

Academic Year/course: 2022/23

66421 - Design and optimization of Manufacturing Systems

Syllabus Information

Academic Year: 2022/23

Subject: 66421 - Design and optimization of Manufacturing Systems

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 330 - Complementos de formación Máster/Doctorado

536 - Master's in Mechanical Engineering

ECTS: 6.0

Year: 536 - Master's in Mechanical Engineering: 1

330 - Complementos de formación Máster/Doctorado: XX

Semester: First semester

Subject Type: 536 - Compulsory

330 - ENG/Complementos de Formación

Module:

1. General information

2. Learning goals

3. Assessment (1st and 2nd call)

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 is based on the design and control of manufacturing systems, and on the application of experimental techniques and optimization in this field. The proposed methodology seeks to promote student work and focus on practical aspects. A wide range of teaching and learning tasks are implemented, such as lectures, practice sessions, problems and industrial case studies, and tutorials, among others.

4.2. Learning tasks

The course of 6 ECTS includes the following learning tasks:

- Lectures (18 hours)
- Problems (4 hours)
- Practice sessions (18 hours distributed in 6 three-hour sessions)
- Tutorials (20 hours)
- Autonomous work (88 hours)
- Assignment presentation (2 hours)

4.3. Syllabus

The course will address the following topics:

Topic 1. Introduction to Design of Manufacturing Systems

Topic 2. Design and modeling systems

- Kinematic modeling of series, parallel and flexible mechanisms
- Identifying strategies for kinematic parameters
- Evaluation methods and error correction

Topic 3. Experimental techniques for control and verification of manufacturing systems

- Standardization. Modeling of production systems
- Direct verification
- Indirect verification

Topic 4. Computational methods of optimization in Manufacturing Engineering

- Mathematical modeling: variables, objectives, constraints
- Types of optimization problems in manufacturing engineering
- Definition of objectives
- Algorithms

Topic 5. Cases of application

Lab sessions

- 1) Use of programming tools
- 1) Modeling and identification (I). Kinematic modeling of an articulated arm coordinate measuring machine
- 2) Modeling and identification (II). Procedures for data capture and analysis for parameter identification
- 3) Modeling and identification (III). Parameter identification and calibration of an articulated arm coordinate measuring
- 5) Adaptation of optimization algorithms to design systems (I): identifying variables, objective function and coding
- 6) Adaptation of optimization algorithms to design systems (II): development of algorithms and parameter setting

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.