

60816 - Manufacturing Technologies

Syllabus Information

Academic Year: 2019/20

Subject: 60816 - Manufacturing Technologies

Faculty / School: 110 -

Degree: 532 - Master's in Industrial Engineering

ECTS: 6.0

Year: 1

Semester: First semester

Subject Type: Optional

Module: ---

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. It promotes continuous work and focuses 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 explained and supported with problems and technical case studies. The practice sessions take place in smaller groups to work with specialized applications and mechanical engineering equipment in the manufacturing and metrology laboratory. Its aim is to promote practical learning, so attendance is recommended because direct experience is gained while students deal with the machines and manufacturing systems. At the end of each practice session, a short test or task is done. In some cases, the practice session enables data collection for a more elaborate work that makes possible better assimilation of knowledge related to the course. Such controls and work will be required in case the student chooses the continuous assessment system.

4.2.Learning tasks

The course (6 ECTS: 150 hours) includes the following learning tasks:

- **Lectures** (28 hours). Oral presentations of theoretical concepts covering most of the course contents. Its aim is to present the knowledge and skills that must be acquired by the student and facilitate their assimilation.
- **Practice sessions** (14 hours). These problem-solving sessions are part of lectures to facilitate the learning process

and provide a practical and applied overview of different theoretical topics.

- **Laboratory sessions** (18 hours). In small groups, students will do 6 sessions of three hours each in metrology laboratories and machining workshops. These sessions complement the understanding of those concepts of the course that require the practical use of specific equipment.
- **Autonomous work** (85 hours). The student should study all the theoretical topics and practice 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.
- **Assessment tasks** (5 hours). In addition to the grading function, assessment tasks let students check their level of learning.

4.3.Syllabus

The course will address the following topics:

1. Topic 1. Metrology
 1. Inspection and industrial metrology.
 2. Measurement assurance.
 3. Systems and methods of measurement.
2. Topic 2. Quality
 1. Fundamental concepts of quality.
 2. Quality management.
 3. Quality planning.
 4. Quality in product design and process.
 5. Manufacturing quality.
3. Topic 3. Fundamentals of machining processes.
 1. Movements and parameters in machining processes.
 2. Technological aspects of the processes of turning, drilling and milling.
 3. Tools: materials, geometry and selection criteria.
 4. Abrasive machining processes
 5. Non conventional machining processes: EDM
4. Topic 4. Mechanical cutting and machining economy
 1. Mechanics of chip formation.
 2. Kinematics and dynamics of metal cutting.
 3. Machining energy balance.
 4. Tool wear and lubrication.
 5. High speed machining.
 6. Optimization of machining.
5. Topic 5. Manufacturing Systems.
 1. Characterization of manufacturing systems and automation.
 2. Tooling and fixtures.
 3. Selection criteria of machining equipment.
 4. Machine tool programming.
6. Topic 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.

4.4.Course planning and calendar

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course, will be provided on the first day of class or please refer to the EINA website.

4.5. Bibliography and recommended resources