

Course Unit	Technology and Construction Processes	Field of study	Technology and Construction Materials
Master in	Construction Engineering	School	School of Technology and Management
Academic Year	2023/2024	Year of study	1
Type	Semestral	Semester	1
Level	2-1	ECTS credits	6.0
Code	5024-419-1105-00-23		
Workload (hours)	162	Contact hours	T - , TP 60 , PL - , TC - , S - , E - , OT - , O -

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s) Rui Alexandre Figueiredo de Oliveira

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:

1. Understand and analyse the feasibility of different construction methods and techniques for building and civil engineering works.
2. Plan the safety organisation on site works.
3. Select and manage plant and equipment.
4. Apply control and inspection techniques for the different stages of development of a construction project.

Prerequisites

Before the course unit the learner is expected to be able to:

Demonstrate knowledge consistent with a first degree course in the construction area.

Course contents

The construction industry and construction technology at a glance. Site works and plant and equipment on site. Earthworks. Methods of construction in structures. Demolitions and managing waste. Support structures in building and in civil engineering infrastructures. Support systems and equipment. Non-traditional methods and techniques of construction. Construction methods in special structures. Safety planning and organisation on site.

Course contents (extended version)

1. The construction industry and construction technology at a glance
 - Historical evolution
 - The industrialization of construction
 - Characteristics of the construction industry activity
 - The constraints and the means of production
2. Site works and equipment on-site works
 - Earthwork
 - Plant and equipment on site works
 - Control and maintenance plan
 - The EU Machinery Safety Directive
 - Certification of plant and machinery
 - Site works and Site work Plan
3. Methods of construction in structures
 - Concrete
 - Pre-stressed concrete
 - Steel
 - Wood
 - Structural masonry
 - Light steel framing
 - Solutions for conservation, maintenance and rehabilitation in structures.
4. Construction and demolition waste.
 - Classification of waste;
 - Decontamination of hazardous waste;
 - Reuse, recycling and final management of waste.
5. Demolition methods.
 - Manual and mechanical demolition;
 - Explosive demolition;
 - Cutting, holing and hidrodemolition.
6. Support structures in building and infrastructures.
 - Active and passive anchorages;
 - Provisional and permanent peripheral walls.
7. Provisional structures in construction works.
 - Formwork. and falsework;
 - Shoring and trench shoring;
 - Platforms, scaffolds and provisional roofs.
8. Construction process of bridges and viaducts.
 - Construction solutions;
 - Control measures.
9. Non-traditional construction techniques.
 - Facade elements and components.
 - Roof elements and components.
10. Prefabrication.
 - Light and heavy prefabrication;
 - Structural and non-structural solutions.
 - Constitutive elements, assembly and links;
 - Prefabrication solutions in structures rehabilitation.
11. Construction methods for special construction works.
 - Methods of construction of tunnels;
 - Methods of construction of dams;
12. Safety planning and organisation on site.
 - Safety planning and organisation on site;
 - The Safety and Health Plan at the design phase;
 - Development and specification of the Safety and Health Plan at the construction phase;
 - Control and risk prevention.

Recommended reading

1. Heene, A and Schmitt, H, (1999), Tratado de Construcción; Editorial Gustavo Gill; Barcelona.
2. Peurifoy, Robert; Schexnayder, Cliff and Shapira, Aviad (2006); Construction Planning, Equipment and Methods, 7th edition, McGraw-Hill, New York.
3. Oliveira, Rui; Prontuário de Apoio à Gestão de Segurança em Estaleiros de Construção: Medidas de Prevenção; 2008.
4. Coelho, Silvério; Tecnologia de Fundações; E. P. Gustave Eiffel; Lisboa; 1996.
5. Lopes, Duarte Barroso; Cálculo de cofragens de acordo com o EC 5; FEUP; Porto; 2000.

Teaching and learning methods

The course unit will be taught through a combination of lectures, practical classes aimed at the resolution of practical exercises and development of individual/group projects.

Assessment methods

1. Alternative 1 - (Regular, Student Worker) (Final, Supplementary, Special)
 - Practical Work - 60% (Group of two practical works during the semester. Practical work 1-25%; Practical work 2-35%.)
 - Final Written Exam - 40%
2. Alternative 2 - (Student Worker) (Final, Supplementary, Special)
 - Final Written Exam - 100%

Language of instruction

Portuguese, with additional English support for foreign students.

Electronic validation

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02-10-2023	04-10-2023	04-10-2023	10-10-2023