Course guide
240EI012 - 240EI012 - Machine Technology

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 712 - EM - Department of Mechanical Engineering.
Degree: MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2014). (Compulsory subject).
Academic year: 2023  ECTS Credits: 4.5  Languages: Catalan, Spanish

LECTURER
Coordinating lecturer: Martinez Miralles, Jordi Ramon
Others: Martinez Miralles, Jordi Ramon
Veciana Fontanet, Joaquin Maria
Domenèch Mestres, Carlos
Blanco Romero, Maria Elena
Caballero Flores, David
De La Fuente Morató, Albert
Fàbregas Massana, Xavier
Perez Gracia, Maria Alba

PRIOR SKILLS
Group 30 of the autumn semester is taught in Spanish.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES
Specific:
CEMEI03. Ability for the design and assays in machines.

Generical:
CGMEI02. (ENG) Projectar, calcular i disenyar productes, procesos, instal.lacions i plantes.

TEACHING METHODOLOGY
The teaching methodology is based on two types of activities.
Class sessions in which the lecturer provides concepts and knowledge and, using practical exercises, shows how to apply them to solve real problems and situations. There is a 2 h class every week.
Practical sessions in small groups in which students carry out activities under the lecturer's supervision. There are lab sessions in which students become familiar with the various types of machine elements, and seminar sessions in which students solve exercises about dimensioning and selection of machine elements guided by the lecturer.

LEARNING OBJECTIVES OF THE SUBJECT
General objective: To ensure that students acquire a thorough knowledge about the operation of the main commercial types of mechanical elements used in machines, and get the basic skills on how to select and size them.

Specific objectives: See the specific objectives of each part and each programmed activity
STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours small group</td>
<td>13,5</td>
<td>12.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>27,0</td>
<td>24.00</td>
</tr>
<tr>
<td>Self study</td>
<td>72,0</td>
<td>64.00</td>
</tr>
</tbody>
</table>

Total learning time: 112.5 h

CONTENTS

**Mechanical fatigue failure**

**Description:**

**Specific objectives:**
Knowledge of the basis of fatigue failure. Ability to identify the types of loads that cause fatigue failure. Being able to calculate rotating shafts under uniaxial stresses.

**Related activities:**
Seminar sessions where the students carry out exercises under the lecturer supervision.

**Full-or-part-time:** 26h
Theory classes: 6h
Laboratory classes: 2h
Self study: 18h

**Motors and receivers**

**Description:**

**Specific objectives:**
Knowledge of the mechanical properties of motors and receivers. Knowing how to analyze the characteristic curve of a motor. Being able to determine the motion equation of a machine. Ability to choose an electric motor for driving a steady operation machine.

**Related activities:**
Seminar sessions where the students carry out exercises under the lecturer supervision. Practical session devoted to the identification of several types of motors and their properties.

**Full-or-part-time:** 22h
Theory classes: 6h
Laboratory classes: 2h
Self study: 14h
Gear reducers

**Description:**

**Specific objectives:**
Knowledge of the main types of comercial gear reducers and their applications. Ability to choose a gear reducer as machine transmission, using the information provided by the manufacturer.

**Related activities:**
Seminar sessions where the students carry out exercises under the lecturer supervision. Practical session devoted to the identification of several types of gear reducers and their properties.

**Full-or-part-time:** 12h 30m
Theory classes: 3h
Laboratory classes: 1h 30m
Self study : 8h

Belt drives

**Description:**

**Specific objectives:**
Knowledge of the main types of belts: flat bets, V belts and timing belts. Knowing how to analyze the dynamic behaviour of belt drives and how to determine the minimum needed mounting force. Ability to select the belt type and size the belt for a certain transmission using the information provided by the manufacturer.

**Related activities:**
Seminar sessions where the students carry out exercises under the lecturer supervision. Practical session devoted to the identification of several types of belts and their pulleys.

**Full-or-part-time:** 22h
Theory classes: 6h
Laboratory classes: 2h
Self study : 14h

Rolling and sliding bearings

**Description:**

**Specific objectives:**
Knowledge of the properties of the main types of sliding and rolling bearings, as well as their applications. Ability to select the type of rolling bearings and size them for a certain application using the information provided by the manufacturer.

**Related activities:**
Seminar sessions where the students carry out exercises under the lecturer supervision. Practical session devoted to the identification of several types of sliding and rolling bearings.

**Full-or-part-time:** 26h
Theory classes: 6h
Laboratory classes: 2h
Self study : 18h
GRADING SYSTEM

Assessment is based on two evaluation activities: a mid-term, partial test and a final exam. Both the partial test and the final exam assess the theoretical and practical aspects of the subject. Some parts of the final exam can be related to activities developed during lab sessions. The final exam is a review of the whole subject, therefore the exam assesses all the contents and skills the subject deals with.

The algorithm for calculating the final mark is: \[ N_{\text{final}} = \text{Maximum}[0,3 \cdot N_{\text{PP}} + 0,7 \cdot N_{\text{EF}}; N_{\text{EF}}] \]

Where: \( N_{\text{PP}} \) = partial test mark; \( N_{\text{EF}} \) = final exam mark.

A special exam will be offered in July to those students that have not passed the subject. The mark obtained with this exam replaces the final exam mark.

EXAMINATION RULES.

Personal notes and reference material can be used during the practical exercises in both the partial test and the final exam. No documentation may be consulted during the theoretical part.

BIBLIOGRAPHY

Basic:

Complementary:

RESOURCES

Audiovisual material:
- Transparències de classe. Audiovisual material prepared by the teaching team. This material is accessible through the Atenea Campus.