220009 - Physics II

Coordinating unit: 205 - ESEIAAT - Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 748 - FIS - Department of Physics
Academic year: 2019
Degree: BACHELOR'S DEGREE IN AEROSPACE TECHNOLOGY ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN AEROSPACE VEHICLE ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)
ECTS credits: 6  Teaching languages: Catalan

Teaching staff
Coordinator: Carles Serrat Jurado
Others: CRINA MARIA COJOCARU - CRISTINA MASOLLER - JAUME CALAF ZAYAS

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, resolution of exercises, 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 dedicated to recommended readings and exercises proposed.

Learning objectives of the subject
If the Physics I course provides an understanding and domain of basic principles of Physics in its Mechanics aspect, the
Physics II course will extend this domain to Oscillations, Waves and Thermodynamics.
On overcoming the subject, students will have acquired:
Understanding and mastery of kinematics and dynamics of the oscillations of particles as well as of solids.
Understanding and mastery of wave phenomena.
Understanding and mastery of the concepts of Temperature and Heat, and their applications in Thermodynamics.
## Study load

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

<table>
<thead>
<tr>
<th>1. Oscillations</th>
<th>Learning time: 44h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>Theory classes: 10h</td>
</tr>
<tr>
<td></td>
<td>Practical classes: 4h</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 4h</td>
</tr>
<tr>
<td></td>
<td>Self study: 26h</td>
</tr>
<tr>
<td>Related activities:</td>
<td>(ENG) 1,2,3,4,6,7,8</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>2. Waves</th>
<th>Learning time: 71h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>Theory classes: 14h</td>
</tr>
<tr>
<td></td>
<td>Practical classes: 7h</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 6h</td>
</tr>
<tr>
<td></td>
<td>Self study: 44h</td>
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<tr>
<td>Related activities:</td>
<td>(ENG) 1,2,3,4,5,6,7,8</td>
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<thead>
<tr>
<th>3. Thermodynamics</th>
<th>Learning time: 35h</th>
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<tbody>
<tr>
<td>Description:</td>
<td>Theory classes: 8h</td>
</tr>
<tr>
<td></td>
<td>Practical classes: 3h</td>
</tr>
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<td></td>
<td>Laboratory classes: 4h</td>
</tr>
<tr>
<td></td>
<td>Self study: 20h</td>
</tr>
<tr>
<td>Related activities:</td>
<td>(ENG) 1,2,3,5,6,7,8</td>
</tr>
</tbody>
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Simple harmonic motion (SHM). Examples.
Damped oscillations.
Forced oscillations.
Superposition of SHMs.

Acústica.

Temperature.
Heat and changes of phase (or state).
First law of Thermodynamics.
Second law of Thermodynamics.
# Planning of activities

| ACTIVITY 1: THEORY SESSIONS | Hours: 78h  
Theory classes: 28h  
Self study: 50h |
|----------------------------|----------------|
| ACTIVITY 2: PRACTICAL SESSIONS | Hours: 37h  
Self study: 23h  
Practical classes: 14h |
| ACTIVITY 3: LABORATORY | Hours: 26h  
Laboratory classes: 12h  
Self study: 14h |
| ACTIVITY 4: FIRST EVALUATION TEST | Hours: 2h  
Theory classes: 2h |
| ACTIVITY 5: SECOND EVALUATION TEST | Hours: 2h  
Theory classes: 2h |
| ACTIVITY 6: LABORATORY EVALUATION TEST | Hours: 2h  
Laboratory classes: 2h |
| ACTIVITY 7: ATENEA EVALUATION TEST | Hours: 3h  
Self study: 3h |
| ACTIVITY 8: DELIVERING WORKS | Hours: 8h  
Self study: 8h |
Qualification system

The final grade is the weighted sum of the various grades.

- If the final exam has chosen the modality of the Second Partial (explained in Activity 5):
  Final Grade = 0.32 * N1A + 0.43 * N2A + 0.15 * NL + 0.10 * NAC

- If the final exam has chosen the modality of the Global Exam (explained in Activity 5):
  - If the Global Examination grade, NEG, is greater than the grade of the First Partial, N1A:
    Final Grade = 0.32 * NEG + 0.43 * NEG + 0.15 * NL + 0.10 * NAC
  - If the Global Examination grade, NEG, is smaller than the grade of the First Partial, N1A:
    Final Grade = 0.32 * N1A + 0.43 * NEG + 0.15 * NL + 0.10 * NAC

N1A: First Partial score (activity 4)
N2A: Second Partial score (activity 5);
NEG: Global Exam grade (activity 5);
NL: grade of the laboratory (activity 6);
NAC: continuous evaluation grade (activity 7);

Regulations for carrying out activities
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