340600 - DIAP-R1012 - Applied Dynamics

Coordinating unit: 340 - EPSEVG - Vilanova i la Geltrú School of Engineering
Teaching unit: 712 - EM - Department of Mechanical Engineering
Academic year: 2016
Degree: MASTER'S DEGREE IN AUTOMATIC SYSTEMS AND INDUSTRIAL ELECTRONICS (Syllabus 2012).
(Teaching unit Compulsory)
ECTS credits: 5  Teaching languages: Catalan

Teaching staff
Coordinator: Ingrid Magnusson
Others: Ingrid Magnusson

Degree competences to which the subject contributes

Specific:
2. CC09 - Identify the symbols of mechanical systems and obtain the knowledge to determine the number of drives that will allow the desired movement of the system.

Transversal:
1. EFFECTIVE USE OF INFORMATION RESOURCES. Managing the acquisition, structure, analysis and display of information from the own field of specialization. Taking a critical stance with regard to the results obtained.

Teaching methodology
Theoretical explanations and practical examples.
Completion of a project.

Learning objectives of the subject
The main objective of the course is to acquire basic tools to carry on a constructive design of a machine, and tools to model a machine (motor - transmission - receptor) to estimate its dynamic behaviour, optimize it and to preview possible problematics.

Study load

<table>
<thead>
<tr>
<th>Total learning time: 125h</th>
<th>Hours large group:</th>
<th>30h</th>
<th>24.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group:</td>
<td>0h</td>
<td>0.00%</td>
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<tr>
<td></td>
<td>Hours small group:</td>
<td>15h</td>
<td>12.00%</td>
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<tr>
<td></td>
<td>Guided activities:</td>
<td>0h</td>
<td>0.00%</td>
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<tr>
<td></td>
<td>Self study:</td>
<td>80h</td>
<td>64.00%</td>
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</tbody>
</table>
## Content

### Constructive structure of a machine

<table>
<thead>
<tr>
<th>Description:</th>
<th>Structural functions of machines</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Angular and lineal joints</td>
</tr>
<tr>
<td></td>
<td>Chassis</td>
</tr>
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</table>

**Related activities:**
- A1
- A2
- A3

**Specific objectives:**
To make a constructive design of a revolute joint or a slide joint, according to the Project specifications.

### Machine drive

<table>
<thead>
<tr>
<th>Description:</th>
<th>Motors. Curves Torque - Angular velocity and Power - Angular velocity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mechanical transmissions. Gear, belts, chains, cams, couplings.</td>
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<tr>
<td></td>
<td>Receivers. Curves Torque - Angular velocity and Power - Angular velocity</td>
</tr>
</tbody>
</table>

**Related activities:**
- A1
- A2
- A3

**Specific objectives:**
To know the Torque - angular velocity curve of different mechanical systems.  
To define the functions of the mechanical transmission systems, and to know the main transmission elements including constructive details.  
To be able to perform a constructive design of a transmission system integrated in a machine and to choose the motor according to the project specifications.
### Mechanical systems modeling

#### Description:
Theory and practice about different tools to model the dynamic behaviour of a mechanical system.

#### Related activities:
A1
A2
A3

#### Specific objectives:
To model the elements in a mechanical system (drive - transmission - receiver) as tool to aid in choosing components, optimizing the design and to explore the influence of the different items in the behaviour of the system.

### Learning time:
- **26h**
  - Theory classes: **10h**
  - Guided activities: **1h**
  - Self study: **15h**
### Planning of activities

| (A1) CLASS THEORY AND PROBLEMS | **Hours:** 67h 30m  
Self study: 37h 30m  
Theory classes: 30h |
<table>
<thead>
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</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Work in the classroom</td>
</tr>
<tr>
<td><strong>Support materials:</strong></td>
<td>Digital Campus Notes</td>
</tr>
</tbody>
</table>

| (A2) Laboratory Practices     | **Hours:** 45h  
Laboratory classes: 18h  
Self study: 27h |
|-------------------------------|------------------|
| **Description:**              | Conduct by the student of a proposed mechanical design of practical application.  
Calculation and design of mechanical systems and transmission needed to solve a specific problem.  
Selection and sizing of drives required. |
| **Support materials:**        | Computer simulation software and mechanical design (CAD-CAE) |
| **Descriptions of the assignments due and their relation to the assessment:** | Design 3D mechanical design  
Project specification and calculations  
Rules used |
| **Specific objectives:**      | Apply knowledge of the student in the calculation and mechanical design for the realization of a mechanical draft practical application.  
It includes the design of the motion transmitting mechanism and the choice of the drives. |

| (A3) Assessment of Learning   | **Hours:** 12h 30m  
Self study: 9h 30m  
Guided activities: 3h |
|-------------------------------|------------------|
| **Description:**              | Individual Exams.  
Performing a mechanical project. |
| **Specific objectives:**      | Certify the degree of achievement of aprenetatge |

### Qualification system

The final grade (QF) takes into account all the work done over the course. It is obtained from the expression:

\[ QF = 0.5 \times \text{Project Qualification} + 0.25 \times \text{Continuos Evaluation Activities} + 0.25 \times \text{Final Exam} \]
Bibliography

Basic:


Complementary:


