Course guide
220578 - 220578 - Mechanics Technology

Last modified: 19/04/2023

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

Degree: MASTER'S DEGREE IN MANAGEMENT ENGINEERING (Syllabus 2012). (Optional subject).

Academic year: 2023 **ECTS Credits:** 3.0 **Languages:** Spanish

LECTURER

Coordinating lecturer: Xavier Salueña Berna

Others: Jasmina Casals Terré

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
7. Apply theories and inherent principles in the production and logistics area in order to analyze uncertainty complex situations and make decisions using engineering tools.

Generical:
1. Ability to apply knowledge to solve problems in new environments or unfamiliar environments within broader contexts (or multidisciplinary) related to engineering.
2. Self-learning capacity to independent continuous training.
3. Ability to effectively communicate their findings, knowledge and concluding reasons to skilled and unskilled audiences, clearly and unambiguously.
4. Ability to integrate knowledge and formulate judgments with the aim of making decisions based on information that, with incomplete or limited include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgments.
5. Ability to understand the impact of engineering solutions in a global and social context .
6. Ability to operate and lead multidisciplinary and multicultural groups, with negotiation skills, group work, relationships in an international setting, and conflict resolution.

TEACHING METHODOLOGY

The course is divided into three parts:

Theory classes
Guided activities class
Self-study for doing exercises and activities.

In the theory classes, teachers will introduce the theoretical basis of the concepts, methods and results and illustrate them with examples appropriate to facilitate their understanding.

In the guided activity class (in the laboratory), teachers guide students in applying theoretical concepts to solve problems in machine, always using practical view.
Students, independently, need to work on the materials provided by teachers and the outcomes of the sessions of exercises/problems, in order to fix and assimilate the concepts.

The teachers provide the curriculum and monitoring of activities (by ATENEA).

LEARNING OBJECTIVES OF THE SUBJECT

The objective of the subject of Manufacturing Technology is the one to develop the knowledge of the processes of manufacture from a design that includes the prototyping, preliminary series, the design of tools as well as the control of the quality. The subject combines explanatory sessions with practical exercises and a practical session on measurement with modern machines of measurement of coordinates and explanation of processes in factory.

STUDY LOAD

Type	Hours	Percentage
Hours large group	8,0	10.67
Guided activities	16,0	21.33
Self study	48,0	64.00
Hours medium group	3,0	4.00

Total learning time: 75 h

CONTENTS

Módulo 1: Introduction to the manufacture processes

Description:
Relation between the manufacture and the management of the production.
The manufacture in the present market and the globalisation.
Solutions: Concurrent engineering and re-engineering.
Technologies CAX in the context of concurrent engineering.
Productivity versus flexibility. Flexible manufacture. SMED.
Cells of manufacture and systems of flexible manufacture.
Rapid prototyping and Rapid tooling.
Techniques of numerical control and systems CAD-CAM.
Management of improvements of the productivity in the industry.
Planning of processes (CAPP).

Related activities:
Activity 1: Theory/Large groups sessions
Activity 3: Final exam
Activity 4: Project of evaluation

Full-or-part-time: 18h 30m
Theory classes: 6h 30m
Self study : 12h

Módulo 2: Measurement and uncertainty

Description:
Processes of measurement and management of the quality in manufacture Functional and nonfunctional measures
Defect zero and process control
Dimensional and geometric tolerances
Uncertainty of measurement

Related activities:
Activity 1: Theory/Large groups sessions
Activity 2: Guided activities session
Activity 3: Final exam
Activity 4: Project of evaluation

Full-or-part-time: 13h
Theory classes: 3h 30m
Guided activities: 1h 30m
Self study : 8h

Módulo 3: Metallic molds for the manufacture of metallic pieces, of plastic, glass or compound materials.

Description:
Castability of materials.
Molded materials in the aeronautics, automobile, feeding, chemistry, naval, graphical, electrical and energetics industry.
Materials for the manufacture of metallic molds
Processes of moulding and design of molds.
Simulation of moulding processes (CAPE).
Manufacture of metallic molds, technical and CAD-CAM.

Specific objectives:

Related activities:
Activity 1: Theory/Large groups sessions
Activity 3: Final exam
Activity 4: Project of evaluation

Full-or-part-time: 10h 30m
Theory classes: 7h
Self study : 3h 30m

Módulo 4: Processes of metallic cold forming

Description:
Metallic sheet.
Metallic sheet in the industry of the automobile, aeronautics, naval, feeding, and electrical.
Processes of die out and design of dies.
Electrodischarge machining.
Simulation of processes of cold forming (CAPE).
Manufacture of metallic dies, technical and CAD-CAM.

Related activities:
Activity 1: Theory/Large groups sessions
Activity 3: Final exam
Activity 4: Project of evaluation

Full-or-part-time: 10h 30m
Theory classes: 3h 30m
Self study : 7h

Módulo 5: Processes of metallic hot forming

Description:
Processes of rolled, drawwing, extrusión, forging and sintering.
Pieces hot forming in the aeronautics, naval, railway, tools, anchorages and construction industry.
Processes of hot forming and design of dies and stamps.
Simulation of hot deformation processes (CAPE).
Manufacture of metallic stamps, technical and CAD-CAM.

Related activities:
Activity 1: Theory/Large groups sessions
Activity 3: Final exam
Activity 4: Project of evaluation

Full-or-part-time: 9h 30m
Theory classes: 3h 30m
Self study : 6h

Módulo 6: Heat and superficial treatments and machining processes

Description:
Machining processes.
Machining components in the aeronautics, naval, automobile, energetics, tools, graph, chemistry, railway and structures industry
Heat and superficial treatments
Manufacture of machining processes, technical and CAD-CAM.

Related activities:
Activity 1: Theory/Large groups sessions
Activity 2: Guided activities session
Activity 3: Final exam
Activity 4: Project of evaluation

Full-or-part-time: 13h
Theory classes: 3h 30m
Guided activities: 1h 30m
Self study : 8h

ACTIVITIES

ACTIVITY 1: THEORY/LARGE GROUPS SESSIONS

Description:
Attendance to the theory sessions.

Specific objectives:
Transfer the necessary knowledge for a correct interpretation of the contents in the large group sessions, resolving doubts about the content of the course and generic skills development.

Material:
Notes posted to the Atenea platform.
General literature of the course.

Delivery:
During some sessions, exercises will be conducted in the class, individually or in small groups.
It represents 5% of the final course grade.

Full-or-part-time: 21h
Theory classes: 21h

ACTIVITY 2: GUIDED ACTIVITIES SESSION

Description:
Preparation after the guided activities session and attendance to the session.

Specific objectives:
To include the processes of mechanized, heat treatments, as well as the techniques of verification of received material.
Verification of quality in manufacture with Machines of Measurement of Coordinates (MMC).

Material:
Notes posted to the Atenea platform.

Delivery:
During this session, in the metrology and factory laboratory, practices will be developed.
After that, a report by groups will be realized as homeworks.
It represents 15% of the final course grade

Full-or-part-time: 5h
Guided activities: 3h
Self study: 2h

ACTIVITY 3: FINAL EXAM

Description:
Individual and writing assessment about the contents of all modules.

Specific objectives:
The exam must demonstrate that the student has acquired and assimilated the concepts, principles and fundamentals related to all modules.

Material:
Instructions and terms for the final exam.

Delivery:
The hand-in will be the result of the exam.
It represents 50% of the final course grade.

Full-or-part-time: 33h
Theory classes: 3h
Self study: 30h

ACTIVITY 4: PROJECT OF EVALUATION

Description:
Proposed problems to realise of nonattendance form, individually.

Specific objectives:
The project must demonstrate that the student has acquired and assimilated the concepts, principles and fundamentals related to 3 modules 1 and 2.Los problemas comprueban si el estudiante/a ha adquirido y asimilado los conceptos, principios y fundamentos básicos relacionados con 3 de los módulos chosen by the educational ones of random form.

Material:
Instructions and terms for the project.

Delivery:
The hand-in would be given and will gather throughout the course in ATENEA.
It represents 30% of the final course grade.

Full-or-part-time: 16h
Self study: 16h

GRADING SYSTEM

The final grade depends on the following assessment criteria:

- Activity 1, weight: 10%
- Activity 2, weight: 15%
- Activity 3 (final exam), weight: 50%
- Activity 4 (project of evaluation), weight: 25%

EXAMINATION RULES.

Activity 2 will take place in groups and written and will send to ATENEA
Activity 3 will be take place individually and will be written in attendance form.
Activity 4 will take place in groups and written and will send to ATENEA

BIBLIOGRAPHY

Basic:
- Salueña Berna, Xavier [et al.]. Tecnología mecánica [on line]. 2a ed. Barcelona: Centre de Recursos de Suport a la Docència, Universitat Politècnica de Catalunya : Edicions UPC, 2001 [Consultation: 13/10/2020]. Available on: http://hdl.handle.net/2099.3/36437. ISBN 8483014491.