Course guide
205246 - LEAN - Lean Construction and Circular Economy Basics

Last modified: 11/04/2025

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 AEROSPACE TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).
BACHELOR'S DEGREE IN AEROSPACE VEHICLE ENGINEERING (Syllabus 2010). (Optional subject).
BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).

Academic year: 2025 **ECTS Credits:** 3.0 **Languages:** English

LECTURER

Coordinating lecturer: JUDEZ, PEDRO

Others:

TEACHING METHODOLOGY

Lecture: Lecturers present concepts, principles and techniques, with the active participation of students.
Problem Based Learning: Lecturers and students resolve exercises and standard problems through specific techniques related to the theoretical contents and principles of the course.
Project Based learning: Students resolve complex problems through specific techniques related to the theoretical contents and principles of the course.
Self-study: Students diagnose their learning needs, in collaboration with the lecturers, and plan their own learning process.

LEARNING OBJECTIVES OF THE SUBJECT

Lean Construction is changing the framework in the AECO industry, building or infrastructure projects involving design by Architects / Engineers, Construction by General Contractor and operation by an Owner. The course explains the actual situation of low productivity in this industry, its root causes and the dominant paradigms. Then, explains how the application of Lean philosophy is changing the design and construction process.
Circular economy is an economic model based on the operation of the natural systems. It recovers the awareness of the connection between all the agents of the system and its cyclical operation: no element is wasted, everything is converted into nutrient, food. Thus, the production of circular goods and services maintains the valuable resources in perpetual circulation, so that they are available for the future generations, without need to continue devastating.
This course takes a holistic approach to the building life cycle, including design, construction, management, maintenance, and sustainability, emphasizing collaborative practices in management.

STUDY LOAD

Type	Hours	Percentage
Hours large group	30,0	40.00
Self study	45,0	60.00

Total learning time: 75 h

CONTENTS

Module 1: Actual Framework of AECO Industry

Description:
This module covers the key principles of construction projects, the types of construction firms, the processes and phases in a construction project, and the role of the main stakeholders from initial briefing to managing the construction process.

Related activities:
Distance and in-class activities
Individual work
Group work

Full-or-part-time: 10h
Theory classes: 4h
Self study : 6h

Module 2: Circular Economy Basics

Description:
This module describes the fundamentals of the circular economy and the main concepts in the construction sector. This module will be taught by Grupo ConstruciÌ□a at the company's headquarters in Sant Cugat, that were built following the criteria of the circular economy.

Related activities:
Distance and in-class activities
Individual work
Group work

Full-or-part-time: 10h
Theory classes: 4h
Self study : 6h

Module 3: Lean application to Construction Projects

Description:
This module introduces the application of Lean concepts to Construction projects.

Related activities:
Distance and in-class activities
Individual work
Group work

Full-or-part-time: 5h
Theory classes: 2h
Self study : 3h

Module 4: Transformational Change from Lean to Cradle.

Description:
This module describes how to thrive in a Circular Economy. It introduces the steps to follow to start a transformation towards the circular economy in the company. This module will be taught by Grupo ConstruciÌ□a, leading company in circular construction.

Related activities:
Distance and in-class activities
Individual work
Group work

Full-or-part-time: 16h
Theory classes: 6h
Self study : 10h

Module 5: Integrated Project Delivery.

Description:
This module explains how to achieve collaboration between the stakeholders, and the Lean IPD basics: early involvement of key actors, high-performing teams, team partner selection, shared risk & rewards, Target Value Design, etc.

Related activities:
Distance and in-class activities
Individual work
Group work

Full-or-part-time: 14h
Theory classes: 6h
Self study : 8h

Module 6: Lean Project Delivery Methods

Description:
The Last Planner System. Reliable Promising. Cluster Groups. Work Planning. Continuous Improvement. Onboarding Team Members Plus / Delta. Big Room and Co-location. Value Stream Mapping. A3 Thinking. Building Information Modeling (BIM).

Related activities:
Distance and in-class activities
Individual work
Group work

Full-or-part-time: 20h
Theory classes: 8h
Self study : 12h

GRADING SYSTEM

The final grade depends on the following three elements:

* 20%, Distance and in-class activities
* 40%, Individual work
* 40%, Group work

BIBLIOGRAPHY

Basic:
- Seed, William R. Transforming design and construction: a framework for change. Arlington, VA: Lean Construction Institute, 2010. ISBN 9780578168425.
- Webster, Ken. The circular economy: a wealth of flows. 2nd ed. Cowes, UK: Ellen MacArthur Foundation Publishing, 2017. ISBN 9780992778460.

Complementary:
- Cheng, Renée [et al.]. Integrated project delivery: an action guide for leaders. Torrazza Piemonte: Amazon Italia Logistica, 2019. ISBN 9781095821527.

RESOURCES

Other resources:
https://ellenmacarthurfoundation.org />https://leanipd.com/integrated-project-delivery-an-action-guide-for-leaders/