240401 - Advanced Mechanics

Degree competences to which the subject contributes

Specific:
1. Knowledge on machines and mechanisms theory principles.

Learning objectives of the subject

General goal
To deepen in the study of Mechanics so that problems encountered in the field of Industrial Engineering and, more particularly, in that of Mechanical Engineering, can be solved with rigor.

Specific goals
To enlarge the training on Mechanics with an introduction to Analytical Mechanics, Percussive Mechanics and Mechanical Vibrations.
To deepen the study of redundancy in constraints, and to illustrate practical aspects of gyroscopy.
# 240401 - Advanced Mechanics

## Study load

<table>
<thead>
<tr>
<th>Total learning time: 75h</th>
<th>Hours large group: 0h</th>
<th>0.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group: 30h</td>
<td>40.00%</td>
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<tr>
<td></td>
<td>Hours small group: 0h</td>
<td>0.00%</td>
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<tr>
<td></td>
<td>Guided activities: 0h</td>
<td>0.00%</td>
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<tr>
<td></td>
<td>Self study: 45h</td>
<td>60.00%</td>
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## Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Learning time:</th>
<th>Description</th>
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<tbody>
<tr>
<td>Redundancy in constraints</td>
<td>14h</td>
<td>Total redundancy and tangent redundancy. Underdetermined and ill conditioned constraint forces.</td>
</tr>
<tr>
<td>Method of virtual work</td>
<td>16h</td>
<td>D’Alembert inertia forces. Particular case of the rigid body. Virtual motions and works. Determination of equations of motion and constraint forces.</td>
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# Qualification system

Qualification is based on three evaluation tests:
- **Test 1**: 3 questions of constraint analysis and 1 problem of the virtual power method (2 hours).
- **Test 2**: Monographic work on vibrations of a mechanical system.
- **Test 3**: 3 questions of percussive dynamics, and 1 problem of mechanical vibrations and percussive dynamics (2 hours).

Final exam.

The final qualification is obtained through the expression:
- Final grade = 0.4 Test 1 + 0.2 Test 2 + 0.4 Test 3
Bibliography

Basic:


Complementary:


Others resources:

What can be found in the Digital Campus:
- Work material for theory and practical lectures.
- The publication "Ampliació de Mecànica, resolucions de qüestions i problemes. Vol.1" (J. Agulló i Batlle. Publicacions OK Punt) with the explained resolution of 23 Test questions and 2 problems.
- Self-evaluation questions for the weekend.
- A significant sample of past exams, with the complete resolution of exercises and the answer to the multiple-choice tests.
- Information concerning the course organization, the compilation of formulae to be used in exams, the grade lists, the test solutions and problem resolutions of the exams corresponding to the running semester.