Industrial Buildings

Academic Year: (2022 / 2023) **Review date: 09-05-2022**

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

Coordinating teacher: ARANDA RUIZ, JOSUE

Type: Compulsory ECTS Credits : 3.0

Year : 1 Semester : 2

OBJECTIVES

Skills acquired by the student:
* Knowledge of the basic requirements of industrial building design, with emphasis on representative construction elements and their optimization methodologies, allowing future development based on original ideas.
* Ability to apply knowledge and problem solving in multidisciplinary areas that encompass the complete design of industrial buildings.
* Ability to know the aspects and techniques of analytical and computational calculation methods used to project, calculate and design industrial and anti-explosion buildings.
* Ability to simplify complex structural problems to allow their analysis and solution.
* Ability to project and calculate conventional and advanced structural solutions in the design of industrial and anti-explosion buildings.
* Ability to apply advanced methods to industrial structures under dynamic and impulsive loads, such as a blast wave.

Learning outcomes acquired by the student. Once the course has been passed, the student is expected to be able to:
* Understand the fundamental concepts of industrial building design, being able to raise and project the its complete design.
* Acquire knowledge of design and structural calculation of typical industrial buildings.
* Calculate and design anti-explosion buildings, considering the effect of dynamic and impulsive loads.
* Use commercial codes of design, calculation and analysis of structural elements of constructive application.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Typologies of the most common buildings in industrial facilities. Materials.
2. Special loads considerations: application of wind, overhead cranes, loads due to equipment and installations, explosions.
3. Calculation and design of industrial buildings.
- Environmental protection buildings (shelters).
- Administration buildings.
- Buildings for compressors and pumps.
- Substations.
- Control rooms
4. Calculation and design of explosion-proof buildings:
- Blast wave. Characteristic typologies and behavior.
- Structural systems.
- Material behavior and safety criteria.
- Equivalent static methods. SDOF systems.
- Dynamic methods and finite elements.
5. Practical cases

LEARNING ACTIVITIES AND METHODOLOGY

Training activities:
* Theoretical classes. Lectures. (0.36 ECTS)
* Exercises classes. Classroom exercises for the understanding of the syllabus. (0.48 ECTS)
* Computer classroom practice. (0.06 ECTS)
* Tutorials. (0.04 ECTS)
* Individual and group work of the student. (2.06 ECTS)

Teaching methodologies:
* Lectures. Class lectures by the professor with the support of computer and audiovisual media, in which the main concepts of the subject are developed and materials and bibliography are provided to complement the students' learning.
* Practical sessions. Resolution of problems, etc. posed by the teacher individually or in groups.
* Laboratory practice. Calculation and design of an industrial building using specific software, under the guidance and supervision of the teacher.
* Elaboration of a report related to the design of the industrial building. This report will be carried out in small groups (2-3 students).

ASSESSMENT SYSTEM

The master's degree has a high practical component and it is recommended that students follow the continuous assessment. However, in subjects where the continuous assessment is 100% of the grade, those students who cannot follow it will have the possibility of taking an end-of-term-examination with a weighting of 100% of the grade.
This applies to both the ordinary and the extraordinary call.

% end-of-term-examination:	0
% of continuous assessment (assigments, laboratory, practicals…):	100

BASIC BIBLIOGRAPHY

- American Association of State Highway and Transportation Officials (AASHTO) AASHTO LRFD Bridge Design Specifications, AASHTO, 2014
- American Concrete Institute Metric Building Code Requirements for Structural Concrete (ACI 318M-14), ACI, 2015
- American Institute of Steel Construction Specification for Structural Steel Buildings (ANSI/AISC 360-16), AISC, 2016
- American Society of Civil Engineers Minimum Design Loads and Associated Criteria for Buildings and Other Structures (ASCE-7/16), ASCE Book Series, 2017
- Association of iron and steel engineers Guide For The Design And Construction of Mill Buildings, AISE, 2003
- International Code Council 2015 International Building Code, ICC , 2014
- James M. Ficher, Lawrence A. Kloiber Design Guide 1: Base Plate and Anchor Rod Design, AISC, 2006
- Task Committee on Blast-Resistant Design of the Petrochemical Committee of the Energy Division of ASCE Design of Blast-Resistant Buildings in Petrochemical Facilities, ASCE Book Series, 2010
- Task Committee on Seismic Evaluation and Design of Petrochemical Facilities of ASCE Guidelines for Seismic Evaluation and Design of Petrochemical Facilities, ASCE Book Series, 2011
- Task Committee on Wind-Induced Forces of the Petrochemical Committee of Energy Division, ASCE Wind Loads for Petrochemical and Other Industrial Facilities, ASCE Book Series, 2011