Course guide
220121 - OMFA - Mechanical Design and Manufacturing

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 712 - EM - Department of Mechanical Engineering.

Degree: BACHELOR’S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).

Academic year: 2023 ECTS Credits: 3.0 Languages: Spanish

LECTURER

Coordinating lecturer: José Antonio Ortiz Marzo
Others: José Antonio Ortiz Marzo
Comas Cespedes, Esteve

PRIOR SKILLS

Students must have achieved the objectives of graphic expression methods, materials technology and theory of machines and mechanisms.

TEACHING METHODOLOGY

The teaching methodology is divided into two parts:
- On-site sessions to introduce the contents, in an expositive way with multimedia material and practical examples, short videos representative of the explained process, visits to the workshops and mechanical laboratories (depending on availability, visits to external companies), and resolution of basic problems, specially in module 2, where real cases of application are developed with the discussion of resolution alternatives.
- Autonomous work of study and performance of exercises, activities and group work.

LEARNING OBJECTIVES OF THE SUBJECT

The basic objective is the knowledge of the different manufacturing processes of the most common components and their application according to the type of components depending on the surface finish and dimensional tolerances required.

The student should also know and make use of the information available from the different suppliers or manufacturers of the technologies and processes involved. For this, references are given to specific websites or catalogs. There is an important part of this information that is in English, therefore, the student will have to make an effort to know technical English, as you will find when you start working professionally.

The student will have learned how to balance the engines and wheels of cars. You will also know the usefulness of flywheels. The student, at the end of the course, will be able to identify and select the processes involved in the manufacture of components of the automotive sector. In this way, the available resources can be optimized, reducing production time and costs, increasing their quality and indirectly reducing energy consumption and waste volume.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self study</td>
<td>45.0</td>
<td>60.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>30.0</td>
<td>40.00</td>
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Total learning time: 75 h
Module 1: Welding processes

**Description:**

**Specific objectives:**
At the end of module 1, the student should be able to name the different welding processes and select a particular process, depending on the type of part and material to be welded. The student will know the necessary safety elements.

**Related activities:**
Activity 1  
Activity 2  
Activity 4  

**Full-or-part-time:** 13h
Theory classes: 5h  
Self study: 8h

Module 2: Machining processes with rotary machines

**Description:**
Topic 5. Lathe. Type and geometry of cutting tools. Basic operations. Calculation of working conditions. Examples

**Specific objectives:**
At the end of module 2, the student should be able to name different machining processes and select a machining process, depending on the part geometry and material work, select the type of machine tool and the sequence of operations required.

**Related activities:**
Activity 1  
Activity 2  
Activity 4  
Activity 5  

**Full-or-part-time:** 22h
Theory classes: 9h  
Self study: 13h
Module 3. Mechanical optimization in the automobile.

**Description:**

**Specific objectives:**
At the end of module 3, the student should be able to know and understand the most common applications of dynamics in the car: flyers and balanced calculation of axles and engines.

**Related activities:**
Activity 1  
Activity 3  
Activity 5

**Full-or-part-time:** 30h  
Theory classes: 12h  
Self study: 18h

Module 4. Other manufacturing processes

**Description:**

**Specific objectives:**
At the end of module 4, the student should be able to name different manufacturing processes of components of the automotive sector.

**Related activities:**
Activity 1  
Activity 2  
Activity 5

**Full-or-part-time:** 10h  
Theory classes: 4h  
Self study: 6h

**ACTIVITIES**

**ACTIVITY 1: THEORETICAL CLASSES**

**Description:**
Classes with the basic explanation of the corresponding manufacturing processes, including images and videos that complement the theoretical session.

**Material:**
Class notes, with links to various complementary material (articles, catalogs, internet links) of interest.

**Full-or-part-time:** 58h  
Theory classes: 26h  
Self study: 32h
ACTIVITY 2: MANUFACTURING WORK

Description:
The students will have to present a work of manufacture in English language, with relation Road Safety (components of Active or Passive Safety)

Specific objectives:
Practice some of the soft skills required in the sector: Teamwork. Strengthen skills in third language. Practical oral presentation of a work.

Material:
In Atenea a document will be shared with the appropriate instructions for carrying out the work. Depending on the selected work theme, specific initial documentation will be provided for its proper development.

Delivery:
Group work. They will be delivered in the corresponding task, through the digital campus Atenea. In the last lesson session of the course there will be an oral presentation of the work to the rest of the students.

Full-or-part-time: 6h
Self study: 6h

ACTIVITY 3: MECHANICAL OPTIMIZATION WORK

Description:
Students must present a mechanical optimization work, in ENGLISH language

Specific objectives:
Practice some of the soft skills required in the sector: Teamwork. Strengthen skills in third language. Practical oral presentation of a work.

Material:
In Atenea a document will be shared with the appropriate instructions for carrying out the work. Depending on the selected work theme, specific initial documentation will be provided for its proper development.

Delivery:
In groups. The works will be delivered through the digital campus ATENEA, before the respective evaluation test.

Full-or-part-time: 4h
Self study: 4h

ACTIVITY 4: MANUFACTURING FINAL TEST

Full-or-part-time: 4h
Theory classes: 2h
Self study: 2h

ACTIVITY 5: FINAL TEST OPTIMIZATION MECHANICAL

Full-or-part-time: 3h
Practical classes: 2h
Self study: 1h
GRADING SYSTEM

The final grade of the course depends on four evaluation acts:
- 1st activity (Assistance and making proposals activities), weight 10%
- 2nd activity (Works Manufacturing), weight 30%
- 3rd activity (Mechanical Optimization Works), weight: 20%
- 4th activity (Manufacturing test), weight: 20%
- 5th activity (Mechanical Optimization test), weight: 20%

Any student who wishes to improve his grade may try it at the exam planned at the end of the course. The best mark is preserved.

EXAMINATION RULES.

Activity 2, obligatory, it will be done in a group and you must present a work by group.
Activity 3, obligatory, it will be done in a group and you must present a work by group.
Activities 4 and 5 (exams), it will be conducted individually.

BIBLIOGRAPHY

Basic:

Complementary:

RESOURCES

Other resources: Throughout the course, Internet addresses are given for consultation and copies of articles to read that complement the explanations given in class. Also interesting links are provided to web seminars related to topics of the subject.