### Degree competences to which the subject contributes

#### Specific:
- CEEMEC6. Use the numerical simulation tools for the design, calculation and manufacturing of components, systems and mechanical facilities.
- CEMEI22. Knowledge and abilities to verify and control the facilities, processes and products.

### Teaching methodology

The teaching methodology is based on two types of activities. First, theoretical classes in which the teacher provides concepts and skills through practical exercises and shows how to apply the exposed knowledge to situations and solving real problems; Most of the sessions are suggested exercises for the students to develop a class with the support of the teacher. Second, in practice classes in small groups in which students perform activities under the supervision of a teacher. In practical work is done, which involves the design and simulation of an automated facility installation and internal transport and storage. The work is done in groups of two students and have to make a delivery of a written report and make an oral presentation and defense. In practice sessions and in the development of work teamwork, oral proficiency and writing skills are developed, among others. Visits are made to install storage and maintenance facilities so that students get to know the real operation of such facilities.

### Learning objectives of the subject

Objective: To ensure that students acquire knowledge about the different systems of internal transport and storage and are able to design a facility from certain requirements and to validate their operation using process simulation.

Specific objectives: See the specific objectives of each subject and activities.
## Study load

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

**Description:**
Study of the transport capacity of the conveyor belts and hand roller. Determining the capabilities of forklifts.

**Specific objectives:**
- Having a theoretical and practical basis of continuous Internal transport systems (conveyors, etc.) and discrete (forklift, stacker, etc.) to ascertain its features ahead in the use of production, distribution or storage facilities.

<table>
<thead>
<tr>
<th>Learning time: 16h</th>
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</thead>
<tbody>
<tr>
<td>Theory classes: 6h</td>
</tr>
<tr>
<td>Self study: 10h</td>
</tr>
</tbody>
</table>

## Automated storage, sorting and order preparation

**Description:**
Analysis of the characteristics of automated warehouses and storage conditions that justify automation.

**Specific objectives:**
- Having a theoretical and practical basis of automated warehouses, automated classification systems and picking to know their characteristics in order to use storage and distribution facilities.

<table>
<thead>
<tr>
<th>Learning time: 14h 30m</th>
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</thead>
<tbody>
<tr>
<td>Theory classes: 6h 30m</td>
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<tr>
<td>Self study: 8h</td>
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</tbody>
</table>

## Designing a facility installation automated order preparation and distribution

**Description:**
Calculate the required storage capacity and design alternatives that meet. Calculation of the picking and movement of materials capacity and design of alternatives that meet them. Calculating the need for workers to make processes based on operational shifts. Optimization design considering the overall combination of alternative storage, order preparation, movement of materials and possible shifts.

**Specific objectives:**
- Being able to design a distribution facility and automated picking systems which involved domestic transportation and storage requirements as specified.

<table>
<thead>
<tr>
<th>Learning time: 36h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory classes: 12h</td>
</tr>
<tr>
<td>Self study: 24h</td>
</tr>
</tbody>
</table>
Simulation of a distribution and automated order preparation facility

**Description:**
Modeling the movement of materials and products in a installation by zones and then globally. Deterministic simulation and then random simulation introducing random processes in increasing gradually detail. Experimentation and analysis of statistical results to assess the capacity of moving materials and products. Depending on the results, validate or adjust its design.

**Specific objectives:**
- Being able to model a distribution and picking facility through automated simulation tools and processes used to validate the design of the facility

**Learning time:** 39h
- Guided activities: 13h
- Self study: 26h

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**Rating system**

The rating is based on two acts of evaluation: a final examination and an evaluation of the work. In the final examination are evaluated theoretical and practical skills are evaluated. The evaluation of the work assesses theoretical and practical knowledge as well as the ability to solve real problems and skills as teamwork, presentation written and oral presentation. The final grade is calculated according to the formula: $N_{final} = 0.7N_{EP} + 0.3N_{EF}$

with:
- $N_{EP}$: note the work.
- $N_{EF}$: Final exam

The reassessment will consist of an exam substuirà the final exam.

**Regulations for carrying out activities**

In the final examination, can only be brought a calculator. In case there is a theoretical part in the exam, nothing could be brought.

**Bibliography**

**Basic:**

