240IBI21 - Biomechanics

Coordinating unit: 240 - ETSEIB - Barcelona School of Industrial Engineering
Teaching unit: 712 - EM - Department of Mechanical Engineering
Academic year: 2017
Degree: MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2014). (Teaching unit Optional)
ECTS credits: 4,5
Teaching languages: English

Teaching staff
Coordinator: Font Llagunes, Josep Maria

Requirements
Knowledge on rigid body kinematics and dynamics (vectorial formulation).

Degree competences to which the subject contributes
Specific:
- CEEBIO1. Ability to develop biomechanical models of the musculo-skeletal system based on the anthropometry of the human body and the mechanical laws of movement.

Teaching methodology
- Theoretical and practical face-to-face class (classroom, computer classroom and lab).
- Scheduled self study.
- Cooperative learning.
- Learning based on projects, problems and cases.

Learning objectives of the subject
The general learning objectives of the course are:
- Know tools for the biomechanical analysis of human motion, based on mathematical models that take into account the body anthropometry.
- Apply kinematic and kinetic descriptors to human motion.
- Apply mechanical laws and principles to anatomical structures.
- Analyze the human body motion from data measured at the lab.

Study load

<table>
<thead>
<tr>
<th>Total learning time: 112h 30m</th>
<th>Hours large group:</th>
<th>27h</th>
<th>24.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours small group:</td>
<td>13h 30m</td>
<td>12.00%</td>
</tr>
<tr>
<td></td>
<td>Guided activities:</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>Self study:</td>
<td>72h</td>
<td>64.00%</td>
</tr>
</tbody>
</table>
## Content

### Kinematics

<table>
<thead>
<tr>
<th>Description:</th>
<th>Learning time: 13h 30m</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Laboratory classes: 4h 30m</td>
</tr>
</tbody>
</table>

### Vectorial dynamics

<table>
<thead>
<tr>
<th>Description:</th>
<th>Learning time: 18h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Laboratory classes: 6h</td>
</tr>
</tbody>
</table>

### Energetics

<table>
<thead>
<tr>
<th>Description:</th>
<th>Learning time: 9h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Laboratory classes: 3h</td>
</tr>
</tbody>
</table>
Global course grade (NF) will be based on the following partial grades:

\[ NF = 0.20 \times Nac + 0.30 \times Ntm + 0.50 \times Nef \]

Reevaluation:

This exam is available to the students that have attended the final ordinary exam and that have submitted all the continuous evaluation works. The reevaluation exam has the same format as the ordinary final exam.

The grade of the reevaluation exam (Nre) replaces the grade Nef in the equation to calculate the global course grade (NF).

Bibliography

Basic:


Complementary:


