River Dynamics (250431)

General Information

School	ETSECCPB
Departments	Departament d'Enginyeria Civil i Ambiental (DECA) Institut en Dinàmica Fluvial i en Enginyeria Hidrològica (FLUMEN) (FLUMEN)
Credits	5.0 ECTS
Programs	MÀSTER UNIVERSITARI EN ENGINYERIA DE CAMINS, CANALS I PORTS (pla 2012) MÀSTER UNIVERSITARI EN ENGINYERIA DE CAMINS, CANALS I PORTS (pla 2012) PARS: ENGINYER/A DE CAMINS, CANALS I PORTS (pla 2022)
Course	2024/25

Main teaching language at each group

- Group 10CA2 Catalan (Q2)

Faculty

Responsible Faculty: Ernest Blade Castellet
Faculty: Ernest Blade Castellet, Carles Ferrer Boix, Juan Pedro Martín Vide, Francisco Nuñez González

Objectives of Education

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 subject gives an overview of various aspectsof River Dynamics and complements the knowledge previously acquired river engineering. We see a vision that encompasses ecological, numerical methods, descriptive and theoretical aspects. The course is taught by several professors that provide an overview of the current state of the art, tools and latest trends.

Competencies

Especific

The ability to plan, dimension, construct and maintain hydraulic works.
The ability to plan, evaluate and regulate the use of surface water and groundwater resources.

Transversal

ENTREPRENEURSHIP AND INNOVATION: Being aware of and understanding the mechanisms on which scientific research is based, as well as the mechanisms and instruments for transferring results among socio-economic agents involved in research, development and innovation processes.
SUSTAINABILITY AND SOCIAL COMMITMENT: Being aware of and understanding the complexity of the economic and social phenomena typical of a welfare society, and being able to relate social welfare to globalisation and sustainability and to use technique, technology, economics and sustainability in a balanced and compatible manner.

TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

Total hours of student work

		Hours	Percentage
Supervised Learning	Large group	25.5 h	56.67 %
	Medium group	9.75 h	21.67 %
	Laboratory classes	9.75 h	21.67 %
	Guided Activities	0.0 h	0.00 %
Self Study		80.0 h	

Contents

Introduction

Description of the current state of rivers in developed countries and the problems that arise

Hydraulic Ecology

Approach to the ecological functioning of river
Seasonal patterns and evolution of the composition of the water

Modelling fluvial processes

Description of numerical methods if equations that describe fluvial processes beyond hydrodynamics: transport of sediments, pollutants, turbulence, wind, etc..
Using numerical simulation tools for the analysis of pollutants and sediment transport.
Use of hydoinformatics for simulation of fluvial processes. Advanced hydrodynamic aspects: bridges, gates, culverts, wind, dam break, etc..
Models and theory sembñlança reduced by fluvial dynamics studies. Case Studies

Reservoirs

Analysis of the hydrodynamics of a Mediterranean reservoir along a year. Modeling tools

Impacts on rivers

Effects of infrastructures, mainly dams, in the dynamics of rivers
The temperature in rivers. Alterations due to dams, cooling facilities, etc.).

Equilibrium and sediment transport

Aspects that influence the transversal and longitudinal equilibrium of a river. Expected evolution
Effects of nonuniform distribution of grain size on the sedimentary dynamics of a river

Other

A speaker on a topic of current intereston fluvial dynamics will be invited

Evaluation

Activities

Introduction and development of volunteer work of the course

Dedication

6h

Teaching Methodology

The course consists of 3hores a week of classes in the regular classroom and the classroom informàtica.S uses material support through the virtual campus ATENEA: content, programming and evaluation activities of learning and bibliography.

Although most of the sessions will be given in the language indicated, sessions supported by other occasional guest experts may be held in other languages.

Grading Rules

(*) The evaluation calendar and grading rules will be approved before the start of the course.

The rating of the course is obtained from the continuous assessment marks which consist of courseworks and exams

Courseworks are vounteer. Each coursework will be considered as one or two additional questions of the final exam. If all the courseworks sre ddone, they will represent 50% of the final grade.

Test Rules

The courseworks are done in groups of two students

Bibliography

Basic

- Petts, G.E.; Amoros, C. Fluvial hydrosystems. London: Chapman & Hall, 1996. ISBN 0412371006.
- Chaudhry, M.H. Open-channel flow. 2nd ed. New York: Prentice Hall, 2007. ISBN 9780387301747.
- Martín Vide, J.P. Ingeniería de ríos. 2a ed. Barcelona: Edicions UPC, 2006. ISBN 9788483019009.

Complementary

- Sedimentation engineering: processes, measurements, modeling and practice. New York: ASCE, 2007. ISBN 9780784471289.
- Toro, E.F. Shock-capturing methods for free-surface shallow flows. Chichester: John Wiley & Sons, 2001. ISBN 0471987662.