Course guide
250555 - GECFMEDMAR - Marine Environment Physics

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: 2022 ECTS Credits: 6.0 Languages: Catalan

LECTURER

Coordinating lecturer: MARC BERENGUER FERRER

Others: MARC BERENGUER FERRER, IVAN CACERES RABIONET, DANIEL SEMPERE TORRES

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.

General:
13380. Develop a professional activity in the field of Marine Sciences and Technologies.
13381. Address in a comprehensive manner the analysis and preservation of the marine environment with sustainability criteria.

TEACHING METHODOLOGY

The course consists of 2,3 hours per week of classroom activity (large size group) and 1,2 hours weekly with half the students (medium size group).

The 2,3 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 1,2 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 are 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.
LEARNING OBJECTIVES OF THE SUBJECT

In this course, the basic physical principles that occur in the marine physical environment are reviewed. Emphasis is placed on the concepts of oscillatory movement and fluid physics (kinematics, conservation equations, constituent equations in fluids, and Fluid Mechanics).

1.- Understand the laws of hydrostatics and fluid dynamics, as well as the principle of Archimedes and the continuity equation. Understand the basic principles of thermodynamics and fluid mechanics.
2.- Assimilate the concepts of basic wave phenomena (Snell’s laws, diffraction, wave groups, dispersion relation). Doppler effect.
3.- Understand the theory of linear waves and the laws that govern the propagation of light and sound in the ocean.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Hours large group</td>
<td>30,0</td>
<td>20.00</td>
</tr>
<tr>
<td>Guided activities</td>
<td>6,0</td>
<td>4.00</td>
</tr>
<tr>
<td>Hours medium group</td>
<td>15,0</td>
<td>10.00</td>
</tr>
<tr>
<td>Self study</td>
<td>84,0</td>
<td>56.00</td>
</tr>
<tr>
<td>Hours small group</td>
<td>15,0</td>
<td>10.00</td>
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</tbody>
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Total learning time: 150 h

CONTENTS

**Hydrostatic and fluid dynamics**

Description:
- Properties of fluids. Pressure
- Fluids - specific density and gravity - compressibility
- Flotation and Archimedes’ principle
- Exercises
- Exercises
- Fluid practice

Full-or-part-time: 52h 48m
- Theory classes: 16h
- Practical classes: 4h
- Laboratory classes: 2h
- Self study: 30h 48m
Waves

Description:
Types of waves and their properties. Energy and intensity.
Mathematical representation
Exercises
Reflection, transmission and interference. Stationary waves Resonance
Refraction. Snell’s law. Diffraction
Exercises
Wave groups and Doppler effect
Propagation of sound and light
Exercises

Full-or-part-time: 48h
Theory classes: 14h
Practical classes: 6h
Self study : 28h

Evaluation

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

Thermodynamics

Description:
Temperature, heat and energy transfer. Specific heat Latent heat Ideal gas equation.
Exercises
Exercises

Full-or-part-time: 28h 47m
Theory classes: 8h
Practical classes: 4h
Self study : 16h 47m

GRADING SYSTEM

The mark of the course is obtained as the weighted arithmetic mean of the grades of exercises assignments, 2 laboratory reports and 2 exams. The weights for these elements are:
Exercises: 10%
Laboratory reports: 20%
Mid-term exam: 25%
Final exam: 45%

The exams (evaluation tests) consist of several exercises to apply the concepts and learning objectives of the course.

EXAMINATION RULES.

Failure to perform a laboratory or continuous assessment activity in the scheduled period will result in a mark of zero in that activity.
**BIBLIOGRAPHY**

**Basic:**