Universidad Zaragoza

Academic Year/course: 2024/25

62953 - Design for additive manufacturing

Syllabus Information

Academic year: 2024/25
Subject: 62953 - Design for additive manufacturing
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 562 - Master's in Product Development Engineering
ECTS: 4.5
Year: 1
Semester: Second semester
Subject type: Optional
Module:

1. General information

The main objective of this subject is to provide students with a series of skills related to all the phases and operations involved in the process necessary to obtain a part by means of additive manufacturing technologies, focusing especially on the design phase and the adaptation of the design to its manufacture through a specific additive manufacturing technology. In this way, the student must acquire all the advanced skills necessary to develop a professional activity in relation to additive manufacturing itself or all the phases involved in the process, from the design to the post-processing of the part according to its application sector,. The student will also learn the main processing and execution alternatives in each case and for each technology, taking into account technical, functional and economic criteria.

2. Learning results

-To know and assimilate the technological criteria of design techniques for emerging additive manufacturing processes.

-To know the additive manufacturing technologies and be able to select the most appropriate one according to technical, economic and functional criteria in each case.

-To know the limitations of design by technology and master new design approaches unique to the field of additive manufacturing technologies.

- To master the software tools involved in the additive manufacturing workflow for design, modelling, file repair and modification, cloud and mesh processing, print preparation, optimization and reverse engineering of parametric surfaces, exact surfaces and direct design.

- To be able to perform topological optimization dedicated to the final geometry of a part or assembly based on technology, mechanical requirements and material properties attending to different objective functions, obtaining optimal generative designs that meet part requirements and minimize material.

- To complete the entire design-manufacturing workflow in a complete additive manufacturing process, being able to operate (preparation, pre-processing, manufacturing, post-processing and maintenance) professional additive manufacturing systems.

- To know the main applications of additive manufacturing and the auxiliary techniques derived from the use of rapid prototyping in different sectors.

3. Syllabus

- Introduction to additive manufacturing. History, classification and phases of the workflow.

- Additive manufacturing technologies. Strengths and weaknesses. End-piece characteristics.

- Design for additive manufacturing

- Point cloud processing tools. Reverse engineering, exact surfaces, parametric surfaces and direct design.

- Specific tools for additive manufacturing preparation, editing, file repair and analysis.

- Optimal design tools in additive manufacturing. Topological optimization and lattice structures.

- Use and maintenance of professional and personal additive manufacturing equipment

- Application sectors and dedicated tools by application sector.

Practical exercises:

1. Technology analysis work.
2. Production of one or several design projects per sector by means of dedicated tools for processing and manufacturing of the final result.

4. Academic activities

- Theoretical class, problem solving and case studies: 28 hours
- Practical sessions: 12 hours
- Practical application or research work :30 hours
- Personalized tutoring teacher-student: 5 hours
- Theory and tools study: 35.5 hours
- Assessment tests: 2 hours

5. Assessment system

The student is offered two types of assessment activities, to choose one of them:

- 70% practical work.
- 30% Theoretical assessment, by means of public presentations.

In accordance with the regulations of the University of Zaragoza, in the subjects that have continuous or gradual evaluation systems, a global evaluation test will also be scheduled for those students who opt for the latter system. In this case, the theoretical test will account for 100% of the subject.

6. Sustainable Development Goals

9 - Industry, Innovation and Infrastructure
12 - Responsible Production and Consumption