

# 25895 - Advanced Technology for Prototyping and Reverse Engineering

## Syllabus Information

**Academic Year:** 2020/21

**Subject:** 25895 - Advanced Technology for Prototyping and Reverse Engineering

**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura

**Degree:** 558 - Bachelor's Degree in Industrial Design and Product Development Engineering

**ECTS:** 6.0

**Year:** 4

**Semester:** Second 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 proposed methodology seeks to promote the continued work of the student and focuses on both the theoretical and practical aspects of reverse engineering, additive manufacturing and prototyping, as well as its main applications and application sectors.

In sessions with the whole group, the more theoretical aspects are addressed in the form of the participatory master class and are completed by the study of real technical cases. Practical work with computer applications is developed in smaller groups and will focus on working methodologies based on cases to facilitate the completion of the draft of the subject.

Knowledge of equipment and technologies for work and practical sessions is complemented, if possible, with an Additive Manufacturing / rapid prototyping company visit with other rapid prototyping technologies integrated into new product development as an everyday activity.

### 4.2.Learning tasks

The course includes the following learning tasks:

Learning activities are divided into participatory scheduled lectures, case studies, and tutored projects

### 4.3.Syllabus

The theoretical and practical program comprises the following topics

- 1. Introduction to additive manufacturing and rapid prototyping
- 2. Prototyping phases, workflow, and integration into the product development cycle
- 3. Additive manufacturing technologies and system selection. Software and file formats
- 4. Introduction to reverse engineering
- 5. Digitizing systems, measurement, and data acquisition. CAD reconstruction. Software.
- 6. Prototyping applications in industrial, medical, artistic and heritage conservation

Laboratory practices and company visits

- 1. Photopolymerizable resin 3D printer. Software file management and printing. Principle of operation, operation, and maintenance
- 2. Photopolymerizable resin 3D printer. Generic CAD design of parts. Data collection and analysis files. Printing, cleaning and finishing prototypes.
- 3. Reverse Engineering. Digitizing parts by triangulation laser sensor and articulated arm coordinate measuring. Coordinate measuring machines and laser tracker.
- 4. Reverse Engineering. CAD reconstruction from point clouds.
- 5. Reverse Engineering. Inspection against CAD point clouds.
- 6. Integration of coursework and printing group prototypes.
- 7. Visit prototyping company / CAD reconstruction sessions with course work parts.

#### 4.4.Course planning and calendar

##### Scheduled sessions and presentation of works

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory	1	2	2	3	3	3	3	4	4	5	5	5	5	6	6
Practice and visits				1		2				3	4	5	6	7	

#### 4.5.Bibliography and recommended resources