

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

Code: 46919
Name: Specialisation in Industrial Hygiene
Cycle: Master's Degree
ECTS Credits: 10
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
2275 - Master's Degree in Occupational Health and Safety	Facultat de Ciències Socials	2	Second quarter

SUBJECT-MATTER

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

COORDINATION

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SUMMARY

The course "Specialization in Industrial Hygiene" is an elective taken during the second year of the master's program and is worth a total of 10 credits. Given its technical nature, it is specifically designed for students in the Master's in Occupational Risk Prevention program who have prior training in the areas of basic and technical sciences or health sciences.

This course provides in-depth knowledge of the risks arising from the presence of chemical, physical, and biological agents in the workplace, the measurement of relevant parameters, the analysis of the data obtained, the assessment of risks based on that information, and the implementation of protective measures in accordance with the scientific criteria set forth in current legislation and the technical criteria established by the INSST.

To this end, a theoretical-practical methodology is applied, combining in-person classroom instruction with hands-on laboratory work, including training in the use of the measuring instruments that students will need to use in their future professional roles.



PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

OTHER REQUIREMENTS

Para el adecuado seguimiento, comprensión y aplicación de los contenidos de la asignatura, el estudiantado debe poseer conocimientos básicos, aunque sólidos, de biología, física, química, cálculo y estadística. Por ello resulta imprescindible haber superado las asignaturas de Ciencias Básicas, Cálculo y Estadística e Higiene Industrial.

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.

Collaborate effectively in work teams, assuming responsibilities and leadership roles while contributing to collective improvement and development.

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.

Demonstrate knowledge and understanding of the importance of respecting gender equality as established in Organic Law 3/2007, of 22 March, for the effective equality of women and men, and the principle of equal



treatment and non-discrimination on the grounds of birth, national or ethnic origin, religion, belief, age, disability, sexual orientation, gender identity or expression, sexual characteristics, illness, socio-economic situation or any other personal or social condition or circumstance.

Demonstrate knowledge and understanding of the importance of respecting the principles of universal accessibility and design for all, in accordance with the second final provision of the Consolidated Text of the General Law on the Rights of Persons with Disabilities and their Social Inclusion, approved by Royal Legislative Decree 1/2013, of 29 November.

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.

Propose creative and innovative solutions to complex situations or problems specific to the field of knowledge to respond to different professional and social needs.

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 RISKS

1. Sampling of Chemical Contaminants

Sampling of Chemical Contaminants. Introduction. Sampling of Gases and Vapors. Sampling of Aerosols.

2. Analytical Techniques in Industrial Hygiene

Analytical Techniques in Industrial Hygiene. Instrumental Techniques Used in Industrial Hygiene: Real-Time Measurements.

3. Health Risk Hierarchy



Health Risk Hierarchy. Determining the hazard class. Determining the quantity class. Determining the frequency class. Determining the potential exposure class. Determining the potential risk score.

4. Simplified Inhalation Risk Assessment

Simplified assessment of inhalation risk: Method based on the HSE's COSHH Essentials. Method based on the INRS method.

5. Assessment of risk from skin contact and/or absorption

Assessment of risk from skin contact and/or absorption: Simplified INRS method. RISKOFDERM methodology and the Toolkit application.

6. Occupational Environmental Risk Assessment

Measurement and assessment of risks from exposure to chemical agents in accordance with Royal Decree 374/2001 and UNE-EN 689: 2019+AC: risk assessment and assessment phases (initial estimate, basic study, and detailed study). Sampling strategy, measurement, and comparison of results with the VLA: sampling; groups with similar exposure (GES); measurements to verify the VLA-ED; assessment by comparison with the Environmental Daily Exposure Limit Value (VLA-ED); measurements to verify the VLA-EC; simultaneous occupational exposure to multiple chemical agents; calculation of exposure for workdays longer than 8 hours; interval for periodic measurements. Biological monitoring of exposure to chemical agents. Assessment criteria for substances without a limit value. Carcinogens and mutagens. Reproductive toxins. Respiratory or skin sensitization. Occupational health survey and assessment report.

7. Control of Exposure to Chemical Agents

Risk control measures. Ventilation and exhaust systems: components, design, calculations, and evaluation. Personal protective equipment (PPE): respiratory protection, hand and arm protection, and skin protection.

PHYSICAL RISKS

8. Noise Risk Assessment and Prevention

Noise Risk Assessment and Control: Fundamentals and measurement techniques, instrumentation, and relevant calculations of sound levels and their uncertainties, aimed at the assessment, control of exposure, and protection established in Royal Decree 286/2006 and the INSST guidelines. Exposure assessment and control, including cases with multiple noise sources, workstations involving multiple tasks, determination of PPE attenuation, and determination of uncertainty. Realistic case studies and laboratory practice involving the use of instrumentation.

9. Assessment and Prevention of Vibration Risks

Assessment and control of vibration risks: Fundamentals of vibration transmission to the hand-arm system and the whole body. Measurement techniques, instrumentation, and relevant acceleration calculations—including their associated uncertainty—aimed at exposure assessment, control, and protection as established in Royal Decree 1311/2005 and the INSST guidelines. Exposure assessment, including cases involving workstations with multiple tasks, and practical exercises in realistic scenarios.

10. Assessment and Prevention of Risks and Well-Being Related to the Thermo-Hygrometric Environment

Assessment and control of risks related to the thermo-hygrometric environment: Fundamentals, instrumentation, and methods for measuring thermo-hygrometric parameters established by regulations (temperature, pressure, humidity, air velocity, thermal insulation). Relevant thermal stress assessment indices (WBGT, IST thermal overload, IREQ, WCI) based on INSST guidelines and technical notes, along with realistic case studies. Laboratory practice involving the use of instrumentation.

11. Assessment and Prevention of Risks from Non-Ionizing Radiation

Assessment and control of risks from non-ionizing radiation: Rationale and general criteria for the prevention of non-ionizing electromagnetic radiation established by Royal Decree 299/2016 and the INSST technical guide on electromagnetic fields (EMF), as well as Royal Decree 486/2010 and the technical guide on artificial optical radiation. Introduction to risk assessment and control with practical exercises.

12. Prevention of Risks from Ionizing Radiation

Prevention of risks from ionizing radiation: Rationale, legislation, and general prevention criteria for



workplaces involving natural and artificial radioactivity, based on Royal Decree 783/2001 and Royal Decree 1439/2010, as well as the INSTT's technical prevention guidelines. Evaluation of case studies in which workers' doses are known.

BIOLOGICAL RISKS

13. Risk assessment related to infectious agents.

Biological risk. Types of exposure and indicators. Routes of infection. Biosafety levels applied to different microorganisms. Identification and assessment of biological agents in the workplace.

14. Occupational diseases related to infectious agents (I). Zoonoses.

Categories of occupational diseases caused by infectious agents: classification and associated risk activities. Zoonoses as occupational diseases: classification, routes of entry, particularly exposed groups, and preventive measures. Special study of the main diseases involved: brucellosis, rabies, anthrax, leptospirosis, tularemia, and hydatid disease. Avian influenza.

15. Occupational Diseases Related to Infectious Agents (II). OBE as a biological hazard.

Occasional Biological Exposure (OBE). Concepts. Response to accidental exposure. Routes of transmission and related agents. Special study of management protocols for hepatitis B, hepatitis C, and HIV. SARS-CoV-2 infection in the workplace.

16. Infections Related to HVAC Systems

Infections related to HVAC systems. Legionellosis: characteristics, affected populations, and high-risk facilities. Aspergillosis: host factors and at-risk populations. Analysis of fungal biological agents. Biodiversity testing. Evaluación de riesgos relacionados con agentes infecciosos.

PRACTICAL LABORATORY

17. Integrated Industrial Hygiene Laboratory

Chemical Hazards: Calibration of the pumping system. Sampling of chemical contaminants: active sampling using adsorbent beds and bubblers. Sampling of solid aerosols: inhalable fraction and respirable fraction. Determination of ambient concentration using direct-reading measurement systems: colorimetric tubes and chips, and gas sensors.

Physical Hazards: Measurements with a Class 2 integrating sound level meter and data processing (using a computer). Determination of the attenuation of different types of hearing protection. Handling and measurement of thermo-hygrometric environmental conditions: thermometers, hygrometers, psychrometers, anemometers, WBGT index meters, and comprehensive assessment of a normal environment and one with heat stress using established assessment indices.

Biological Hazards: Environmental sampling. Handling of biological and laboratory materials. Basic procedures for the direct and indirect diagnosis of microorganisms. Techniques for differentiating various agents: bacteria, fungi, viruses, and parasites. Guided tours of potential high-risk facilities (cooling towers, safety laboratories, etc.). Handling of biological waste. Laboratorio integrado de Higiene Industrial

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	65,00



Laboratory	25,00
Classroom practices	10,00
Total hours	100,00

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	25,00
Independent study and work	25,00
Preparation of lessons	25,00
Preparation for assessment activities	50,00
Resolution of case studies	25,00
Total hours	150,00

TEACHING METHODOLOGY

Asistencia participativa y crítica.
Resolución de casos realistas.
Tutorías individuales.
Utilización de tecnologías informáticas y calculadoras del INSSBT.
Presentaciones en público.
Trabajo de laboratorio.
Lectura y análisis de documentos científico-técnicos.
Búsqueda y análisis de documentación.
Utilización de instrumentos de medición y evaluación.
Redacción de informes.

EVALUATION

Grading will be based on a written exam (75%) and continuous assessment covering both laboratory work and corresponding reports (20%) as well as other assessable activities carried out inside and outside the classroom (5%). The grade derived from assessable activities carried out in the laboratory CANNOT be made up by taking other types of tests. A score of 5.0 out of 10.0 on the written exam is required to be included in the final grade calculation. A final passing grade requires a minimum overall score of 5.0 out of 10.0.

The written exam will be administered at the end of the course. It will cover the topics of physical, chemical, and biological hazards in proportion to their respective course content. This exam will consist of three parts corresponding to biological hazards (20%), physical hazards (35%), and chemical hazards (45%). To pass the written exam, students must obtain a minimum grade of 4.0 in each part, and the weighted average must be 5.0 or higher.

The course grade will be subject to the provisions of the "Regulations on Assessment and Grading at the University of Valencia for Bachelor's and Master's Degrees" (ACGUV 108/2017 of May 30). http://www.uv.es/graus/normatives/2017_108_Reglament_avaluacio_qualificacio.pdf

REFERENCES



Básica

Guías técnicas del INSST de los diferentes riesgos.

"Manual de higiene industrial". Fundación Mapfre. 2ª ed. 2015. <https://links.uv.es/9CKO00X>- Enciclopedia de salud y seguridad en el trabajo, Instituto Nacional de Seguridad y Salud en el Trabajo. Tercera edición. <https://www.insst.es/documentacion/enciclopedia-oit>

- Higiene Industrial. Félix Bernal y otros técnicos del INSST. 2006. 4ª Edición. <https://links.uv.es/fBmmuj4>

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Complementaria

- Notas técnicas preventivas publicadas por el INSHT (INSSBT) para cada riesgo <http://www.insht.es/portal/site/Insht/>

Manual para la formación en prevención de riesgos laborales. Especialidad de Higiene industrial. Genaro Gómez Etchevarría. Ed. Ecoiuris.(3ªed, 2006)

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- Fundamentos de Química Analítica, Skoog, West, Holler y Crouch Ed Thomson, 2005 - Grau Ríos , M. y Grau Sáenz, M. Riesgos ambientales en la industria. Unidades didácticas. Madrid. UNED. 2006.

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