Degree competences to which the subject contributes

Specific:
1. Understanding and mastery of basic concepts about the general laws of mechanics, thermodynamics and electromagnetism fields and waves and their application to solving problems in engineering.

Teaching methodology

The directed learning consists of several processes. At first, it is necessary to consider the theory classes which develop in a big group. The teaching staffs introduce, in a brief way, general objectives of the chapter. Later, it is attempted to involve students with exercises for their active participation. The material of this part is in ATENEA: objectives, concepts, examples, evaluated programmed activities and bibliography. In second place, classes of problems, which develop in medium groups, are carried out. People work in reduced groups doing problems and exercises related with the objectives of the subject. This is an opportunity to develop transversal competences of work in team and to introduce, for the first time, concepts of cooperative learning. In last place, laboratory practices allow to develop basic concepts of methodology, objectives, experimental material, results and conclusions. Also it is a way to know the scientific method for the resolution of technological challenges. These practices are made in groups small, teams of two persons. Students have to prepare some part of work out of the laboratory classroom. This work could be individual or in group. Finally, it is necessary to stand out a time dedicated to autonomous learning different work as recommended readings and exercises proposed.

Learning objectives of the subject

If the Physics I provides an understanding and domain of basic principles of the Physics in its Mechanics aspect, the Physics II will extend this domain to Oscillations, Waves and Thermodynamics. On overcoming the subject, students will have acquired:
Understanding and domain of cinematic and dynamics of the oscillatory movements, of particles as well as of solids.
Understanding and domain the wavy phenomena.
Understanding and domain the concepts and applications of the Temperature, Heat and Thermodynamics.
## Study load

<table>
<thead>
<tr>
<th></th>
<th>Hours large group:</th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Total learning time:</strong> 150h</td>
<td>32h</td>
<td>21.33%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>14h</td>
<td>9.33%</td>
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<tr>
<td></td>
<td>14h</td>
<td>9.33%</td>
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<tr>
<td></td>
<td>90h</td>
<td>60.00%</td>
<td></td>
</tr>
<tr>
<td><strong>Self study:</strong></td>
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</tbody>
</table>
## 1. Oscillations

**Learning time:** 44h  
Theory classes: 10h  
Practical classes: 4h  
Laboratory classes: 4h  
Self study: 26h

**Description:**  
(ENG) Moviments harmònics simples (MHS). Exemples.  
Oscil.lacions amortides.  
Oscil.lacions forçades.  
Superposició de MHS.

**Related activities:**  
(ENG) 1,2,3,4,6,7,8

## 2. Waves

**Learning time:** 71h  
Theory classes: 14h  
Practical classes: 7h  
Laboratory classes: 6h  
Self study: 44h

**Description:**  
(ENG) Introducció general a les Ones.  
Descripció física d'algunes ones.  
Propagació de les ones.  
Superposició d'ones.  
Acústica.

**Related activities:**  
(ENG) 1,2,3,4,5,6,7,8

## 3. Thermodynamics

**Learning time:** 35h  
Theory classes: 8h  
Practical classes: 3h  
Laboratory classes: 4h  
Self study: 20h

**Description:**  
(ENG) Temperatura.  
Calor i canvis d'estat.  
Primer principi de la Termodinàmica.  
Segon Principi de la Termodinàmica.

**Related activities:**  
(ENG) 1,2,3,5,6,7,8
### Planning of activities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTIVITY 1: THEORY SESSIONS</td>
<td>Theory classes: 28h&lt;br&gt;Self study: 50h</td>
<td>78h</td>
</tr>
<tr>
<td>ACTIVITY 2: PRACTICAL SESSIONS</td>
<td>Self study: 23h&lt;br&gt;Practical classes: 14h</td>
<td>37h</td>
</tr>
<tr>
<td>ACTIVITY 3: LABORATORY</td>
<td>Laboratory classes: 12h&lt;br&gt;Self study: 14h</td>
<td>26h</td>
</tr>
<tr>
<td>ACTIVITY 4: FIRST EVALUATION TEST</td>
<td>Theory classes: 2h</td>
<td>2h</td>
</tr>
<tr>
<td>ACTIVITY 5:</td>
<td>Theory classes: 2h</td>
<td>2h</td>
</tr>
<tr>
<td>ACTIVITY 6: LABORATORY EVALUATION TEST</td>
<td>Laboratory classes: 2h</td>
<td>2h</td>
</tr>
<tr>
<td>ACTIVITY 7: ATENEA EVALUATION TEST</td>
<td>Self study: 3h</td>
<td>3h</td>
</tr>
<tr>
<td>ACTIVITY 8: DELIVERING WORKS</td>
<td>Self study: 8h</td>
<td>8h</td>
</tr>
</tbody>
</table>

### Qualification system

Hours:

- Theory classes: 2h
- Self study: 50h
- Self study: 23h
- Self study: 14h
- Laboratory classes: 12h
- Laboratory classes: 2h
- Self study: 3h
- Self study: 8h

*Hours total: 78h*
Regulations for carrying out activities

All the activities are compulsory.

Bibliography

Basic:


Complementary:


Others resources:

Hyperlink

Apunts de l’assignatura a Atenea
http://atenea.upc.edu/moodle

Controls i notes en Aransa
http://aransa.upc.es

Física con ordenador (Ángel Franco García)
http://www.ehu.es