

**COURSE DATA****Data Subject**

<b>Code</b>	34784
<b>Name</b>	Industrial safety and occupational risk prevention
<b>Cycle</b>	Grade
<b>ECTS Credits</b>	4.5
<b>Academic year</b>	2022 - 2023

**Study (s)**

<b>Degree</b>	<b>Center</b>	<b>Acad. year</b>	<b>Period</b>
1401 - Degree in Chemical Engineering	School of Engineering	4	Second term

**Subject-matter**

<b>Degree</b>	<b>Subject-matter</b>	<b>Character</b>
1401 - Degree in Chemical Engineering	23 - Optional subjects	Optional

**Coordination**

<b>Name</b>	<b>Department</b>
BELTRAN TAURA, PAULA	245 - Chemical Engineering

**SUMMARY**

This optional course “industrial safety and occupational risk prevention”, is taught in the fourth degree course in chemical engineering and is a continuation of the safety content taught in the former course: Organization and Production Management.

The goal of this course is to provide a fundamental knowledge needed to address safety both from the industrial point of view as from the point of view of prevention of occupational hazards, in all policy areas of mechanical engineering, including project design and safe industrial facilities and the safe operation of the same. This implies a focus towards the management of industrial and labor safety in the field of industrial plants, especially in chemical plants, and the prevention of accidents.

On the other hand, graduates in chemical engineering degree should know and be familiar with all legal regulations surrounding the security as they must comply with such regulations. Therefore, one of the specific objectives of the course is that students know, understand and be able to apply these regulations in industrial and occupational safety, both in the design and in the operational phases.



As a result of this, the course is divided into three distinct parts. The first part deals with the general concepts of safety and addresses the basic legislative framework.

A second part is directed to the knowledge of the specific industrial and occupational safety regulatory development derived from the basic legal framework. This part will cover areas such as: safety of workplaces and their signage, safety in the use of work equipment, fire safety, particularly in the industrial establishments, the basic rule of self-protection, the use of personal protective equipment, ...

This part deal also with specific security issues that have to do with common risks related to chemical and as they are preventing serious accidents in establishments that use and store hazardous substances, electrical hazard prevention, the risks from static electricity prevention, safety and maintenance tasks, as a particular case, the security work in confined spaces, the risks in the work with explosive atmospheres or major health hazards.

Finally, once explained all technical and legal aspects, the third part deal exclusively to the management of both industrial safety and the work to develop a range of topics such as risk assessment and planning of preventive , Plan of occupational risk prevention, management systems of standardized occupational risk prevention, management of accidents, including the investigation of them, coordination of business activities, preventive management in the field of construction facilities and infrastructure, or safety inspections.

The theory classes will be taught in Spanish as stated in the course sheet available on the website of the degree.

## PREVIOUS KNOWLEDGE

### Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

### Other requirements

It is necessary that the student has previously acquired knowledge that will help them to understand all the technical and legal concepts that are involved in the context of industrial facilities. It is therefore necessary that students have the following knowledge:

1. Principles and basic concepts of industrial safety and occupational acquired in the course of organization and production management.
2. Skill and knowledge of the use of mathematical tools .
3. Knowledge related to chemical processes: che

## OUTCOMES



### 1401 - Degree in Chemical Engineering

- O1 - More comprehensive skills than those acquired in compulsory subjects.

## LEARNING OUTCOMES

1. Understand the basic principles of industrial safety and labor and the different legal sources (Skill O1).
2. Know the basics of security in industrial processes and industrial utilities (Skill O1).
3. Know the risks to which workers are exposed at work in industrial area and the preventive measures to be taken to diminish these risks (Skill O1).
4. Apply the principles of preventive action in both the industrial plant installation and the operation of these, including maintenance, coordination of business activities, as well as alterations, modifications (Skill O1).
5. Know and apply regulations in industrial safety and risk prevention (Skill O1).
6. Know the different ways of preventive organization (Skill O1).
7. Know how to apply the main analytical control methodologies in industrial and labor safety (Skill O1).
8. Know and understand the main forms and tools of security management in business industrial organizations (Skill O1).
9. Design processes, equipment and facilities safe and comply with the safe regulations (Skill O1).
10. Know the basic principles underlying the occupational risk assessment and planning of preventive activity (Skill O1).
11. Learn the basic principles of the plan of risk prevention and most important standard management systems of risk prevention (Skill O1).
12. Be able to work in multidisciplinary work teams (Skill O1).
13. Possess ability to manage information and the use of information technology and communications (Skill O1).
14. Possess critical thinking skills, creativity and decision-making (Skill O1).
15. Be able to solve problems in the technical-safety legal-industry, gather and interpret information, make judgments of value and take decisions (Skill O1).
16. Possess learning skills to continue and update their training throughout working life with a high degree of autonomy (Skill O1).
17. Know and understand the main risks in the chemical industry (Skill O1).



## DESCRIPTION OF CONTENTS

### 1. Basic principles of industrial and labor safety

- a. Basics safety and health at work.
- b. The different sources of regulations on safety. The double regulation.
- c. Spanish Law 31/1995, prevention of occupational hazards. RD 39/97, which approves the regulation of prevention services.
- d. Spanish Law 21/1992, of industry. Industrial regulations

### 2. Main risks and preventive measures in matter of safety. Regulations

- a. The safety of the workplace and its signage.
- b. The safe use of work equipment. The safety regulations of the machines and commissioning of the same.
- c. Principles regarding fire safety. Fire safety in industrial establishments.
- d. The basic rule of self-protection.
- e. The electrical hazard. The problem of static electricity.
- f. The risk in work in explosive atmospheres (ATEX). Working equipment. The safety regulations in equipment that will be used in ATEX atmospheres.
- g. Safety in industrial maintenance. Application to the case of work in confined spaces.
- h. Use of personal protective equipment. The safety rules of personal protective equipment.
- i. The risks in the handling and storage of chemicals.
- j. Hygiene risk.
- k. Safety in chemical plants. Serious accidents in industrial establishments where dangerous substances handled and stored. The emergency plan. The safety report.
- l. Analysis of risks, consequences and vulnerability.

### 3. Basic principles of management of the industrial and labor safety

- a. The risk assessment and planning of preventive activity.
- b. The coordination of industrial and business activities.
- c. The management of accidents. The accident investigation.
- d. The plan of prevention of occupational hazards. Other standardized management systems.
- e. Managing labor safety modifications / extensions of facilities.
- f. Safety inspections.
- g. The work planned observations.

**WORKLOAD**

ACTIVITY	Hours	% To be attended
Theory classes	25,00	100
Classroom practices	20,00	100
Development of individual work	20,00	0
Study and independent work	37,50	0
Preparing lectures	5,00	0
Preparation of practical classes and problem	5,00	0
<b>TOTAL</b>	<b>112,50</b>	

**TEACHING METHODOLOGY**

The development of the course is structured around classes of theory and problems. Moreover a home work will be carried out.

In theory classes the lecture model will be used. The teacher will present on presentation and / or explain the contents of each issue to highlight those key aspects for understanding.

The practical classes of problems are developed following two models. In some classes the teacher will resolve a number of problems so that students learn to identify the essential elements of the approach and problem resolution. In other kinds of problems it will be students, individually or arranged in clusters, who should solve similar problems under the supervision of the teacher. After the work, the problems will be collected, analyzed and corrected by the teacher or by the students themselves.

The homework proposed (worked individually or in groups ) will have a timetable for completion and delivery by the students. After correction, the students will be informed of their results and a summary of the most consolidated and more frequent failures.

(Skill O1).

**EVALUATION**

The evaluation consists of different tests:

Exam (EX): Written test of open response type, test and/or short/long problems on the contents worked in the classroom. Minimum exam = 4.0

Works (TR): Elaboration of one or several group works and corresponding memories. Deliveries of sections TR are not recoverable between calls. Minimum weighted average of the works = 4.0.





Based on these evaluation evidences, 2 modalities are established, with the final grade corresponding to the higher of both:

Modality A:  $70\% \cdot EX + 30\% \cdot TR$

Mode B:  $100\% \cdot EX$

In case of not exceeding the minimum grade in the written test, the grade will be EX. In no case will the grade of any thematic unit be kept between exams.

Exceeded the minimum EX grade, in case of not exceeding the minimum grade in TR, the grade will be determined by the one obtained through modality B.

The evaluation methodology is valid for the first and second call.

In any case, the evaluation system will be governed by the provisions of the Evaluation and Qualification Regulations of the University of Valencia for Degrees and Masters.

## REFERENCES

### Basic

- Técnicas de Prevención de Riesgos Laborales, J. M. Cortés Díaz, Tebar, 2003
- Manual para la Prevención de Riesgos Laborales, G. López Etxebarria, CISS PRAXIS, 2001
- Manual de seguridad industrial en plantas químicas y petroleras. Mc Graw Hill. J.M. Storch de Gracia.
- Análisis y reducción de riesgos en la industria química. Fundación MAPFRE. J.M. Santamaría Ramiro, P.A. Braña Aísa..
- Sistemas de gestión de riesgos laborales e industriales. Fundación MAPFRE. Germán Burriel LLuna.

### Additional

- Notas Técnicas de Prevención publicadas por el Instituto Nacional de Seguridad e Higiene en el Trabajo.
- Guías Técnicas de Aplicación de la normativa en materia de prevención de riesgos laborales publicadas por el Instituto Nacional de Seguridad e Higiene en el Trabajo.
- Anàlisi del risc en Instal·lacions industrials. Casal, Montiel, Planas i Vilchez, UPC, 2012.