

Academic Year: (2023 / 2024)

Review date: 26-04-2023

Department assigned to the subject: Continuum Mechanics and Structural Analysis Department

Coordinating teacher: IVÁÑEZ DEL POZO, INES

Type: Compulsory ECTS Credits : 6.0

Year : 1 Semester : 1

OBJECTIVES

- Get and understand knowledge that provides a basis or opportunity to be original in the development and/or application of ideas, often in a research context.
- Students will know how to apply the knowledge acquired and develop their ability to solve problems in new environments within broader (or multidisciplinary) contexts related to their area of study.
- Be able to know the aspects and techniques of analytical and computational calculation methods to project, calculate and design structures and plants in the field of Industrial Construction.
- Ability to formulate the necessary hypotheses that allow solving structural problems in industry.
- Ability to understand aspects in the design of industrial plants.
- Ability to design and calculate conventional and advanced structural solutions in industrial plants.
- Be able to apply local, regional, national and/or international standards and regulations in the field of Industrial Construction.

Students who successfully pass the subject achieve the following learning outcomes:

1. Knowledge of the fundamentals in the design of industrial plants.
2. Ability to handle specific regulations applied to the field of the engineering and industrial construction sector.
3. Skills and abilities to carry out the pertinent hypotheses related to the calculation of actions on industrial structures.
4. Knowledge for calculating static and dynamic actions on industrial buildings.
5. Knowledge and ability to evaluate geotechnical studies intended to be used in the field of engineering and industrial constructions.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction to the design of industrial plants.
 - Generalities.
 - Characteristics of industrial plants.
 - Elements of the production system: Process units.
 - Organization of the plant.
 - Types of distributions: By process or by product
 - Industrial plant projects.
 - Typology of projects/contracts
 - Technical disciplines involved in the design of industrial plants.
 - Scope of work by technical disciplines.
2. Introduction to applicable standards: national and/or international standards.
3. Calculation of actions on structures according to Specific Standards.
 - Permanent actions.
 - Environmental effects: snow, wind and temperature
 - Live loads: bridge crane, traffic jam, etc.
 - Actions due to dimensional variations.
 - Ground-structure interaction.
 - Earthquakes.
 - Earthquake resistance systems.
 - Dynamic effects, vibrations.
 - Special loads in industrial facilities: pipes, equipment, etc.

- Combinations of actions: Ultimate Limit State (ULS) and Serviceability limit state (SLS).

4. Introduction to geotechnical studies.

- Objectives and scope of geotechnical studies.
- Types of tests applicable in both field and laboratory.
- Interpretation of geotechnical studies.
- Ground-structure interaction: static and dynamic ground pressure.
- Phreatic level.

5. Practical examples.

LEARNING ACTIVITIES AND METHODOLOGY

Learning activities:

- Theoretical classes (0.84 ECTS)
- Practical classes (0.84 ECTS)
- Laboratory practices (0.12 ECTS)
- Tutorials (0.12 ECTS)
- Individual student work (3.64 ECTS)
- Group work (0.26 ECTS)
- Partial and/or final exams (0.18 ECTS)

Methodology:

- Lectures supported by computer and audiovisual media, in which the main concepts of the subject are developed. The bibliography is provided to complement the students' learning.
- Reading of texts recommended by the professor of the subject:
Press articles, reports, manuals and/or academic articles, either for later discussion in class, or to expand and consolidate knowledge of the subject.
- Resolution of practical cases, problems, etc. raised by the teacher individually or in a group.
- Presentation and discussion in class, under the moderation of the teacher, on topics related to the content of the subject, as well as practical cases.
- Preparation of work and reports individually or in groups.

Tutorials:

- Available in Aula Global.

ASSESSMENT SYSTEM

- * Continuous assessment
 - Practical example/s = 40%
 - Quizzes = 10%

- * End-of-term-examination
 - Final exam= 50%

% end-of-term-examination: 50

% of continuous assessment (assignments, laboratory, practicals...): 50

BASIC BIBLIOGRAPHY

- American Society of Civil Engineers ASCE/SEI 7-16. Minimum Design Loads and Associated Criteria for Buildings and Other Structures., American Society of Civil Engineers .
- AENOR Eurocódigo 1: Acciones en estructuras, Norma básica.
- Miguel Ángel Agúndez Betelu Manual de derecho para ingenieros, La Ley.
- Ministerio de Obras Públicas y Urbanismo - España Norma básica de la edificación NBE-AE/88 "Acciones en la edificación", Norma básica.
- Morales Palomino Diseño de plantas industriales, UNED.

BASIC ELECTRONIC RESOURCES

- Construmática . Normativa de la Edificación:

https://www.construmatica.com/construpedia/Categor%C3%ADa:Normativa_de_la_Edificaci%C3%B3n

- Eurocode applied . Free online calculation tools for structural design according to Eurocodes:

<https://eurocodeapplied.com/>