240IME34 - Machine Design Methodology

Coordinating unit: 240 - ETSEIB - Barcelona School of Industrial Engineering
Teaching unit: 712 - EM - Department of Mechanical Engineering
Academic year: 2019
Degree: MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2014). (Teaching unit Optional)
ECTS credits: 4.5
Teaching languages: Catalan, Spanish

Teaching staff

Coordinator: Blanco Romero, Elena
Others: Domènech Mestres, Carles
Blanco Romero, Elena

Prior skills

Knowledge of machine design

Teaching methodology

The teaching methodology is based on two types of activities. Classes in which the teacher provides concepts and knowledge and through practical exercises illustrates how to apply knowledge exposed to situations and solving real problems. It is a class of 1.5 hours each week. Practical sessions in small groups in which students perform activities under the supervision of a teacher. There are practical sessions where the students become familiar with various aspects of machine design methodology guided by the teacher in the perspective of the job done for the course. It is a session of 1.5 hours every week. The work of the course is delivered at the end of the course.

Learning objectives of the subject

Objective: To ensure that students acquire knowledge of machine design methodology and its different stages. To integrate the tools and the knowledge acquired in other subjects in the development of projects.

Study load

<table>
<thead>
<tr>
<th>Total learning time: 112h 30m</th>
<th>Hours large group:</th>
<th>20h 15m</th>
<th>18.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours small group:</td>
<td>20h 15m</td>
<td>18.00%</td>
<td></td>
</tr>
<tr>
<td>Guided activities:</td>
<td>0h</td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td>Self study:</td>
<td>72h</td>
<td>64.00%</td>
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</tbody>
</table>
# 240IME34 - Machine Design Methodology

## Content

<table>
<thead>
<tr>
<th>Engineering design methodologies. Phase's methodology</th>
<th>Learning time: 44h 15m</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 6h</td>
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<tr>
<td></td>
<td>Laboratory classes: 3h</td>
</tr>
<tr>
<td></td>
<td>Guided activities: 15h</td>
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<td></td>
<td>Self study: 20h 15m</td>
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### Description:
- Includes:
  1. Introduction Types of methodologies
  2. Phase methodologies. General structure
  3. Definition and specifications
  4. Conceptual design
  5. Materialization design
  7. Selection of actuators

### Related activities:
- Theoretical sessions in which teachers provide concepts and knowledge about these aspects.
- Practical sessions where the main lines of project development are traced throughout the course, applying the described phase methodology.
- Directed work where this project is developed in detail.

### Specific objectives:
- Understand the importance of following a methodology in the design process.
- To know the different methodologies emerging in the design of machines.
- Understand the basic structure of the phases methodology and apply it to a machine design project.
- Expand knowledge about tools for calculating machine elements.
240IME34 - Machine Design Methodology

Design support tools

<table>
<thead>
<tr>
<th>Learning time: 68h 15m</th>
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<tbody>
<tr>
<td>Theory classes: 15h</td>
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<tr>
<td>Laboratory classes: 7h 30m</td>
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<tr>
<td>Guided activities: 25h</td>
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<tr>
<td>Self study: 20h 45m</td>
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</tbody>
</table>

**Description:**
Includes:
1. Materials in design. Metals and plastics: characteristics, good design practices. Specific sheet metal forming session
3. Transmissions and shafts calculation. Critical speeds and other characteristics
4. Welding: features, good practices, calculation and fatigue
5. Springs: type, selection and calculation
6. Architecture of the machine, design for manufacture and assembly (DFMA), design for the environment (DFE)

**Related activities:**
Theoretical sessions in which teachers provide concepts and knowledge about these aspects.
Practical sessions where the main lines of project development are traced throughout the course, applying the described phase methodology.
Directed work where this project is developed in detail.

**Specific objectives:**
Integrate all the knowledge acquired in other subjects.

Qualification system

The rating system is:

Work the subject: 4/10 points
Final exam: 6/10 points
240IME34 - Machine Design Methodology

Bibliography

Basic:


Complementary:
