

220047 - Sustainable Manufacturing Technologies

Coordinating unit:	205 - ESEIAAT - Terrassa School of Industrial, Aerospace and Audiovisual Engineering		
Teaching unit:	712 - EM - Department of Mechanical Engineering		
Academic year:	2019		
Degree:	BACHELOR'S DEGREE IN AEROSPACE VEHICLE ENGINEERING (Syllabus 2010). (Teaching unit Optional) BACHELOR'S DEGREE IN AEROSPACE TECHNOLOGY ENGINEERING (Syllabus 2010). (Teaching unit Optional) BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Teaching unit Optional)		
ECTS credits:	3	Teaching languages:	English

Teaching staff

Coordinator:	Jasmina Casals
Others:	José A. Ortiz, Xavier Salueña

Prior skills

Students should have basic technical drawing capabilities and knowledge about technology materials.

Degree competences to which the subject contributes

Specific:

1. GrETA/GrEVA - An understanding of manufacturing processes
2. Applied knowledge of manufacturing systems and processes, metrology and quality control

Teaching methodology

The teaching methodology is divided in three parts:

- Theoretical contents sessions.
- Visits to metrology and mechanical lab sessions or Probleme solving sessions.
- Autonomous work and homeworks.

In the theoretical sessions the professor will present the theoretical concepts

In the lab sessions, students will practice the knowledge acquired setting practical experiments or solving problems under the supervision of the professor.

In each module a selfstudy time is required in order to assimilate the concepts and resolve the proposed exercises .

Learning objectives of the subject

- To Provide basic knowledge, theoretical, practical, sustainable manufacturing processes most commonly those areas aerospace, automotive and renewable energy, among others.
- To Introduce students to the techniques of quality control in the manufacturing sector, with considerations of design, safety and sustainability.



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Study load

Total learning time: 75h	Hours large group:	30h	40.00%
	Self study:	45h	60.00%

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Content

<p>Module 1: MANUFACTURING PROCESSES and QUALITY CONTROL</p>	<p>Learning time: 20h Theory classes: 8h Self study : 12h</p>
<p>Description: 1.1. Introduction to Manufacturing Technologies 1.2. Sustainability and ecomanufacturing 1.3. Quality control (metrology, tolerances)</p> <p>Related activities: Activity 1 - Activity 2 - Activity 3 - Activity 4 - Activity 5</p>	
<p>Module 2: WELDING PROCESSES</p>	<p>Learning time: 8h Theory classes: 3h Self study : 5h</p>
<p>Description: 2.1. Introduction to welding processes 2.2. Welding heterogeneous / homogeneous 2.3. Quality control. Standards. Safety</p> <p>Related activities: Activity 1 - Activity 3 - Activity 4 - Activity 5</p>	
<p>Module 3: MACHINING PROCESSES</p>	<p>Learning time: 28h Theory classes: 10h Self study : 18h</p>
<p>Description: 3.1. Introduction to machining processes 3.2. Features Machine Tools 3.3. Features Cutting Tools and Tooling 3.4. Quality Control. Safety 3.5. Sustainability processes</p> <p>Related activities: Activity 1 - Activity 2 - Activity 3 - Activity 4 - Activity 5</p>	



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Module 4: OTHERS MANUFACTURING TECHNOLOGIES	Learning time: 19h Theory classes: 9h Self study : 10h
<p>Description:</p> <ul style="list-style-type: none">4.1. Hot forming4.2. Cold forming4.3. Rapid Prototyping4.4. Micromanufacturing <p>Related activities:</p> <p>Activity 1 - Activity 2 - Activity 3 - Activity 4</p>	

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Planning of activities

ACTIVITY 1: THEORY SESSIONS	Hours: 22h Theory classes: 14h Self study: 8h
<p>Description: Description in class of the theoretical contents of the subject</p> <p>Support materials: Basic and specific bibliography ATENEA Handouts</p> <p>Descriptions of the assignments due and their relation to the assessment: This activity is graded through one written final exam (activity 4)</p> <p>Specific objectives: After these classes, the student should have consolidated and adquired all the knowledges enumerated in the general learning goals of subject.</p>	
ACTIVITY 2: PRACTICAL PROJECT SESSIONS	Hours: 22h Theory classes: 6h Self study: 16h
<p>Description: Students organized by project groups. Teachers provide generals criteria contained project "Design and manufacturing of a prototype sustainable." Also, it will provide the content specific to each project group.</p> <p>Support materials: Bibliography and Project guide</p> <p>Descriptions of the assignments due and their relation to the assessment: Report on the activity performed in groups. Must be delivered in digital format (ATENEA) and make an oral presentation at the end of course (3-5 min. per group). It is part of continuous evaluation systems.</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> - Ability to find technical information autonomously. - Ability to resolve production problems, go to a design (on paper or digital), the making a physical prototype or real. - Understand and apply different methods to raise production. - The student aware of the concept of standardization and the concept of 3R's (Reduce, Reuse and Recycling), designed and manufactured components. - Development of Sustainability and Social generic competence. 	
ACTIVITY 3: LAB SESSIONS	Hours: 18h Theory classes: 8h Self study: 10h
<p>Description: In this activity the student will set up practical experiments related to the subject contents</p>	

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Support materials:

Bibliography and Lab Guide

Descriptions of the assignments due and their relation to the assessment:

Lab report prepared for groups.

It is part of continuous evaluation systems.

Specific objectives:

Improve and use concepts related to metrology and manufacturing technologies. +

Contents related to module 1, 2, 3 and 4

ACTIVITY 4: FINAL EXAM

Hours: 9h

Theory classes: 2h

Self study: 7h

Description:

Individual test related to the required contents.

Support materials:

Exam and handouts provided

Descriptions of the assignments due and their relation to the assessment:

Solved exam is handed to the professor

It is part of continuous evaluation systems

Specific objectives:

Contents related to module 1,2, 3 and 4

ACTIVITY 5: HOMEWORKS

Hours: 4h

Self study: 4h

Description:

Solve problems posted in ATENEA in order to fix the contents developed in the theoretical and practical sessions

Support materials:

Problem posted in ATENEA

Descriptions of the assignments due and their relation to the assessment:

Handout the solution through ATENEA

Specific objectives:

Contents related to module 2 and 3

Qualification system

Activity 2 (Project sessions), weight: 25%

Activity 3 (Lab sessions), weight: 20%

Activity 4 (Final exam), weight: 45%

Activity 5 (Homeworks), weight: 10%

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Regulations for carrying out activities

All the activities are compulsory.

Activities 2 and 3 are held in groups and writing. The third activity will also have a 3-5 minute oral presentation.

Activities 4 and 5 will be individually written.

Bibliography

Basic:

Kalpakjian, S.; Schmid, S.R. Manufacturing processes for engineering materials. 5th ed. Upper Saddle River: Prentice Hall, 2008. ISBN 9789810679538.

Complementary:

Ehmann, K.F. [et al.]. Micromanufacturing: international research and development. Dordrecht: Springer, 2007. ISBN 9781402059483.

Castellanos, Rafael [et al.]. Diccionari del taller mecànic. Barcelona: La Llar del Llibre, 1991. ISBN 8472794563.

Reithmaier, L. (ed.). Standard aircraft handbook for mechanics and technicians. 6th ed. New York: McGraw-Hill, 1999. ISBN 9780071348362.

Others resources:

Notes of teachers.

Research articles and / or technical information.