60833 - Precision engineering and additive manufacturing

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	2
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 that is designed for this subject is based on the following:
Learning is based on the understanding of the application of computational techniques and experimental in different areas of design and product development of special features and manufacturing systems and measuring everything from the principles of precision engineering and additive manufacturing. the case method in each of them and the student must focus work / project subject in one area will be used.
To do this, the various concepts related to the subject in lectures, later, in the kinds of problems / practices, develop industrial case studies and introduce the different types of tools and techniques involved are introduced. Subsequently, the classes will be used for the drafting of course, with extensive tutorial assistance of specialist teachers in the area chosen by the student.

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Possibility of carrying out any other activities that the teacher deems appropriate (such as visits to companies, participation of external guests ...) to achieve the learning objectives set.

5.2.Learning activities

The program that the student is offered to help you achieve the expected results includes the following activities ...
Lectures (about 15 hours with the entire group of students). In these classes most of the contents of the subject will be developed. Its aim is to present the knowledge and skills acquired by the student aims and facilitate their assimilation, so that their monitoring is essential for the consolidation and development of programmed learning good.
Problems and technical cases (approximately 15 hours with the entire group of students). They will go to the exercises and technical cases aimed at enhancing the acquisition and assimilation of acquired in the theoretical knowledge and learning management of various tools and techniques necessary for the development of projects.
Practical classes workshop / laboratory computer (18 hours divided into 6 practices 3 hours with small groups of students). Complement those concepts of the subject for whose better understanding is necessary to use specific equipment or make complicated for what the computer is a valuable tool calculation.
Mentoring and personal coaching course project (approximately 15 hours).
Study and work personae (Approximately 85 hours of non-contact work).
Final testing / evaluation exam (about 2 hours).

5.3.Program

Learning activities scheduled
Theoretical and practical agenda
1) Design, development and optimization of manufacturing and measurement systems according to principles of precision engineering.
2) Design, manufacture and measurement of products with special characteristics.
3) Verification of manufacturing and measurement systems.
4) additive manufacturing and rapid prototyping. Prototyping phases, workflow and integration into the product development cycle.
5) Rapid prototyping Technologies and system selection. Software and file formats.
6) Prototyping a pplications in industrial, medical, artistic and heritage conservation.
Lab practices
1) Analytical calculation and finite element simulation of machine elements.
2) Modeling and verification of machine tool.
3) Modeling and analysis of measurement systems.
4) 3D printing photopolymerizable resin. Software file management and printing. Principle of operation, operation and maintenance
5) generic CAD design of parts. Data collection and analysis files. Printing, cleaning and finishing prototypes.
6) Digitization of parts laser triangulation sensor and articulated arm coordinate measuring. Coordinate measuring machines and laser tracker.
technical cases
1) Design of a precision instrument.
2) Manufacturing and measurement products large and / or complex geometries.
3) modeling, identification and verification of volumetric machine tool.
4) Development of mechanism by additive manufacturing.
5) Reverse Engineering, CAD reconstruction from point clouds and prototype development.
6) Modelling and improves precision 3D printer.

5.4.Planning and scheduling

Schedule of sessions and presentation of works
The proposed methodology seeks to promote the continued work of the student and focuses on the practical aspects of precision engineering and additive manufacturing.
In sessions with the whole group the more theoretical aspects are addressed in the form of master class and completed

with the development of problems and technical case study.
The practical sessions take place in smaller groups to work with specialized applications and equipment manufacturing engineering workshop and metrology laboratory. It aims to promote hands-on learning, so that attendance at practice sessions, where direct experience with machines and manufacturing systems are advised lives. At the end of each practice 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 enables better assimilation of knowledge related to the subject.
The personalized tutorials will be used for evaluation, correction and clarification of aspects of the proposed subject by each student, in order to analyze the possible shortcomings and answer questions to improve personal work.
Such controls and work are required in case of opting for the gradual evaluation.
Planning and scheduling
6 ECTS: 150 hours / student distributed as follows:
The distribution of teaching (60 hours) is as follows:
a) Imparting by master class theory and development of technical and troubleshooting cases: 30 hours given to the whole group, at 2 hours / week.
b) Practical sessions in metrology laboratories and machine shops: 18 hours spread over 6 sessions of 3 hours.
c) Tutoring customized individual meetings to monitor projects subject: 15 hours spread over 5 sessions of 3 hours.

5.5.Bibliography and recomended resources