

## Course guide

### 205228 - CT - Critical Thinking for 3D Printing

**Last modified:** 02/04/2024

**Unit in charge:** Terrassa School of Industrial, Aerospace and Audiovisual Engineering  
**Teaching unit:** 758 - EPC - Department of Project and Construction Engineering.

**Degree:** BACHELOR'S DEGREE IN AUDIOVISUAL SYSTEMS ENGINEERING (Syllabus 2009). (Optional subject).  
BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Optional subject).  
BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Optional subject).  
BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Optional subject).  
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Optional subject).  
BACHELOR'S DEGREE IN TEXTILE TECHNOLOGY AND DESIGN ENGINEERING (Syllabus 2009). (Optional subject).  
BACHELOR'S DEGREE IN AEROSPACE TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).  
BACHELOR'S DEGREE IN AEROSPACE VEHICLE ENGINEERING (Syllabus 2010). (Optional subject).  
BACHELOR'S DEGREE IN INDUSTRIAL DESIGN AND PRODUCT DEVELOPMENT ENGINEERING (Syllabus 2010). (Optional subject).  
BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).

**Academic year:** 2024 **ECTS Credits:** 6.0 **Languages:** English

#### LECTURER

**Coordinating lecturer:** Macarulla Martí, Marcel

**Others:** Arcal Cunillera, Jordina  
Nicolau Martinez, Marc

#### TEACHING METHODOLOGY

This is a hands-on course where students will learn and implement Creativity and Design Thinking methodologies to solve a real challenge from the industry, using HP's additive manufacturing technology. They will work hand by hand with HP's industry experts and industrial companies, learning how to identify opportunities for the adoption of 3D printing production. Students will practice how to guide teams into the unknown through the process of experimentation, understanding user needs, generating innovative solutions & reducing the risks of launching new ideas through Minimum Viable Products.

During the course different ideas will be developed and the best idea of each group will be printed with the HP additive manufacturing technology. In total, each group will have two prints granted by HP.

#### LEARNING OBJECTIVES OF THE SUBJECT

The main objective of this course is to train students to solve industry challenges using additive manufacturing technologies.

#### STUDY LOAD

Type	Hours	Percentage
Self study	90,0	60.00
Hours medium group	60,0	40.00

**Total learning time:** 150 h

## CONTENTS

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### Module 1: Introduction to user centered desing and desing thinking

**Description:**

In this module, students will learn the basics of user-centered design and design thinking and will apply its processes and tools including: research techniques to understand people and identify user needs, empathy & interpreting reality, workflow, persons & their needs, mapping user needs and looking for patterns.

**Full-or-part-time:** 15h

Practical classes: 6h

Self study : 9h

### Module 2: Creativity and prototyping

**Description:**

In this module, students will learn and will apply techniques for creativity and prototyping.

**Full-or-part-time:** 25h

Practical classes: 10h

Self study : 15h

### Module 3: Best practices for additive manufacturing

**Description:**

In this module, students will learn best practices for additive manufacturing.

**Full-or-part-time:** 25h

Practical classes: 10h

Self study : 15h

### Module 4: Solving an industry challenge using additive manufacturing

**Description:**

This module will be focus on solving a challenge proposed by a company using additive manufacturing. Designed solutions will be printed using HP additive manufacturing technology, one print during the course, and another at the end of the course.

**Full-or-part-time:** 75h

Practical classes: 30h

Self study : 45h

### Module 5: Storytelling

**Description:**

This module will be focused on learn techniques to communicate developed ideas and solutions.

**Full-or-part-time:** 10h

Practical classes: 4h

Self study : 6h



## GRADING SYSTEM

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The final grade depends on the following assessment criteria:

- 20% classroom deliverables
- 20% midterm deliverable (solutions + first print of the solution)
- 40% final deliverable (final solution and second print of the solution)
- 20% Presentation and video

## BIBLIOGRAPHY

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### Basic:

- Kelley, Tom; Kelley, David. Creative confidence : unleashing the creative potential within us all. London: William Collins, 2013. ISBN 9780008139384.
- Portigal, Steve. Interviewing users : how to uncover compelling insights. Brooklyn, NY: Rosenfeld Media, 2013. ISBN 9781933820118.
- Osterwalder, Alexander [et al.]. Value proposition design : how to create products and services customers want : get started with : bad value proposition design : a guide to burning cash, communicating poorly, and spending your short life building stuff nobody wants. Hoboken: John Wiley & Sons, cop. 2014. ISBN 9781118968055.
- Knapp, Jake. Sprint : how to solve big problems and test new ideas in just five days. New York: Simon & Schuster, 2016. ISBN 9781501140808.
- Fitzpatrick, Rob. The MOM test : how to talk customers and learn if your business is a good idea when everyone is lying to you. Leipzig: Founder Centric, 2014. ISBN 9781492180746.