Debris Flow and Flash Flood. Risk, Vulnerability, Hazard and Resilience Concepts (250911)

General Information

School	ETSECCPB
Departments	Departament d'Enginyeria Civil i Ambiental (DECA) Departament de Màquines i Motors Tèrmics (MMT)
Credits	5.0 ECTS
Programs	MÀSTER UNIVERSITARI EN ENGINYERIA DE L'AIGUA (pla 2025) MÀSTER UNIVERSITARI ERASMUS MUNDUS EN GESTIÓ DEL RISC D'INUNDACIÓ (pla 2024) MÀSTER UNIVERSITARI ERASMUS MUNDUS EN GESTIÓ DEL RISC PER INUNDACIÓ (pla 2019)
Course	2025/26

Main teaching language at each group

- Group 10Q1 English (Q1)

Faculty

Responsible Faculty: Vicente César De Medina Iglesias
Faculty: Vicente César De Medina Iglesias

Objectives of Education

The principal objective of the present course is to introduce the student to new phenomena as the debris flow and flash flood. The students learn how to evaluate the debris flows and flash floods mathematics and how to delimitate flooded areas, and also to calibrate and create new models. The students learn and apply concepts as risk, vulnerability and resilience.

Total hours of student work

		Hours	Percentage
Supervised Learning	Large group	45.0 h	100.00 %
	Medium group	0.0 h	0.00 %
	Laboratory classes	0.0 h	0.00 %
	Guided Activities	0.0 h	0.00 %
Self Study		80.0 h	

Contents

introduction

Introduction to the subject.

Risk assessment

Quantitative description of risk analysis.
Introduction to hazard analysis-

Initiation

Introduction to the initiation mechanisms of DFs.
Introduction to the DF start-up processes.
Use of qualitative initiation models.
Use of quantitative models of initiation.

Propagation

Rehology
Hydrodynamics of DF.
Qualitative models.
Use of 1D models.
Use of 2D models.

Risk management

Structural measures.
Risk exposure assessment.
Introduction to resilience.
Erosion processes in hydraulic structures.
Quantitative methodology for risk.

experiments

Preparation of DF experiments.
Realization of the DF experiments.

Teaching Methodology

The course consists of 2 hours per week of classroom activity (large size group) and 0.8 hours weekly with half the students (medium size group).

The 2 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.

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 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.

Bibliography

Basic

- Takahashi, Tamotsu. Debris flow : mechanics, prediction, and countermeasures. 2nd ed. Leiden, The Netherlands: CRC Press, 2014. ISBN 9781136687518.