

60816 - Manufacturing Technologies

Información del Plan Docente

Academic Year	2016/17
Academic center	110 - Escuela de Ingeniería y Arquitectura
Degree	532 - Master's in Industrial Engineering
ECTS	6.0
Course	1
Period	First semester
Subject Type	Optional
Module	---

1. Basic info

1.1. Recommendations to take this course

1.2. Activities and key dates for the course

2. Initiation

2.1. Learning outcomes that define the subject

2.2. Introduction

3. Context and competences

3.1. Goals

3.2. Context and meaning of the subject in the degree

3.3. Competences

3.4. Importance of learning outcomes

4. Evaluation

5. Activities and resources

5.1. General methodological presentation

The learning process designed for this course is based on the following:

The proposed methodology seeks to promote continued student work and focus on the more practical aspects of machining processes planning and implementation of metrology instruments and tools for quality control.

In sessions with the whole group, the more theoretical aspects are considered with and completed with development problems and technical case study. The practical sessions take place in smaller groups to work with specialized applications and mechanical engineering equipment workshop and manufacturing and metrology laboratory. It aims is to promote hands-on learning, so the attendance is advised to practical sessions where direct experience is gained with the

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machines and manufacturing systems. At the end of each practical session, the immediate realization of a small control or script is required. In some cases, the practice session enables data collection for a more elaborate work that makes possible better assimilation of knowledge related to the subject. Such controls and work are required in case of choosing the gradual evaluation.

5.2.Learning activities

In class work : 2.4 ECTS (60 hours)

1) Lectures (28 hours)

Oral presentations of theoretical concepts covering most of the contents of the subject. Its aim is to present the knowledge and skills that must be acquired by the student and facilitate their assimilation.

2) Problems sessions (14 hours)

These problems sessions are integrated with the lectures to facilitate learning and provide a practical and applied overview of different theoretical topics.

3) Laboratory sessions (18 hours)

Students arranged in small groups will realize six workshop or laboratory sessions that last three hours. These sessions complement the understanding of those concepts of the subject requiring the practical use of specific equipment.

Out-of-class work: 3.6 ECTS (90hours)

4) Individual work (85 hours).

The student should study all the theoretical topics and practice in the solution of problems. The student will be encouraged to work in a continuous manner by means of a uniform work load along the semester.

5) Examination tasks (5 hours)

They have a twofold goal: to grade the student academic progress, and to inform him about the learning level he have reached in the course.

5.3.Program

Contents

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1) Metrology

- a. Inspection and industrial metrology.
- b. Measurement assurance.
- c. Systems and methods of measurement.

2) Quality

- a. Fundamental concepts of quality.
- b. Quality management
- c. Quality planning.
- d. Quality in product design and process.
- e. Manufacturing quality.

3) Fundamentals of machining processes.

- a. Movements and parameters in machining processes.
- b. Technological aspects of the processes of turning, drilling and milling.
- c. Tools: materials, geometry and selection criteria.
- d. Abrasive machining processes
- e. Non conventional machining processes: EDM

4) Mechanical cutting and machining economy

- a. Mechanics of chip formation.
- b. Kinematics and dynamics of metal cutting.

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- c. Machining energy balance.
- d. Tool wear and lubrication.
- e. High speed machining.
- f. Optimization of machining.

5) Manufacturing Systems.

- a. Characterization of manufacturing systems and automation.
- b. Tooling and fixturing..
- c. Selection criteria of machining equipment.
- d. Machine tool programming.

6) Process Planning.

Laboratory sessions

- 1) Measurement and calibration in dimensional metrology.
- 2) Geometric measurement with conventional systems and 3D measuring systems.
- 3) QFD and FMEA.
- 4) Processes turning, drilling and milling.
- 5) Grinding and EDM processes. Tooling and fixturing.
- 6) Machine Tool Programming.

5.4.Planning and scheduling

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6 ECTS: 150 hours / student distributed as follows:

The distribution of teaching (60 hours) is as follows:

- Lectures and development of technical cases and problem solving: 42 hours taught to the whole group, at 3 hours/week.
- Practical sessions in metrology laboratories and machining workshops: 18 hours spread over 6 sessions of 3 hours.

5.5. Bibliography and recommended resources