250205 - FISAPLI - Applied Physics

Coordinating unit: 250 - ETSECCPB - Barcelona School of Civil Engineering
Teaching unit: 748 - FIS - Department of Physics
Academic year: 2018
Degree: BACHELOR'S DEGREE IN PUBLIC WORKS ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)
ECTS credits: 6
Teaching languages: Catalan, Spanish

Teaching staff
Coordinator: DANIEL CALVETE MANRIQUE
Others: DANIEL CALVETE MANRIQUE, CARLES PANADES GUINART

Opening hours
Timetable: 11 am to 13 pm Tuesday and agreed.

Degree competences to which the subject contributes

Specific:
3099. Understanding and mastery of the basic concepts of the general laws of mechanics, thermodynamics and electromagnetic fields and waves, and their application in solving engineering problems

Transversal:
591. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 1. Planning oral communication, answering questions properly and writing straightforward texts that are spelt correctly and are grammatically coherent.
597. 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.
600. SELF-DIRECTED LEARNING - Level 1. Completing set tasks within established deadlines. Working with recommended information sources according to the guidelines set by lecturers.

Teaching methodology

The course consists of 4 hours per week of classroom activity.

The 2 hours are devoted to theoretical lectures, in which the teacher presents the basic concepts and topics of the subject, shows examples and solves exercises.

The 2 hours are devoted to solving practical problems with greater interaction with the students. The objective of these practical exercises is to consolidate the general and specific learning objectives.

During the 4 weekly lecture hours there will be short gradable exercises.

The rest of hours devoted to laboratory practice and conducted activities.

Support material in the form of a detailed teaching plan is provided using the virtual campus ATENEA: content, program of learning and assessment activities conducted and literature.

Learning objectives of the subject

The course consists of 4 hours per week of classroom activity.

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Students will acquire advanced physics' knowledge of the general laws of thermodynamics, electromagnetism and fields and waves. They will also learn how these laws can be used to solve engineering problems.

On completion of the course, students will have acquired the ability to:
1. Apply general thermodynamic principles to basic engineering problems;
2. Apply the concepts of fields and waves in engineering;

Thermodynamics, including the first and second laws, heat transmission and the basic principles of kinetic theory; Basic principles of wave propagation, in particular as applied to acoustic problems; Electromagnetism, including its applications in engineering

Acquiring physical skills necessary for basic scientific education of a civil engineer which it is based on other scientific and technical knowledge developed in subjects in later grades. We introduce the principles of fluid mechanics, heat, thermodynamics, oscillations and waves, and electromagnetism.

The specific objectives, ability to address problems of physics and make the solution properly, and execute and perform reports of experiments.

<table>
<thead>
<tr>
<th>Study load</th>
<th>Total learning time: 150h</th>
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<tbody>
<tr>
<td>Hours large group:</td>
<td>26h</td>
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<tr>
<td>Hours medium group:</td>
<td>20h</td>
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<tr>
<td>Hours small group:</td>
<td>14h</td>
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<tr>
<td>Guided activities:</td>
<td>6h</td>
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<tr>
<td>Self study:</td>
<td>84h</td>
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<tr>
<td><strong>Content</strong></td>
<td><strong>Learning time:</strong> 4h 48m</td>
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<tr>
<td><strong>Introduction</strong></td>
<td>Laboratory classes: 2h  Self study: 2h 48m</td>
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</tbody>
</table>

**Description:**
Treatment of experimental data

<table>
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<tr>
<th><strong>Continuous Media</strong></th>
<th><strong>Learning time:</strong> 26h 24m</th>
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<tbody>
<tr>
<td></td>
<td>Theory classes: 4h  Practical classes: 4h  Laboratory classes: 3h  Self study: 15h 24m</td>
</tr>
</tbody>
</table>

**Description:**
### Heat and Thermodynamics

**Learning time:** 45h 36m  
- Theory classes: 9h  
- Practical classes: 7h  
- Laboratory classes: 3h  
- Self study: 26h 36m

**Description:**  
Examples and problem solving  
Examples and problem solving  
Examples and problem solving  
Calorimetry  
Examples and problem solving  
Examples and problem solving  
Examples and problem solving
**Oscillations and Waves**

**Description:**

Examples and problem solving


Waves on a string, waves on a wire.

Examples and problem solving

Energy, power and intensity of a wave. Spherical waves.

Examples and problem solving

Propagation on inhomogeneous media. Reflection, transmission and refraction.

Examples and problem solving


Examples and problem solving

Pressure waves in a solid, a liquid and a gas. Acoustic waves, sound.

Intensity and scale of decibels. Standing waves and normal modes.

Examples and problem solving


Examples and problem solving

Speed of sound

**Learning time:** 62h 24m  
- Theory classes: 11h  
- Practical classes: 11h  
- Laboratory classes: 4h  
- Self study: 36h 24m

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**Electricidad and Magnetism**

**Description:**
Measurement of quantities in AC

**Learning time:** 4h 48m  
- Laboratory classes: 2h  
- Self study: 2h 48m
The final mark is the sum of the following partial marks:

Nel: laboratory teaching qualification  
Nac: mark from continuous assessments  
Nps: mark from summary exams

N_{final} = 0.10 \times Nel + 0.30 \times Nac + 0.60 \times Nps

The teachings of the laboratory grade is the average in such activities.

Continued assessments correspond to exercises and other activities made at the classroom during the course.

The summary exams consists in two exams.

Criteria for re-evaluation qualification and eligibility: Students that failed the ordinary evaluation and have regularly attended all evaluation tests have the opportunity of carrying out a re-evaluation test during the period specified in the academic calendar. Students who have already passed the test or were qualified as non-attending will not be admitted to the re-evaluation test. The maximum mark for the re-evaluation exam will be five over ten (5.0). The non-attendance of a student to the re-evaluation test, in the date specified will not grant access to further re-evaluation tests. Students unable to attend any of the continuous assessment tests due to certifiable force majeure will be ensured extraordinary evaluation periods.

These tests must be authorized by the corresponding Head of Studies, at the request of the professor responsible for the course, and will be carried out within the corresponding academic period.

 Regulations for carrying out activities

Failure to perform a laboratory or continuous assessment activity in the scheduled period will result in a mark of zero in that activity. At the end of semester examinations are scheduled for those who have not made any final exams due to a number of reasons verifiable.

Bibliography

Basic:

Complementary: