Degree competences to which the subject contributes

Basic:
CB1. The students have demonstrated to possess and to understand knowledge in an area of study that starts from the base of the general secondary education, and is usually found to a level that, although it relies on advanced textbooks, also includes some aspects that involve knowledge from the vanguard of their field of study.
CB2. Students can apply their knowledge to their work or vocation in a professional way and possess the skills that are usually demonstrated through the elaboration and defense of arguments and problem solving within their area of study.

Specific:
CE2. Understanding and mastering the basic concepts of the general laws of mechanics, thermodynamics, fields and waves and electromagnetism and their application for solving engineering problems.

Generical:
CG3. Knowledge in basic and technological subjects that will enable them to learn new methods and theories and give them the versatility to adapt to new situations.

Transversal:
1. 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.
2. SELF-DIRECTED LEARNING - Level 1. Completing set tasks within established deadlines. Working with recommended information sources according to the guidelines set by lecturers.

Learning objectives of the subject

At the end of the course the student should be able to do the following:
- Understand and use the basic principles of electric fields.
- Understand and use the basic principles of magnetic fields.
- Manipulate laboratory instruments, properly collect data, process data and prepare a report.

<table>
<thead>
<tr>
<th>Study load</th>
<th>Hours large group:</th>
<th>Hours medium group:</th>
<th>Hours small group:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total learning time:</strong> 112h 30m</td>
<td>22h 30m</td>
<td>0h</td>
<td>22h 30m</td>
</tr>
<tr>
<td>Guided activities:</td>
<td>0h</td>
<td>0h</td>
<td>0h</td>
</tr>
<tr>
<td>Self study:</td>
<td>67h 30m</td>
<td>0h</td>
<td>0h</td>
</tr>
</tbody>
</table>
### Content

<table>
<thead>
<tr>
<th>Topic 1: Electric fields</th>
<th>Learning time: 52h 30m</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 10h 30m</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 10h 30m</td>
</tr>
<tr>
<td></td>
<td>Self study : 31h 30m</td>
</tr>
</tbody>
</table>

**Description:**
Coulomb's law, electric fields, electric potential. Applications of electrostatics. Capacitors, dielectrics. Electric current. DC circuits.

**Related activities:**
- Activity 1: Laboratory practical
- Activity 1: Laboratory practical
- Activity 2: Assessment test
- Activity 3: Delivery
- Activity 4: Final assessment test

**Specific objectives:**
To understand and use the basic principles of electric fields.

<table>
<thead>
<tr>
<th>Topic 2: Magnetic fields</th>
<th>Learning time: 60h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 12h</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 12h</td>
</tr>
<tr>
<td></td>
<td>Self study : 36h</td>
</tr>
</tbody>
</table>

**Description:**
Magnetic fields, magnetic field sources, magnetic materials, Faraday's law of induction.

**Related activities:**
- Activity 1: Laboratory practical
- Activity 2: Assessment test
- Activity 3: Delivery
- Activity 4: Final assessment test

**Specific objectives:**
To understand and use the basic principles of magnetic fields.
### Planning of activities

<table>
<thead>
<tr>
<th>Activity 1: Laboratory practical</th>
<th>Hours: 4h 30m</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Laboratory classes: 1h 30m</td>
</tr>
<tr>
<td></td>
<td>Self study: 3h</td>
</tr>
</tbody>
</table>

**Description:**
- Laboratory teamwork.
- The students read the instructions and produce a sheet to record the experimental data.

**Support materials:**
- Web page: [http://www.epsem.upc.edu/practiquesfisica](http://www.epsem.upc.edu/practiquesfisica)
- All necessary equipment for carrying out the practical.

**Descriptions of the assignments due and their relation to the assessment:**
The team prepare and deliver a report to the professor, following the instructions.

**Specific objectives:**
At the end of the activity, students should be able to do the following:
- Effectively handle the devices used in the activity.
- Understand the physical concepts involved in the activity.

<table>
<thead>
<tr>
<th>Activity 2: Assessment test</th>
<th>Hours: 7h 30m</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 1h 30m</td>
</tr>
<tr>
<td></td>
<td>Self study: 6h</td>
</tr>
</tbody>
</table>

**Description:**
Individual classroom on the theoretical concepts of the topics with exercises related to the learning objectives.

**Support materials:**
Test paper and calculator.

**Descriptions of the assignments due and their relation to the assessment:**
Completed test.

**Specific objectives:**
After the activity, students should be able to understand and use the basic principles of the topics.

<table>
<thead>
<tr>
<th>Activity 3: Delivery</th>
<th>Hours: 3h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Self study: 3h</td>
</tr>
</tbody>
</table>

**Description:**
Individual multiple choice test about theoretical concepts and/or problem solving related to the topics.

**Support materials:**
Test paper and calculator.

**Descriptions of the assignments due and their relation to the assessment:**
Delivery of the completed test on time.

**Specific objectives:**
After the activity, students should be able to understand and use the basic principles of the topics.
Title of activity of class 4: Final assessment test

**Hours:** 13h  
Theory classes: 3h  
Self study: 10h

**Description:**  
Individual classroom test on the theoretical concepts of the subject with exercises related to the learning objectives.

**Support materials:**  
Test paper and calculator.

**Descriptions of the assignments due and their relation to the assessment:**  
Completed test.

**Specific objectives:**  
After the activity, students should be able to understand and use the basic principles of the subject.

---

### Qualification system

- Activity 1 (Laboratory practical) is repeated for each topic, twice for the first and once for the second, and is assessed within the denomination EV5 "Performance and quality of the work group (TG)". The set of two topics represent 25% of the final mark. To pass the subject, students must pass this assessment.
- Activity 2 (Assessment test) is repeated for each topic and is assessed within the denomination EV1 "Written test of knowledge (PE)", with 30% of the final mark for each topic.
- The activity 3 (Delivery) is repeated for each topic and is assessed as EV3 "Work done throughout the course (TR)", with 15% of the final mark for the set of two topics.
- Students who have not passed one or both of the topics in Activity 2 must sit a final assessment test (Activity 4).

---

### Regulations for carrying out activities

Each activity will be carried out according to the course schedule. An alternative day will be scheduled for students who are unable to perform one or more of the topics in Activity 1 on the day scheduled. Students who are unable to attend the tests in Activity 2 must sit the test in Activity 4. Activity 3 must be carried out on the day set.
Bibliography

Basic:


Complementary:


Others resources: