Course guide
250912 - 250912 - Coastal Flooding: Impacts, Conflicts and Risks

Last modified: 27/05/2024

Unit in charge: Barcelona School of Civil Engineering
Teaching unit: 751 - DECA - Department of Civil and Environmental Engineering.

Degree: ERASMUS MUNDUS MASTER'S DEGREE IN FLOOD RISK MANAGEMENT (Syllabus 2019). (Compulsory subject).

Academic year: 2023 **ECTS Credits:** 3.0 **Languages:** English

LECTURER

Coordinating lecturer: AGUSTIN SANCHEZ-ARCILLA CONEJO

Others: JOSE MARIA ALSINA TORRENT, CORRADO ALTOMARE, MARIA LISTE MUÑOZ, AGUSTIN SANCHEZ-ARCILLA CONEJO, XAVIER SÁNCHEZ ARTÚS

TEACHING METHODOLOGY

The cours consists of 22 hours of face-to-face classes in the classroom

The rest of the hours are devoted to the preparation of a work.

Support material is used in the form of a detailed teaching plan through the ATENEA virtual campus: contents, schedule of assessment and directed learning activities and bibliography.

Although the majority of sessions will be held in the language indicated in the guide, sessions supported by other guest experts from time to time may be held in another language.

LEARNING OBJECTIVES OF THE SUBJECT

To present the coastal zone as a dynamic zone submitted to an increase in pressures of use and, thus, with a high level of risk for the infrastructures/activities that "rigidize" it. To present the main driving factors for coastal dynamics in terms of the risk that they produce. To present how the risk does develop, how to manage it and its perception by the "agents" that live at and use the coast.

To present the coastal zone as a dynamic zone subject to increased use pressures and therefore with a high level of risk to the infrastructures/activities that "govern" it. To present the main drivers of coastal dynamics in terms of the risk they produce. To present how risk develops, how to manage it and its perception by the "agents" who live and use the coast.

STUDY LOAD

Type	Hours	Percentage
Hours large group	15,3	20.37
Hours medium group	5,9	7.86
Hours small group	5,9	7.86
Self study	48,0	63.91

Total learning time: 75.1 h

CONTENTS

Introduction

Description:
In this module, students will be shown the structure of the course and its main objectives, illustrated with real examples.

Specific objectives:
Objectives and organization. Definition of concepts and examples

Full-or-part-time: 4h 48m
Theory classes: 2h
Self study : 2h 48m

Coastal flooding and erosion risks

Description:
This module will introduce students to the origin and propagation of flood and erosion risks in coastal areas. The different common coastal typologies in European coasts will be considered with emphasis on low coastal areas that present a higher risk of flooding and erosion.

Analytical formulations for a first estimation of erosion and flooding will be analyzed, depending on characteristic wave parameters such as superelevation, irregularity or wave types. In the same way, the different variations of sea level will be considered, presenting, in an integrative way, the meteorological tide, the astronomical tide and the elevation due to wave breaking (SET UP). The capabilities of the usual models to simulate and analyze erosion and inundation will also be presented and discussed.

Translated with www.DeepL.com/Translator (free version)
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This module will present the main coastal structures, both rigid and green engineered, that contribute to risk in the coastal zone. Emphasis will be placed on the time scale associated with the calculation of this risk and what is the best scale to evaluate the efficiency of the coastal structures presented.

Specific objectives:
Familiarizar al alumnado con el origen y propagación de los riesgos debidos a la erosión costera y debidos a la inundación costera.

Presentar y analizar críticamente las formulaciones disponibles y los modelos numéricos más habituales para simular y analizar la erosión y de inundación costera, considerando, de forma integradora, la marea emergida y sumergida.
To familiarize students with the origin and propagation of risks due to coastal erosion and coastal flooding.
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To present the main coastal structures to reduce the risk at different staircases.
To familiarize the student to the efficiency of these coastal structures, both rigid and green at different time scales.

Full-or-part-time: 26h 24m
Theory classes: 7h
Practical classes: 4h
Self study : 15h 24m

Risk reduction by coastal structures

Description:
This module will present the main coastal structures, both rigid and green engineered, that contribute to risk in the coastal zone. Emphasis will be placed on the time scale associated with the calculation of this risk and what is the best scale to evaluate the efficiency of the coastal structures presented.

Specific objectives:
To present the main coastal structures to reduce the risk at different staircases.
To familiarize the student to the efficiency of these coastal structures, both rigid and green at different time scales.

Full-or-part-time: 7h 11m
Theory classes: 3h
Self study : 4h 11m

Risks associated to coastal processes

Description:
Summary of typology and predictive equations for shore waves trapped on the coast and infragravitational waves associated with wave groups. Summary of typology and equations for long period waves associated with atmospheric pulsations.

Presentation of the morphological response associated with low frequency waves and their interaction with erosional and active processes.

Relationship between erosion and flood hazards with infragravitational waves and associated morphological response.

Summary presentation of accretionary flows as a function of the type of coastline and existing meteoceanographic conditions.

Reduction of the risk due to accretionary flows depending on different types of interventions on the coast, especially dykes parallel to the shore.

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Summary presentation of accretionary flows as a function of the type of coastline and existing meteoceanographic conditions.

Reduction of the risk due to accretionary flows depending on different types of interventions on the coast, especially dykes parallel to the shore.

Specific objectives:
To familiarize the student with the concepts of long waves both parallel and perpendicular to the shore in shallow areas. To critically compare erosional and active processes so that the student is aware of their different intensity and time scale and how each type of process conditions coastal risks.
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Full-or-part-time: 16h 48m
Theory classes: 5h
Practical classes: 2h
Self study : 9h 48m

Presentations

Full-or-part-time: 9h 36m
Laboratory classes: 4h
Self study : 5h 36m

GRADING SYSTEM

The grade for the subject is obtained on the basis of the coursework with progressive assessment and final public presentation. The final grade will be the result of the course work and the continuous evaluation.

EXAMINATION RULES.

The document and the presentation will be taken into account. Delivery of the coursework material (report and ppt) and public defence of the same.

BIBLIOGRAPHY

Basic:

- Navarra, A. & Tubiana, L.. Regional Assessment of Climate Change in the Mediterranean. 1. Volume 1: Air, Sea and Precipitation and Water. Springer, 2013. ISBN ISBN 9400757808, 9789400757806.
- Navarra, A. & Tubiana, L. Agriculture, Forests and Ecosystem Services and People. Volum 2. Springer, 2013. ISBN 10.1007/978-94-007-5772-1.
- Navarra, A. & Tubiana, L.. Case studies. Volum 3. Springer, 2013.
- Basco, David. Design of Coastal Hazard Mitigation Alternatives for Rising Seas. Singapore: World Scientific 2020, 2020. ISBN 9789811206931.
- H.H. Lamb. Climate, History and the Modern World. World. Ed. Routledge, Taylor & Francis Group. 1997. ISBN ISBN 0-415-12735-1.