Course guide
3200961 - F1 - Physics I

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 748 - FIS - Department of Physics.
Degree: BACHELOR’S DEGREE IN AUDIOVISUAL SYSTEMS ENGINEERING (Syllabus 2009). (Compulsory subject).
Academic year: 2022 ECTS Credits: 6.0 Languages: Catalan

LECTURER
Coordinating lecturer: JUANJO FERNÁNDEZ SOLER - RAMON HERRERO SIMÓN - CARME HERVADA SALA - JORDI SELLARÈS GONZÁLEZ - M. DEL CARMEN TORRENT SERRA - JOSÉ FRANCISCO TRULL SILVESTRE - M. DEL CARMEN CASAS CASTILLO

Others:

PRIOR SKILLS
Students are expected to have achieved the level of physics required for the university entrance examinations (PAU).

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES
Specific:
1. AUD_BASIC: Ability to understand the basic concepts behind the general laws of mechanics, thermodynamics, fields and waves, and electromagnetism and understand how apply them to problems.

Transversal:
2. TEAMWORK - Level 1. Working in a team and making positive contributions once the aims and group and individual responsibilities have been defined. Reaching joint decisions on the strategy to be followed.
3. EFFECTIVE USE OF INFORMATION RESOURCES - Level 1. Identifying information needs. Using collections, premises and services that are available for designing and executing simple searches that are suited to the topic.

TEACHING METHODOLOGY
- Face-to-face lecture sessions.
- Face-to-face practical work sessions.
- Independent learning and exercises.
- Preparation and completion of group activities subject to assessment.
In the face-to-face lecture sessions, the lecturer will introduce the basic theory, concepts, methods and results for the subject and use examples to facilitate students’ understanding.
Students will be expected to study in their own time so that they are familiar with concepts and are able to solve the exercises set.

LEARNING OBJECTIVES OF THE SUBJECT
To introduce some of the fundamental concepts of physics to gain a greater understanding of physical phenomena.
To explain how the physical phenomena studied apply to the field of engineering.
To familiarise students with critical thinking as a tool for problem solving.
To familiarise students with various measurement techniques and instruments.

Familiarizing the student with the use of the critical reasoning as a tool for the resolution of problems.
Familiarizing the student with the utilization of several instruments and techniques of measure.
## STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours medium group</td>
<td>15,0</td>
<td>10.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>30,0</td>
<td>20.00</td>
</tr>
<tr>
<td>Hours small group</td>
<td>15,0</td>
<td>10.00</td>
</tr>
<tr>
<td>Self study</td>
<td>90,0</td>
<td>60.00</td>
</tr>
</tbody>
</table>

**Total learning time:** 150 h

## CONTENTS

### Topic 1: OSCILLATION

**Description:**
- 1.1. Simple harmonic motion
- 1.2. Energy in simple harmonic motion
- 1.3. Oscillating systems
- 1.4. Damped oscillations
- 1.5. Forced oscillations and resonance

**Related activities:**
- Theory classes.
- Problem-solving classes.
- Practical laboratory sessions for applying the theory covered for this topic

**Full-or-part-time:** 27h
- Theory classes: 6h
- Practical classes: 3h
- Self study: 18h

### Topic 2: WAVE MOTION

**Description:**
- 2.1. Simple wave motion
- 2.2. Periodic waves
- 2.3. Waves in three dimensions: acoustics
- 2.4. Waves and obstacles
- 2.5. Doppler effect

**Related activities:**
- Theory classes.
- Problem-solving classes.
- Practical laboratory sessions in which knowledge of the topic is applied.

**Full-or-part-time:** 18h
- Theory classes: 4h
- Practical classes: 2h
- Self study: 12h
Topic 3: WAVE OVERLAP PHENOMENA

Description:
3.1. Wave overlap
3.2. Standing waves.
3.3. Overlap of standing waves
3.4. Harmonic analysis and synthesis
3.5. Wave packets and dispersion
3.6. Applications: musical instruments

Related activities:
Theory classes.
Problem-solving classes.
Practical laboratory sessions in which knowledge of the topic is applied.

Full-or-part-time: 27h
Theory classes: 6h
Practical classes: 3h
Self study: 18h

Topic 4: ELECTROSTATICS

Description:
4.1. Electric field:
4.1.2. Electric forces: Coulomb's law.
4.1.3. Electric field lines.
4.1.5. Electric fields for different charge distributions (discrete and continuous)
4.1.6. Field and charges in a conductor in electrostatic equilibrium
4.2. Electric potential:
4.2.1. Potential electrostatic energy of a point charge
4.2.2. Electric potential. Voltage.
4.2.3. Equipotential surfaces.
4.2.4. Potential of a conductor in electrostatic equilibrium
4.3. Capacity and dielectric:
4.3.1. Polarisation of a dielectric
4.3.2. Forces between charges in a dielectric
4.3.3. Theorem of corresponding elements
4.3.4. Capacity of a conductor
4.3.5. Capacitors. Capacity of capacitors

Related activities:
Theory classes.
Problem-solving classes.
Practical laboratory sessions in which knowledge of the topic is applied.

Full-or-part-time: 63h
Theory classes: 14h
Practical classes: 7h
Self study: 42h
ACTIVITIES

LABORATORY

Full-or-part-time: 15h
Laboratory classes: 15h

GRADING SYSTEM

- Examinations: 75% (1st partial 37.5% and 2nd partial 37.5%)
- Laboratory sessions: 15%
- Works submitted and other proposed activities: 10%
- Retrieval of unsatisfactory results: there will a remedial of the 1st partial. Everybody will be able to take it. If the grade obtained in this remedial is greater than the grade of the 1st partial then this grade will be substituted by the grade of the remedial.

For those students who meet the requirements and submit to the reevaluation examination, the grade of the reevaluation exam will replace the grades of all the on-site written evaluation acts (tests, midterm and final exams) and the grades obtained during the course for lab practices, works, projects and presentations will be kept.
If the final grade after reevaluation is lower than 5.0, it will replace the initial one only if it is higher. If the final grade after reevaluation is greater or equal to 5.0, the final grade of the subject will be pass 5.0.

BIBLIOGRAPHY

Basic:

Complementary: