280601 - Physics

**Coordinating unit:** 280 - FNB - Barcelona School of Nautical Studies

**Teaching unit:** 748 - FIS - Department of Physics

**Academic year:** 2020

**Degree:** BACHELOR'S DEGREE IN NAUTICAL SCIENCE AND MARITIME TRANSPORT (Syllabus 2010). (Teaching unit Compulsory)

**ECTS credits:** 9  

**Teaching languages:** Catalan, Spanish

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### Degree competences to which the subject contributes

**Specific:**

2. Understanding and mastering the basics of the general laws of mechanics, thermodynamics, fields and waves and electromagnetism and their application to problem solving principles of engineering.

**General:**

1. ABILITY TO IDENTIFY AND SOLVE PROBLEMS IN THE FIELD OF ENGINEERING

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### Teaching methodology

Receive, understand and synthesize knowledge
Put out and solve problems and questions related with the subject
Develop reasoning and critical thinking, pose it and defend, in written or oral
Perform an individual work
Perform a work in a reduced group.

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### Learning objectives of the subject

Understand and dominate the basic
Comprendre i dominar els conceptes bàsics sobre les lleis generals de la mecànica, termodinàmica, camps i ones, i electromagnetisme.

Aplicar els principis físics bàsics a la resolució de problemes propis de l'enginyeria.

Plantejar correctamente el problema a partir de l'enunciat proposat i identificar les opcions per la seva resolució. Aplicar el mètode de resolució apropiat.

Realitzar les tasques encomanades en el temps previst, d'acord amb les pautes marcats pel professor o tutor. Identificar el progrés i el grau de compliment dels objectius de l'aprenentatge.
## Study load

<table>
<thead>
<tr>
<th></th>
<th>Total learning time: 225h</th>
<th>Hours large group:</th>
<th>45h</th>
<th>20.00%</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group:</td>
<td>36h</td>
<td></td>
<td>16.00%</td>
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<tr>
<td></td>
<td>Hours small group:</td>
<td>9h</td>
<td></td>
<td>4.00%</td>
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<tr>
<td></td>
<td>Guided activities:</td>
<td>9h</td>
<td></td>
<td>4.00%</td>
</tr>
<tr>
<td></td>
<td>Self study:</td>
<td>126h</td>
<td></td>
<td>56.00%</td>
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</table>
### Content

#### Mechanics.

**Learning time:** 51h
- Theory classes: 36h
- Practical classes: 12h
- Laboratory classes: 2h
- Guided activities: 1h

**Description:**

**Related activities:**
- Reading of chapters of books specified in the bibliography, or notes.
- Listen to the teacher and participate in the problem solving.
- Solve problems individually.
- Realization of three practices with simulators (computer), on relative movement, movement with friction, and stopping of boats.

**Specific objectives:**
- Understand and master the basic concepts about the general laws of mechanics.
- Apply the basic physical principles of mechanics to the resolution of simple problems.
- Propose and solve correctly the simple mechanical problems from the proposed statements and identify the options for their resolution.

#### Oscillations.

**Learning time:** 30h
- Theory classes: 24h
- Practical classes: 6h

**Description:**

**Related activities:**
- Read the book chapters related to the oscillations of some of the recommended bibliography books.
- Listen to the teacher the indications on the ways to solve the simple exercises.
- Perform simple exercises on oscillations, autonomously
- Perform a practice with pendulums, to evaluate the value of gravity and estimate the error.

**Specific objectives:**
- Understand and master the basic concepts about the general laws of vibrations.
- Propose and solve correctly the simple problems of oscillations from the proposed statements.
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### Waves.

**Description:**

**Related activities:**
Read the chapters corresponding to waves in one of the books of the recommended basic bibliography. Listen to the teacher's instructions on solving problems. Perform three practices with a computer simulator on aspects of waves.

**Specific objectives:**
Understand and master the basic concepts about the general laws of the waves. Propose and solve correctly the wave problems from the proposed basic statements.

### (ENG) Termodinàmica i propietats tèrmiques de la matèria.

**Description:**

**Related activities:**
Read the chapters corresponding to thermodynamics in one of the books of the recommended basic bibliography. Listen to the teacher's instructions on solving problems. Perform an experimental practice (the cooling of a body) with a digital thermometer, and write the report.

**Specific objectives:**
Understand and master the basic concepts about the general laws of Thermodynamics. Propose and solve correctly the simple problems of thermodynamics from the basic statements proposed.
### (ENG) Electricitat i magnetisme.

**Learning time:** 32h  
- Theory classes: 24h  
- Practical classes: 6h  
- Laboratory classes: 2h

**Description:**  

**Related activities:**  
Read the chapters corresponding to waves in one of the books of the recommended basic bibliography.  
Listen to the teacher's instructions on solving problems.  
Perform an experimental practice (magnetic field of a magnet and its interaction with a compass), and write the report.

**Specific objectives:**  
Understand and master the basic concepts about the general laws of electromagnetism.  
Propose and solve correctly the simple problems on the magnetic field and its interaction with electric currents and magnetic moments from the proposed basic statements.

### Electromagnetic waves, light and properties.

**Learning time:** 22h  
- Theory classes: 16h  
- Practical classes: 4h  
- Laboratory classes: 2h

**Description:**  

**Related activities:**  
Read the chapters corresponding to electromagnetic waves in some of the books of the recommended basic bibliography.  
Solve some problems on the subject.

**Specific objectives:**  
Understand and master the basic concepts about the general laws of electromagnetic waves.
Final qualification results from:
\[ N_{\text{final}} = 0.45 \times N_{\text{pf}} + 0.25 \times N_{\text{pract}} + 0.30 \times N_{\text{parcials}} \]

The students that do not succeed will be able to, according to the norms from the University and the Center, to be re-evaluated, in the dates determined by the Center. In the re-evaluation, grades on practical exercises and other activities (Nac) will be taken into account, and can be completed, presenting them at the moment of re-evaluation exam, which will be graded as Nre. For the students which are re-evaluated, the final grade will be:
\[ N_{\text{final}} = 0.75 \times N_{\text{re}} + 0.25 \times N_{\text{pract}} \]

Nfinal: final qualification.
Npf: qualification of final exercise.
Npract: qualification from lab work and simulators work.
Nparcials: qualification of partial exercises.

Partial exercises will span up to 3 h each.

Regulations for carrying out activities

- Activities not performed by the student will not receive a grade.
- Not-presented grade will be given if a student does not perform evaluation exercises worth 25% of total grade or more.
Bibliography

Basic:


Complementary:


Others resources:

Hyperlink

http://baldufa.upc.es/

Hi ha alguns resums de teoria i exemples visuals, a més de problemes i qüestions