Course guides
200021 - FIS - Physics

Unit in charge: School of Mathematics and Statistics
Teaching unit: 749 - MAT - Department of Mathematics.
Degree: BACHELOR’S DEGREE IN MATHEMATICS (Syllabus 2009). (Compulsory subject).
Academic year: 2021  ECTS Credits: 7.5  Languages: Catalan, Spanish

LECTURER
Coordinating lecturer: NARCISO ROMAN ROY
Others: Segon quadrimestre: JOSEP ELGUETA MONTO - M-A
NARCISO ROMAN ROY - M-A

PRIOR SKILLS
Single and multiple variable calculus: derivation and integration. Vector analysis.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. CE-2. Solve problems in Mathematics, through basic calculation skills, taking in account tools availability and the constraints of time and resources.

Generical:
5. CB-2. Know how to apply their mathematical knowledge and understanding, and problem solving abilities in new or unfamiliar environments within broader or multidisciplinary contexts related to Mathematics.
6. CB-3. Have the ability to integrate knowledge and handle complexity, and formulate judgements with incomplete or limited information, but that include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgements.
7. CG-1. Show knowledge and proficiency in the use of mathematical language.
10. CG-4. Translate into mathematical terms problems stated in non-mathematical language, and take advantage of this translation to solve them.
12. CG-6 Detect deficiencies in their own knowledge and pass them through critical reflection and choice of the best action to extend this knowledge.

Transversal:
11. SELF-DIRECTED LEARNING. Detecting gaps in one’s knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one's knowledge.

TEACHING METHODOLOGY
The teaching activity is divided into three hours of theory (description and development of the topics presented in the syllabus) and two hours devoted to solving exercises as direct applications of the theory. Students will have access to resumés of each topic and a collection of related exercises that will be available in the web.
LEARNING OBJECTIVES OF THE SUBJECT

Knowledge of: Newton's Laws, dynamics of particle systems, kinematic and dynamics of accelerated systems
Understand the concepts of work and energy
Understand the conservation laws.
Basic knowledge on the gravitational field.
Basic knowledge on electric and magnetic fields.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self study</td>
<td>112.5</td>
<td>60.00</td>
</tr>
<tr>
<td>Hours small group</td>
<td>30.0</td>
<td>16.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>45.0</td>
<td>24.00</td>
</tr>
</tbody>
</table>

Total learning time: 187.5 h

CONTENTS

1. Reference systems and Newton Laws.

Description:

Full-or-part-time: 37h
Theory classes: 9h
Practical classes: 6h
Self study: 22h

2. conservation laws.

Description:

Full-or-part-time: 37h
Theory classes: 9h
Practical classes: 6h
Self study: 22h
3. Introduction to the rigid solid.

**Description:**

**Full-or-part-time:** 20h
- Theory classes: 4h 30m
- Practical classes: 3h
- Self study: 12h 30m

4. Gravitational field (Newton’s theory)

**Description:**

**Full-or-part-time:** 46h
- Theory classes: 10h 30m
- Practical classes: 7h 30m
- Self study: 28h

5. Electromagnetism (Maxwell theory)

**Description:**

**Full-or-part-time:** 46h 30m
- Theory classes: 11h
- Practical classes: 7h 30m
- Self study: 28h

**GRADING SYSTEM**

The subject is divided into two parts, Mechanics and Field Theory (Gravitation and Electromagnetism). There will be two partial exams, one on each side, and the regular final exam. The grade of the subject shall be one of the following:
(a) The average of the two partial exams.
(b) The final exam score, which will be mandatory for students whose mark (a) is less than 5, and optional for those whose mark (a) is equal or greater than 5 (in this case the mark of (a) is waived).

There will be an extraordinary exam in July for students who have failed the subject in the regular call, with a single grade.

**BIBLIOGRAPHY**

**Basic:**
Complementary:
  ISBN 0521636361.

RESOURCES

Other resources:
Notes on Mechanics (available through "Atenea").
Notes on Gravitation and Electromagnetism (available through "Atenea").
Problems (proposed and solved) (available through "Atenea").