introduction to physical oceanography. Prentice Hall, 1997.

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