

**COURSE DATA****DATA SUBJECT**

Code: 46914
Name: Industrial Hygiene
Cycle: Master's Degree
ECTS Credits: 9
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
2275 - Master's Degree in Occupational Health and Safety	Facultat de Ciències Socials	1	Second quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
2275 - Master's Degree in Occupational Health and Safety	Higiene Industrial	COMPULSORY

COORDINATION

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SUMMARY

Esta asignatura es de carácter obligatorio, y se cursa en el primer curso del máster. Está dirigida a los estudiantes del Máster en Prevención de Riesgos Laborales que, independientemente de su formación previa y especialidad posterior, deberán adquirir los conocimientos básicos referentes a la naturaleza y riesgos derivados de la presencia de agentes químicos, físicos y biológicos en el ámbito laboral.

Esta asignatura es una introducción a la higiene industrial y a sus distintas ramas, y el proceso de identificación de los riesgos específicos de la higiene industrial, su evaluación tras un proceso de medición y valoración de los resultados obtenidos y la adopción de las medidas de protección adecuadas, de acuerdo a la legislación vigente y los criterios técnicos emanados del INSST.

PREVIOUS KNOWLEDGE**RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE**

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



OTHER REQUIREMENTS

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

Students must have a basic understanding of biology, physics, chemistry, calculus, and statistics; therefore, they must have successfully completed the courses in Basic Sciences and Calculus and Statistics and have mastered the corresponding learning outcomes.

Search for and select information from scientific and professional databases and documents, and be able to synthesize and interpret it.

Understand risk assessments (related to industrial hygiene, occupational safety, ergonomics, and applied psychosociology) with the utmost regard for the safety of the operator and the environment.

Understand the general and specific obligations regarding occupational risk prevention and be able to provide advice on each of the obligations that constitute the duty of care.

Understand the risks posed by the presence of physical, chemical, and biological agents in the workplace.

Understand the importance of addressing sustainability and climate change, in accordance with the provisions of Article 35.2 of Law 7/2021, of May 20, on Climate Change and Energy Transition.

Understand the interrelated aspects of the environment-occupational health relationship. Develop the capacity for initiative, critical thinking, and creativity.

Plan, advise, and make decisions based on ethical and legal criteria.

Conduct searches in the scientific literature and rigorously analyze and interpret the results of scientific studies carried out in the field of occupational safety and health.

Be able to analyze the needs and demands of those served by the occupational safety and health technician, taking into account different contexts.

Be able to communicate effectively, both orally and in writing, adapting to the characteristics of the situation and the audience.

Be able to take an independent approach to learning, making informed decisions in different contexts, forming judgments based on experimentation and analysis, and applying knowledge to new situations.

Be able to analyze new problems using the knowledge and tools acquired and to reason rigorously and systematically.

Be able to apply acquired knowledge and problem-solving skills in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study.



Be able to apply the fundamentals and methods of qualitative and quantitative research to the study and analysis of elements related to occupational risk prevention at all levels of action.

Be able to engage in critical and self-critical reasoning within the scope of the degree program, considering aspects such as professional ethics, moral values, and the social implications of the various activities carried out.

Be able to measure and collect data relevant to organizational diagnosis regarding occupational hazards.

Be able to plan preventive actions and propose measures for the control and reduction of risks.

Be able to plan preventive actions and propose measures to control and reduce risks.

Be able to conduct general information and training activities at all levels and in subjects related to their area of expertise.

Be able to monitor compliance with risk control and reduction programs and personally carry out the assigned activities to monitor working conditions.

COMPETENCES / LEARNING OUTCOMES

2275 - Master's Degree in Occupational Health and Safety

Be able to analyse new problems using the knowledge and tools learnt and reason rigorously and systematically.

Be able to apply knowledge and problem-solving abilities in new or unfamiliar environments within broader (or multidisciplinary) contexts related to the field of study.

Be able to apply the fundamentals and methods of qualitative and quantitative research to study and analyse elements related to occupational risk prevention at all levels of action.

Be able to measure and obtain relevant data for the organisational diagnosis of occupational risks.

Be able to monitor compliance with risk control and reduction programmes and carry out activities to control working conditions.

Be able to plan preventive action and propose measures for the control and reduction of risks.

Be aware of the risks posed by the presence of physical, chemical and biological agents in the workplace.

Conduct general information and training activities at all levels and in the areas of specialisation.

Conduct searches in scientific literature and rigorously analyse and interpret the results of scientific studies carried out in the field of occupational health and safety.



Demonstrate knowledge and understanding of the importance of addressing sustainability and climate change, in accordance with Article 35.2 of Law 7/2021, of 20 May, on Climate Change and Energy Transition.

Develop critical and self-critical reasoning within the field of study, considering aspects such as professional ethics, moral values and the social implications of the different activities carried out.

Develop initiative, critical thinking and creativity.

Know how to analyse the needs and demands of the recipients of the functions of the occupational health and safety specialists, considering different contexts.

Know how to communicate effectively, both orally and in writing, adapting to the characteristics of the situation and the audience.

Know the generic and specific obligations in occupational risk prevention and be able to advise on each of the obligations in which the duty of protection is specified.

Learn autonomously, making informed decisions in different contexts, making judgements based on experimentation and analysis and transferring knowledge to new situations.

Perform risk assessments (related to industrial hygiene, safety at work, ergonomics and applied psychosociology) with maximum safety for the operator and the environment.

Plan, advise and make decisions based on ethical and legal criteria.

Search for and select information in scientific and professional databases and documents and have the ability to synthesise and interpret it.

Understand the interrelationships between environmental and occupational health.

DESCRIPTION OF CONTENTS

CHEMICAL HAZARDS

1. Introduction to Occupational Hygiene.

Historical background. Classification of contaminants in occupational hygiene. Definition, objectives, and functions of occupational hygiene. Branches of occupational hygiene. Legislation on occupational hygiene.

2. Occupational toxicology.

Concept of a toxic substance. Dose-effect and dose-response relationships. Routes of exposure. Distribution, accumulation, metabolism, and elimination of toxic substances. Health effects of chemicals.

3. Classification of Chemical Agents.

Introduction. Classification of chemical contaminants. Gases and vapors: properties and examples relevant to the workplace. Solid aerosols: standards for their measurement. Liquid aerosols.

4. Labeling, packaging, storage, and disposal of chemicals.

Introduction. Chemical regulation: REACH regulations. Classification and labeling: CLP Regulation. The Safety Data Sheet (SDS). Packaging and storage. Hazardous waste: classification and manufacturer obligations.

5. Quantitative assessment of the risk of exposure to chemical agents by inhalation.



Legal regulations. Theoretical occupational hygiene: exposure limit values: VLA-ED, VLA-EC, and VLB. Chemical risk assessment: Royal Decree 374/2001 on the protection of workers' health and safety against risks related to chemical agents in the workplace. Assessment criteria, reverse hygiene, and exposure index. Combined effects of chemical agents. Biological monitoring of exposure to chemical agents: the concept of biological indicators and biological limit values (VLB).

Non-standard work shifts and substances without limit values. Health surveillance. Protection of maternity, particularly sensitive workers, and reproductive function.

6. Methodology and instrumentation for sampling.

Analytical Occupational Hygiene: sampling and analysis. Sampling systems. Analytical techniques. Direct-reading measurement systems. Standardized methods for sampling and analysis. Control of dermal exposure. The occupational hygiene report.

7. Carcinogens and mutagens.

Exposure to carcinogens and mutagens in the workplace: Royal Decree 665/1997. Jobs involving a risk of asbestos exposure: Royal Decree 396/2006. Specific agents: crystalline silica; dust in the woodworking industry; diesel engine exhaust.

8. Occupational Hygiene: control measures targeting the source, the environment, and the individual.

Ventilation techniques for controlling chemical agents: dilution ventilation and local exhaust ventilation. Personal protective equipment (PPE) against chemical agents: eye protection; skin protection; respiratory protection.

9. General occupational health risks and their prevention.

Hygiene risks in specific activities. Chemical and pharmaceutical industries and chemical laboratories. Metal industry. Wood industry. Plastics and rubber industry. Construction. Ceramics. Agriculture and food industry.

PHYSICAL RISKS

10. Noise

Introduction to the basic quantities related to sound, its propagation, and reception. Sound pressure level: decibels. Types of noise, measurement, and effects. Equivalent daily level, limit values, and preventive measures based on legislation. Practical exercises.

11. Vibrations

Introduction to the basic quantities related to vibrations and their transmission. Effects of vibrations, limit values, and preventive measures based on legislation. Practical exercises.

12. thermo-hygrometric Environment

Thermo-hygrometric quantities and the human body. Temperature and heat, mechanisms of heat exchange, and thermal balance. Exposure to harsh thermal environments and physiological effects. Assessment and control indices based on legislation. The WBGT index. Practical exercises.

13. Non-Ionizing Radiation

Relevant parameters and effects of the different ranges of the non-ionizing electromagnetic spectrum: electromagnetic fields (EMF) and artificial optical radiation (coherent and incoherent). Introduction to assessment and control based on legislation.

14. Ionizing Radiation

Relevant parameters and effects of the different types of ionizing radiation: particle radiation and electromagnetic radiation. Introduction to assessment and control based on legislation.

BIOLOGICAL HAZARDS

15. Biological hazards and their assessment in the workplace.

Biological hazards. Legal framework. Basic concepts. Classification of biological agents. Biological hazard



assessment: evaluation and criteria for interpreting results.

16. Measures to Reduce Biological Risk.

Measures to Reduce Biological Risk. Areas of Focus. Levels of Biological Containment. Microorganism Sampling Techniques. Management of Biological Waste.

17. Biological Contaminants. Their Assessment in Work Environments.

Biological contaminants. Their assessment in workplace environments. Classification, routes of entry, and measures in response to exposure to biological contaminants. Selection of samplers.

18. Workplace-related zoonoses

Zoonoses. Concept, classification, and major workplace-related zoonoses. Involved agents and intervention measures for at-risk groups.

19. Immunization as a prevention tool for at-risk groups.

Active and/or passive immunization as a prevention tool for at-risk groups. General considerations regarding vaccines and their usefulness for the groups in question.

20. Hepatitis and HIV.

Description, epidemiology, diagnosis. Specific aspects and protocols for action in the event of accidental exposure.

21. SARS-CoV-2

Description, epidemiology, diagnosis. Specific aspects and protocols for action.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	80,00
Classroom practices	10,00
Total hours	90,00

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	10,00
Independent study and work	40,00
Preparation of lessons	25,00
Preparation for assessment activities	40,00
Resolution of case studies	20,00
Total hours	135,00

TEACHING METHODOLOGY

Active and critical participation.

Completion of exercises.

Group discussions.

Individual tutoring sessions.

Reading and analysis of scientific and technical documents.



EVALUATION

REFERENCES

- Basic
 - "Manual de higiene industrial". Fundación Mapfre. 2ª ed. 2015. <https://links.uv.es/9CKO00X>
 - "Higiene Industrial", Félix Bernal y otros técnicos del INSST, 2006, 4ª Edición. <https://links.uv.es/fBmmuj4>
 - "Higiene industrial. Problemas resueltos", Técnicos CNCT-INSST, 2006, Ed. INSST
 - "Higiene Industrial". X. Baraza Sánchez, E. Castejón Vilella y X. Guardino Solà. Editorial UOC. 2014.
 - "Manual básico de prevención de riesgos laborales: Higiene industrial, Seguridad y Ergonomía". Manuel Jesús Falagán Rojo y otros Sociedad Asturiana de Medicina y Seguridad en el Trabajo y Fundación Médicos Asturias. 2000
 - "Higiene Industrial. Manual práctico". Manuel Jesús Falagán Rojo. Ed. Fundación Luis Fernández Velasco (1ª ed.). Oviedo. 2008.
- Supplementary
- Higiene Industrial, Manual para la formación del especialista. Faustino Menéndez. Ed. Lex Nova.
 - Manual para la formación en Prevención de Riesgos Laborales. Especialidad de Higiene Industrial. Genaro Gómez Etxebarria, Ed. Ecoiuris 2006.
 - Principios de química: los caminos del descubrimiento P. Atkins y L. Jones Editorial Médica Panamericana, 2005
 - Física para la ciencia y la tecnología. Tipler, p. A.; Mosca, G. Vol 1, Editorial Reverté, 2005.
 - Introducción a la microbiología. GJ Tortora, BR Funke, CL Case. (9ª ed.) Editorial Médica Panamericana, 2007.
 - Microbiología. LM Prescott, JP Harley, DA Klein. McGraw- Hill Interamericana. 2004.
 - <http://www.insst.es> (legislación actualizada relativa a la Higiene Industrial; Notas técnicas de prevención; Guías para la acción preventiva.