COURSE DATA

Data Subject	
Code	43818
Name	Physical pollution: noise and radiation
Cycle	Master's degree
ECTS Credits	3.0
Academic year	2023 - 2024

Study (s)

Degree	Center	Acad. year	Period
2227 - Master's Degree in Environmental Engineering	School of Engineering	2	First term
2250 - Master's Degree in Environmental Engineering	School of Engineering	2	First term

Subject-matter

Degree	Subject-matter	Character
2227 - Master's Degree in Environmental Engineering	6 - Optatividad para especialización	Optional
2250 - Master's Degree in Environmental Engineering	23 - Contaminación física: ruido y radiaciones	Optional

Coordination

Name	Department
SECO TORRECILLAS, MARIA AURORA	245 - Chemical Engineering

SUMMARY

Professors UPV: Antonio Uris Martínez, Constanza Rubio Michavila, Pilar Candelas Valiente

The aim of this course is to ensure that all students acquire enough knowledge on both environmental acoustics and electromagnetic radiation to be able to carry out comprehensive studies in these fields. The course syllabus includes several subjects, such as sound propagation, measurement and control of noise, environmental acoustic regulations, electromagnetic spectrum and measurement and control of electromagnetic radiation.

It is well known that noise pollution causes serious damage to health: it causes hearing problems, insomnia, stress and affects the immune system and metabolism, as well as increasing the chances of having a heart attack or stroke. On the other hand, electromagnetic radiation can be the cause (or at least one of the co-causes), directly or indirectly, of health problems and various conditions called electromagnetic stress. This subject describes both noise and electromagnetic radiation control techniques that would be directly related to ODS 3.9 "By 2030, substantially reduce the number of deaths and illnesses caused by dangerous chemicals and air, water and pollution. I usually." On the subject of noise control, the ability to calculate acoustic screens for noise reduction is acquired. Acoustic screens made with recycled materials are presented, which would be directly related to SDG 12.5 "By 2030, considerably reduce waste generation through prevention, reduction, recycling and reuse activities."

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

Knowledge of Physics and Mathematics grade level is required.

COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

2227 - Master's Degree in Environmental Engineering

- Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.
- Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.
- Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.
- Students should demonstrate self-directed learning skills for continued academic growth.
- Students should possess and understand foundational knowledge that enables original thinking and research in the field.
- Identify and apply technologies, tools and techniques in the field of environmental engineering.
- Assume with responsibility and ethics the Environmental Engineer role in a professional context.

- Adapt to changes, being able to apply the principles of Environmental Engineering to unknown cases and use new and advanced technologies and other relevant developments, with initiative and entrepreneurial spirit.
- Identify, declare and entirely analyze environmental problems.
- Carry out theoretical analyzes of environmental systems, both natural and artificial, and develop and apply mathematical models for their simulation, optimization or control.
- Design and calculate engineering solutions to environmental problems, comparing and selecting technical alternatives and identifying emerging technologies.
- Understand and apply environmental national and international legislation, adapting environmental solutions to these regulations.
- Apply standard methodologies for the analysis and evaluation of environmental risks.
- Evaluate the environmental quality of the air from a global point of view, especially when there is a risk to public health.
- Be able to characterize the emissions to air, coming from the anthropogenic activity.
- Evaluate the treatment of emissions to the atmosphere to assess different alternatives and obtain the required information for the design of the selected treatment processes.
- Design and manage wastewater treatment and treatment systems for atmospheric emissions.

2250 - Master's Degree in Environmental Engineering

- Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.
- Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.
- Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.
- Students should demonstrate self-directed learning skills for continued academic growth.
- Students should possess and understand foundational knowledge that enables original thinking and research in the field.
- Identify, formulate and solve complex environmental engineering problems by applying engineering, scientific and mathematical principles.
- Recognise the ethical and professional responsibilities of environmental engineering and make informed judgements considering the impact of engineering solutions in global, economic, environmental and social contexts.
- Work in a team effectively and with leadership, in a collaborative and inclusive environment, setting goals, planning tasks and meeting objectives.

- Conduct appropriate experimentation, analyse and interpret data and use environmental engineering knowledge to draw conclusions.
- Learn and apply new knowledge, using appropriate learning strategies.
- Carry out a comprehensive assessment of environmental air quality.
- Characterise emissions to air.
- Develop and apply mathematical models for the simulation, optimisation or control of processes in the field of environmental engineering.
- Design, calculate and select engineering solutions to environmental problems, comparing alternatives that include emerging technologies under criteria of technical, social, economic and environmental viability.
- Manage and operate treatment and/or purification systems in the field of environmental engineering
- Interpret and apply national and international environmental legislation and adapt environmental solutions to these regulations.

LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)

1 Link the physical concepts of wave motion with the physical magnitudes of sound
2 Determine the values of hearing threshold and sound pain
3 Apply the concepts prior to the definition of sound levels
4 Deduce the fundamental aspects of the spectral analysis
5 Distinguish between the objective assessment of sound and subjective sound sensation
6 Enter the weighting networks
7 Classify the different rates of evaluating noise
8 Recognize the importance of acoustic instrumentation in sound measurement
9 Know the main aspects of the operation of the sound instrumentation
10 Identify and locate regulations and legislation that refer to acoustic aspects
11 Develop the mathematical procedures of sound propagation
12 Assess the importance of noise maps in acoustic analysis.
13 Apply techniques for the development of control techniques

DESCRIPTION OF CONTENTS

1. Wave motion and propagation phenomena.

2. Sound measurement.

3. Measurement equipment and techniques.

4. Sound propagation in the free field.

5. Sources of environmental noise.

6. Control techniques and noise maps.

7. Noise regulations.

8. Fundamentals of electromagnetic radiation. Electromagnetic spectrum. Ionizing and non-ionizing radiation.

9. Physical quantities and identification of sources. Instrumentation. Radiation measurement equipment

10. Measurement procedures at low and high frequencies.

11. Regulations on electromagnetic radiation.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	18,00	100
Classroom practices	9,00	100
Theoretical and practical classes	3,00	100
Development of individual work	5,00	0
Study and independent work	10,00	0
Preparation of evaluation activities	15,00	0
Preparing lectures	5,00	0
Preparation of practical classes and problem	10,00	0
TOTAL	**75,00**	

TEACHING METHODOLOGY

The training activities will be developed according to the following distribution:

• Theoretical activities.

Description: In the theoretical classes the topics will be developed providing a global and integrating vision, analyzing in greater detail the key aspects and of greater complexity, promoting, at all times, the participation of the student.

• Practical activities.

Description: They complement the theoretical activities with the aim of applying the basic concepts and expanding them with the knowledge and experience that they have, acquiring during the realization of the proposed works. They comprise the following types of face-to-face activities:

• Classes of problems and questions in the classroom

• Discussion and problem solving sessions and exercises previously worked by the students

• Laboratory practices

• Oral presentations

• Conferences

• Programmed tutoring (individualized or in groups)

• Realization of individual evaluation questionnaires in the classroom with the presence of the teacher.

• Work • Personal work of the student.

Description: Realization (outside the classroom) of monographic works, directed bibliographic search, issues and problems, as well as the preparation of classes and exams (study). This task will be carried out individually and tries to promote autonomous work.

• Evaluation.

Description: Realization of individual evaluation questionnaires in the classroom with the presence of the teacher.

The e-learning platform (Virtual Classroom of the Universitat de València and / or PoliformaT of the Polytechnic University of Valencia) will be used as a communication support with the students. Through it you will have access to the didactic material used in class, as well as the problems and exercises to solve.

EVALUATION

The continuous evaluation will be carried out through 2 open-ended written tests in which the resolution of practical cases and two academic works will be assessed. The final grade for the course will be: 40% written test 1 + 40% written test 2 + 10% academic laboratory work + 10% academic work. In order to obtain the average of the final mark, a minimum of 4 points out of 10 must be obtained in each of the written tests. In case of not reaching the minimum grade of 4 out of 10 in any of the written tests, the student will have to recover them at the end of the course, on the dates set for recovery indicated by the ERT.

The evaluation for students with a waiver of attendance is the same as the proposal for students without a waiver.

Academic work (2): 20% of the grade

Written test (2): 80% of the mark

REFERENCES

Basic

- Industrial noise control and acoustics [Recurso electrónico-En línea] (Barron, Randall F.) URL: https://polibuscador.upv.es/discovery/search?institution=UPV&query=any,contains,996891679203706&vid=34UPV_INST:bibupv Acústica medioambiental. Vol. I (Barti Domingo, Robert.) URL: https://polibuscador.upv.es/discovery/search?institution=UPV&query=any,contains,990004369010203706&vid=34UPV_INST:bibupv Acústica medioambiental. Vol. II.(Barti Domingo, Robert.) URL: https://polibuscador.upv.es/discovery/search?

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