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

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 correctament el problema a partir de l’enunciat proposat i identificar les opciones per la seva resolució. Aplicar el
mètode de resolució apropiat. Realitzar les tasques encomanades en el temps previst, d'acord amb les pautes marcades pel professor o tutor. Identificar el progrés i el grau de compliment dels objectius de l'aprenentatge

<table>
<thead>
<tr>
<th>Study load</th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Total learning time:</strong> 225h</td>
<td>Hours large group:</td>
<td>45h 20.00%</td>
</tr>
<tr>
<td></td>
<td>Hours medium group:</td>
<td>36h 16.00%</td>
</tr>
<tr>
<td></td>
<td>Hours small group:</td>
<td>9h  4.00%</td>
</tr>
<tr>
<td></td>
<td>Guided activities:</td>
<td>9h   4.00%</td>
</tr>
<tr>
<td></td>
<td>Self study:</td>
<td>126h 56.00%</td>
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</tbody>
</table>
# 280601 - Physics

## Content

### Mechanics.

<table>
<thead>
<tr>
<th>Learning time: 51h</th>
</tr>
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<tbody>
<tr>
<td>Theory classes: 36h</td>
</tr>
<tr>
<td>Practical classes: 12h</td>
</tr>
<tr>
<td>Laboratory classes: 2h</td>
</tr>
<tr>
<td>Guided activities: 1h</td>
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</tbody>
</table>

**Description:**
Description of the movement: Cinematics. Relative movement. Coriolis and centripetal accelerations. Changes in
the movement: Dynamics. Newton's laws. Statics of rigid bodies. Rotation of a solid. Introduction to the
gyroscope (part of STCW A-II_1 I, and STCW A-II_2 III - Compass - magnetic and gyro Knowledge of the
principles of magnetic and gyro-compasses). Introduction to the mechanics of materials. Stresses in solids and in
fluids. Statics of fluids, Buoyancy. Fluids in movement: Equation of continuity and Bernoulli’s equation.
Movement with friction and with drag. Force, velocity and power. Energy in the transport.

**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.

<table>
<thead>
<tr>
<th>Learning time: 30h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes: 24h</td>
</tr>
<tr>
<td>Practical classes: 6h</td>
</tr>
</tbody>
</table>

**Description:**
Relaxation time and quality factor. The forced oscillations. Resonance and bandwidth.

**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.
Waves.

**Learning time:** 50h
- Theory classes: 10h
- Practical classes: 10h
- Laboratory classes: 6h
- Self study: 24h

**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.**

**Learning time:** 40h
- Theory classes: 30h
- Practical classes: 8h
- Laboratory classes: 2h

**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.

**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.

**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_{final} = 0.45 \text{ Npf} + 0.25 \text{ Npract} + 0.30 \text{ Nparcials}

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_{final} = 0.75 \times \text{Nre} + 0.25 \times \text{Npract}

N_{final}: final qualification.
N_{pf}: qualification of final exercise.
N_{pract}: qualification from lab work and simulators work.
N_{parcials}: 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.