Course guide
250576 - TEXPECAMLA - Experimental Techniques in Laboratory and Field

Last modified: 20/06/2024

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

Degree: BACHELOR'S DEGREE IN MARINE SCIENCE AND TECHNOLOGY (Syllabus 2018). (Compulsory subject).

Academic year: 2024 **ECTS Credits:** 6.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: FRANCESC XAVIER GIRONELLA I COBOS

Others: Gironella I Cobos, Francesc Xavier
Caceres Rabionet, Ivan

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
13388. To know and apply the lexicon and concepts of the Marine Sciences and Technologies and other related fields.
13390. Establish a good practice in the integration of common numerical, laboratory and field techniques in the analysis of any problem related to the marine environment.
13394. Address the most relevant processes and their interactions related to their physical / chemical / biological / geological components, applying technical and scientific knowledge and criteria.
13397. Carry out environmental impact, management and protection studies of the marine environment and adjacent coastal areas, including the corresponding infrastructures and their related impacts.
13403. Develop a conceptual framework to address the sustainability of the marine environment and the related socio-economic activities at different scales, explaining the effects of climate change.
13404. Set, plan and execute basic and applied research in the field of Marine Sciences and Technologies.
13405. Carry out calculations, assessments, surveys and inspections in coastal and marine environments, as well as the corresponding technical documents.
13406. Write technical reports and disseminate knowledge about the different components of the marine system, considering the applicable legal framework.

Generical:
13382. Apply state-of-the-art methods and techniques in oceanography and marine climate, jointly covering the physical, chemical, geological and biological aspects.
13383. Develop a conceptual framework that links the scientific-technological and management aspects for marine resources, explaining the interactions with marine infrastructures and management plans in coastal areas.
13384. Apply knowledge and academic experience to the control and monitoring of the marine environment and its coastal boundary, using the state-of-the-art tools in the Marine Sciences and Technologies.
13386. Encompass and teach studies in the different research lines that converge in Marine Sciences and Technologies.
13387. Combining preservation with economic activity within the framework of current legislation promoting the development of a social and environmental awareness.

TEACHING METHODOLOGY

The course consists of 4 (2 + 2) hours a week mostly in the classroom.
In the lectures the teacher explains the concepts and basic materials of the subject, presents examples and exercises.
In practical classes approached solving problems with greater interaction with students to consolidate the learning objectives.
Support materials used in the form of detailed educational plan through the virtual campus ATENEA: content, programming and evaluation activities directed learning and literature.

LEARNING OBJECTIVES OF THE SUBJECT

This subject will show the most relevant aspects of observation field campaigns and the methods of experimentation in a physical laboratory on a reduced scale, as indispensable tools in meteo-oceanographic studies, as well as the complementarity between both disciplines. The students will be shown how to design and execute field measurement campaigns, emphasizing the spatial and temporal scales of the processes to be studied, as well as the type of measures that are required, either for characterization or to obtain essential data for numerical simulations. On the other hand, the most relevant aspects of laboratory experimentation will be shown, highlighting important aspects related to experimental design, scale effects, operability, etc. In both cases, students will be shown the measuring devices, their implementation, their scope and limitations and the combination of field and laboratory experiments to generate added value.

1.- Design the work campaigns in the field, solve the logistics of the activities of the different scientific teams involved, know the respective action protocols as well as organize and direct the correct execution of the scheduled tasks.
2.- Understand the problems related to scale and laboratory effects for the correct interpretation of the results and possible comparison with field results.
3.- Carry out laboratory measurements following pre-established protocols, estimate systematic and random errors and make a report relative to a measuring process and its analysis.

This subject is focused on showing, familiarizing and training students with techniques of observation, monitoring, acquisition and treatment of marine data, as well as modeling techniques, physical and numerical, which allow to characterize practically all of the real problems that will have to address in the professional practice and that will allow the students to finish a generic training cycle but with advanced and transversal knowledge in Sciences and Technologies of the Sea.

Around the most relevant variables, know why they are measured and how they are measured. Design the work campaigns in the field, solve the logistics of the activities of the different scientific teams involved, know the respective action protocols, as well as organize and direct the correct execution of the scheduled tasks. Understand problems related to scale and laboratory effects for the correct interpretation of results and possible comparison with field results. Carry out laboratory measurements following pre-established protocols, estimate systematic and random errors and carry out a report on a measurement process and its analysis.

STUDY LOAD

Type	Hours	Percentage
Hours large group	30,0	20.00
Hours medium group	15,0	10.00
Self study	90,0	60.00
Hours small group	15,0	10.00

Total learning time: 150 h

CONTENTS

Introduction

Description:
Temari
Variables and processes. Time and space scales
Practice

Full-or-part-time: 12h
Theory classes: 3h
Practical classes: 2h
Self study : 7h

Scale laws

Description:
Laws of scale and Pine Theorem
Laws of scale and Pine Theorem

Full-or-part-time: 12h
Theory classes: 2h
Practical classes: 3h
Self study : 7h

Facilities I

Description:
Docks, vessels, satellites

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

Facilities II

Description:
Flumes, basins

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

Meteorology

Description:
Relevance of meteorology and workstations

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

Sea level and waves

Description:
Zero reference (bathymetries / structures). Equipment: visual, tide gauges, radars, pressure sensors, resistive sensors, capacitive sensors, acoustic
Practice

Full-or-part-time: 16h 48m
Theory classes: 3h
Practical classes: 4h
Self study : 9h 48m

Chemical and biological variables

Description:
Chemical and biological variables

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

Bathymetries

Description:
Measurement equipment and data
Practice

Full-or-part-time: 16h 48m
Theory classes: 4h
Laboratory classes: 3h
Self study : 9h 48m

Currents

Description:
Measurement equipment and data
Measurement equipment and data. Practice.

Full-or-part-time: 9h 36m
Theory classes: 2h
Laboratory classes: 2h
Self study : 5h 36m

Sediment transport

Description:
Sea Sediment Transport (by bottom and suspension)
Wind sediment transport (rolling, jumping, suspension)
Practice

Full-or-part-time: 14h 23m
Theory classes: 4h
Practical classes: 2h
Self study : 8h 23m

Structures

Description:
Overtopping, forces and stability
Practice

Full-or-part-time: 19h 12m
Theory classes: 4h
Practical classes: 4h
Self study : 11h 12m

Laboratories

Description:
Laboratories

Full-or-part-time: 14h 23m
Laboratory classes: 6h
Self study : 8h 23m

Evaluations

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

GRADING SYSTEM

The rating of the course is obtained from the qualifications of two partial exams, deliverable work and the qualifications corresponding to laboratory practices. All activities, as well as laboratory practices, are compulsory.
The activities to be evaluated will be the following:
Control 1st partial, CP1, (35%)
Control 2nd partial, CP2, (35%)
Course work, TC, (10%)
The evaluation of the laboratory practices, LAB, will correspond to the average of the activities of this type and will be equivalent to 20% of the final mark.
Therefore, the final mark of the continuous evaluation will be
FINAL MARK = 0.35 * CP1 + 0.35 * CP2 + 0.10 * TC + 0.20 * LAB

EXAMINATION RULES.

All exams, activities, and laboratory practices are mandatory for continuous assessment.
Criteria for qualification and admission to reassessment: Students who fail the regular assessment and have attended the subject's assessment tests regularly will have the option to take a reassessment exam during the period specified in the academic calendar. Students who have already passed, or who are graded as not attended, or who have not submitted all exercises/problems and coursework and reports cannot take the reassessment exam for a subject.
Reassessment (RE) will consist of a single exam covering the entire course content. The maximum grade for reassessment will be five (5.0), and the final grade for the course will be the highest grade between continuous assessment and reassessment exam. Non-attendance by a student called for reassessment examination during the specified period will not give rise to another test at a later date. Extraordinary assessments will be carried out for those students who, due to accredited major force, have been unable to take any of the continuous assessment tests. These tests must be authorized by the corresponding head of studies, at the request of the responsible professor of the subject, and will be conducted within the corresponding academic period.

BIBLIOGRAPHY

Basic:
- CIRIA, CUR. Manual on the use of rock in coastal and shoreline engineering. London ; Gouda: CIRIA, CUR, 1991. ISBN 0860173267.
- Morang, A. [et al.]. Coastal engineering manual [on line]. Washington: U.S. Army Corps of Engineers, 2003 [Consultation: 02/02/2021]. Available on: http://www.a-jacks.com/Coastal/GeneralInfo/CEM/CEM.aspx.
- Dean, R.C.; Dalrymple, R.A. Water wave mechanics for engineers and scientists. 2nd. Singapore ; Teaneck, NJ: World Scientific, 1991. ISBN 9810204205.

RESOURCES

Other resources:
"The course consists of 4 (2 + 2) hours a week during the second semester of the course, mostly in the classroom.
In the lectures the teacher explains the concepts and basic materials of the subject, presents examples and exercises.
In practical classes approached solving problems with greater interaction with students.
Exercises are conducted to consolidate the learning objectives.
Support materials used in the form of detailed educational plan through the virtual campus ATENEA: content, programming and evaluation activities directed learning and literature. In general, teachers will teach their lectures in catalan.

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.

To do the laboratory practices you need the following personal protective equipment (PPE):
* Blue lab coat UPC Mechanical
* Protection gloves - Mechanical
You can buy them at UPC Shop (upc-shop.com) or any specialty store."