240503 - Manufacturing Workshop

Coordinating unit: 240 - ETSEIB - Barcelona School of Industrial Engineering
Teaching unit: 712 - EM - Department of Mechanical Engineering
Academic year: 2018
Degree: BACHELOR’S DEGREE IN MATERIALS ENGINEERING (Syllabus 2010). (Teaching unit Optional)
BACHELOR’S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2010). (Teaching unit Optional)
BACHELOR’S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Teaching unit Optional)
ECTS credits: 3
Teaching languages: Catalan, Spanish

Teaching staff
Coordinator: IRENE BUJ CORRAL
Others: IRENE BUJ CORRAL

Degree competences to which the subject contributes

Specific:
3. Knowledge applied to manufacturing systems and processes, metrology and quality control.

Transversal:
1. SELF-DIRECTED LEARNING. Detecting gaps in one's knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one's knowledge.
2. EFFICIENT ORAL AND WRITTEN COMMUNICATION. Communicating verbally and in writing about learning outcomes, thought-building and decision-making. Taking part in debates about issues related to the own field of specialization.

Teaching methodology
Two hours of class are expected every week to all students, in order introduce the different topics. There will be two groups of laboratory class, with two hours of laboratory class every three weeks.

Theory classes will alternate with classes of problems where students will solve practical exercises, as well as laboratory classes in the Manufacturing Technology Workshop, where students will see in situ operation of the machines and will be able to practice with the different measuring and verification elements of the manufactured parts in the machines.

Students will prepare a report about the manufacturing process of a workpiece in groups.

Learning objectives of the subject

General goal:
Knowing and understanding the processes, components and basic equipment in a production workshop, related to the manufacturing and testing processes of parts.

Specific goals:
- Understanding specifications in the drawings of parts to be manufactured.
- Knowing how to verify manufactured parts, with different measuring instruments.
- Knowing basic machine tools, conventional and CNC, that are used to manufacture parts, different types of tools and types of operations they can perform.
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- Learning Advanced Manufacturing Technologies.

<table>
<thead>
<tr>
<th>Study load</th>
<th>Hours large group:</th>
<th>Hours medium group:</th>
<th>Hours small group:</th>
<th>Guided activities:</th>
<th>Self study:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total learning time:</strong> 75h</td>
<td>0h</td>
<td>20h</td>
<td>10h</td>
<td>0h</td>
<td>45h</td>
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<td>0.00%</td>
<td>26.67%</td>
<td>13.33%</td>
<td>0.00%</td>
<td>60.00%</td>
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</table>
# Content

<table>
<thead>
<tr>
<th>1. Basic metrology</th>
<th>Learning time: 15h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 2h</td>
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<tr>
<td></td>
<td>Practical classes: 2h</td>
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<tr>
<td></td>
<td>Laboratory classes: 2h</td>
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<tr>
<td></td>
<td>Self study: 9h</td>
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**Description:**
Definition of tolerances in the drawings according to the ISO system. Use of basic Metrology devices: caliper, micrometer, dial indicator, etc.

**Related activities:**
Laboratory class 1. Basic metrology.

**Specific objectives:**
- Identifying and interpreting dimensional tolerances according to ISO standard.
- Selecting most appropriate measuring device in each case.

<table>
<thead>
<tr>
<th>2. Computer assisted metrology</th>
<th>Learning time: 15h</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 2h</td>
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<td></td>
<td>Laboratory classes: 2h</td>
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<td>Self study: 9h</td>
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**Description:**
Use of computer assisted measuring machines: profilometer and roughness meter 2D and 3D, roundness measuring machine, profile projector and laser interferometer in order to check numerical control machines.

**Related activities:**
Laboratory class 2. Computer assisted metrology.

**Specific objectives:**
- To select most appropriate measuring machine in each case.
### 3. Manufacturing of parts by means of turning operations in a conventional or numerical control lathe machine. Grinding of cylindrical surfaces.

**Learning time:** 15h  
Theory classes: 4h  
Laboratory classes: 2h  
Self study: 9h

**Description:**  
Operation of the lathe machine, operation of the cylindrical grinder, fixture of parts and tools, types of operations and types of tools, definition of phase sheets and list of operations.

**Related activities:**  
Laboratory class 3. Lathe.

**Specific objectives:**  
Identifying, evaluating, selecting and comparing different manufacturing operations for revolution parts in the lathe and in the cylindrical grinding machine.


**Learning time:** 15h  
Theory classes: 4h  
Laboratory classes: 2h  
Self study: 9h

**Description:**  
Operation of the milling machine, operation of the drilling machine, operation of the surface grinder, fixture of parts and tools, types of operations and types of tools, definition of phase sheets and list of operations.

**Related activities:**  
Laboratory class 4. Milling machine.

**Specific objectives:**  
Identifying, evaluating, selecting and comparing different manufacturing operations of prismatic parts in the milling machine, the drilling machine and the grinding machine for flat surfaces.

### 5. Other processes.

**Learning time:** 15h  
Theory classes: 4h  
Laboratory classes: 2h  
Self study: 9h

**Description:**  
Study of other manufacturing processes such as casting, forging and metal sheet forming. Visit to CIM Centre: Advanced Manufacturing Technologies: rapid prototyping, multi-tasking machines, sinker electrical discharge machining, wire electrical discharge machining, etc.

**Related activities:**  
Laboratory class 5. Casting process.

**Specific objectives:**  
Identifying, evaluating, selecting, and comparing manufacturing processes different than cutting processes.
Qualification system

\[ NF = 0.1 \cdot NLT + 0.1 \cdot NTC + 0.8 \max(NEF; 0.6NEF + 0.4NPP) \]

NF = Final mark
NEP = Mark of the partial exam
NEF = Mark of the final exam
NLT = Mark of laboratory + exercises
NTC = Mark of the report

Regulations for carrying out activities

In the theory part it is not possible to read anything. In the exercise part it is possible to read the metrology tables.

Bibliography

Complementary:


Others resources: