VNIVERSITAT DE VALÈNCIA

Course Guide
43825 Environmental engineering of linear works

COURSE DATA

Data Subject	
Code	43825
Name	Environmental engineering of linear works
Cycle	Master's degree
ECTS Credits	3.0
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
2227 - M.U. en Ingeniería Ambiental	School of Engineering	2	First term
2250 - M.D. in Environmental Engineering	School of Engineering	2	First term

Subject-matter

Degree	Subject-matter	Character
2227 - M.U. en Ingeniería Ambiental	7 - Optional subjects of specialisation	Optional
2250 - M.D. in Environmental Engineering	27 - Ingeniería ambiental de las obras lineales	Optional

Coordination

Name	Department
SECO TORRECILLAS, AURORA	245 - Chemical Engineering

SUMMARY

Professors UPV: Evaristo Manuel López Porta

The Environmental Engineering subject of Linear Works contributes to the degree profile aspects not covered in other subjects related to Environmental Impact Assessment, by treating the effects produced by infrastructures of a particular nature, such as linear works, which present a important spatial affection but limited to a narrow strip of land in the transverse direction and with an important affection in the longitudinal direction.

In this way, effects such as territorial permeability or barrier effect will be studied, which are not studied in depth when dealing with the environmental impact assessment of other types of infrastructures, such as industries, urban actions or energy facilities.

On the other hand, the corrective measures that are usually established for this type of actions are typical of them, so their knowledge and practical application is interesting.

Finally, it should be noted that the environmental impact assessment process itself is also slightly different from other disciplines, introducing concepts such as the Informative Study, which is why its knowledge is considered convenient.

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 prerequisites. Knowledge of the following subjects is recommended: Evaluation of environmental quality
Analysis and application of environmental legislation Environmental impact assessment
Physical contamination: noise and radiation
Control of air pollution
Environmental Management Instruments (UV)
Processing and analysis of environmental data

OUTCOMES

2227 - M.U. en Ingeniería Ambiental

- 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.

- Promote and apply the principles of sustainability.
- 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.
- Be able to organize their own work as well as the material and human resources necessary to achieve the objectives stated.
- Identify, declare and entirely analyze environmental problems.
- Assess the application of measures for the pollution prevention and the recovery, protection and improvement of environmental quality.
- 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 methodologies for evaluation and correction of environmental impact.
- Apply standard methodologies for the analysis and evaluation of environmental risks.
- Apply different tools and environmental management systems.
- Be able to characterize the emissions to air, coming from the anthropogenic activity.
- Be able to characterize the emissions to water, coming from the anthropogenic activity.
- Be able to characterize the emissions to soils, coming from the anthropogenic activity.
- Apply techniques for the analysis and resolution of regional planning problems.

2250 - M.D. 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.

- Apply environmental engineering designs to produce solutions that meet specific needs addressing public health, safety and welfare taking account of global, cultural, social, environmental and economic factors.
- 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.
- Learn and apply new knowledge, using appropriate learning strategies.
- Characterise emissions to air.
- Characterise emissions to water.
- Characterise emissions to land.
- Implement measures for preventing pollution and recovering, protecting and improving environmental quality.
- 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.
- Interpret and apply national and international environmental legislation and adapt environmental solutions to these regulations.
- Apply tools for environmental assessment and management including environmental impact assessment and environmental risk assessment.
- Prepare and draft technical reports and/or environmental engineering projects considering technical, economic, social, energy and/or environmental aspects.
- Develop environmental solutions under the principles of circular economy and the sustainable development goals.

LEARNING OUTCOMES

1 Know the environmental conditions of linear works and their causes.

2 Know and assess the measures tending to their control.

3 Know and differentiate the environmental evaluation derived from the construction of linear infrastructures, their conservation and exploitation.

4 Define and implement programs for the control and monitoring of impacts.

5 Know the environmental management resulting from the useful life of an infrastructure and know how

to select between different solutions according to the environmental criteria.

DESCRIPTION OF CONTENTS

1. INTRODUCTION AND BASIC CONCEPTS

1. INTRODUCTION
2. OBJECTIVES OF THE COURSE
3. DEFINITIONS AND BASIC CONCEPTS
4. ADMINISTRATIVE PROCEDURES FOR EVALUATION OF THE ENVIRONMENTAL IMPACT
5. OWN CHARACTERISTICS OF LINEAR WORKS

2. METHODOLOGY IN THE EVALUATION OF THE ENVIRONMENTAL IMPACT

1. INTRODUCTION
2. OBJECTIVES PERSECUTED BY THE EVALUATION OF THE ENVIRONMENTAL IMPACT
3. PROCEDURES FOR EVALUATION OF THE ENVIRONMENTAL IMPACT
4. THE INFORMATIVE STUDY
5. THE DECLARATION OF ENVIRONMENTAL IMPACT

3. ENVIRONMENTAL IMPACTS AND CORRECTIVE ACTIONS IN THE CONSTRUCTION PHASE

1. TERRITORIAL PERMEABILITY
2. SPATIAL OCCUPATION
3. PREVENTION OF NOISE IN THE WORKS PHASE
4. PROTECTION OF THE ATMOSPHERIC ENVIRONMENT
5. ALTERATIONS ON THE WATERS
6. PROTECTION OF THE GEOMORPHOLOGICAL ACTIONS
7. STABILIZATION OF ROCKY SLOPES
8. DEFENSE AGAINST THE EROSION OF SLOPES IN LAND
9. VEGETALIZED WALLS OF CONTAINMENT
10. RESTITUTION OF THE SOIL SYSTEM
11. LANDSCAPE AND FUNCTIONAL INTEGRATION
12. PROTECTION OF ARCHAEOLOGICAL AND CULTURAL HERITAGE

4. ENVIRONMENTAL IMPACTS AND CORRECTIVE ACTIONS IN EXPLOITATION PHASE

1. INTRODUCTION
2. ENERGY IMPACT AND IN EMISSIONS OF ROAD DESIGN
3. EMISSIONS AND AIR QUALITY
4. SOUND AND NOISE EMISSIONS
5. WATER AFFECTS
6. SOIL AFFECTION AND THE LANDSCAPE

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	18,00	100
Classroom practices	8,00	100
Theoretical and practical classes	4,00	100
Development of group work	10,00	0
Study and independent work	5,00	0
Readings supplementary material	5,00	0
Preparation of evaluation activities	10,00	0
Preparing lectures	5,00	0
Preparation of practical classes and problem	5,00	0
Resolution of case studies	5,00	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 in order to apply the basic concepts and expand them with the knowledge and experience that they acquire during the realization of the proposed works. They include the following types of face-to-face activities:

o Classes of problems and questions in the classroom

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

o Programmed tutoring (individualized or in groups)

Student's personal work.

Description: Realization (outside the classroom) of monographic works, directed bibliographic search, resolution of 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. · Work in small groups. Description: Realization, by small groups of students (2-4) of work and problem solving outside the classroom. This task complements the individual work and fosters the capacity for integration in work groups.

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 evaluation system of the subject is based, on the one hand, on a continuous evaluation, based on the student's performance in class and their active participation in its development. Likewise, three evaluable works or practices and two multiple choice tests (one for each block of the subject) will be carried out. Multiple choice tests will have a weight of 30% in the final grade, corresponding to 15% for each of them. The continuous evaluation and performance of the student in class will count 20% of the final grade and the remaining 50% will correspond to the evaluable works or practices.

Of the acts of evaluation, both the multiple choice tests and the evaluable works and practices will be recoverable. The tests can be recovered in a final exam and the evaluable works and practices can be recovered through their subsequent delivery, modified or corrected. Therefore, the recoverable evaluation acts correspond to 80% of the evaluation weight.

Assistance requirements:

Theory Classroom 20%

Classroom Practice 20%

Field Practice 0%

REFERENCES

Basic

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Guía metodológica para la evaluación del impacto ambiental (Vicente Conesa Fernández-Vitoria)
Implementación de la legislación de medio ambiente en la evaluación del impacto ambiental (Josue Pérez Mor)
Propuesta para la caracterización de la calidad del proceso de evaluación de impacto ambiental. Aplicación a proyectos de infraestructura viaria (Luis Víctor Fernández Velasco)

Impactos paisajísticos de carreteras y medidas correctoras. Niveles de detalle (Glaría, Germán ; Ceñal, María Ángeles)
Medidas correctoras del impacto ambiental en las infraestructuras lineales (Juan Tiktin)
Impacto social de la contaminación acústica de las infraestructuras lineales en España (*)
Guía metodológica para la elaboración de estudios de impacto ambiental de obras hidráulicas (Juan José Martínez de la Vallina)
Ecología para ingenieros : el impacto ambiental (Santiago Hernández Fernández)
Development of VT-Micro model for estimating hot stabilized light duty vehicle and truck emissions (Rakha, Hesham ; Ahn, Kyoungho ; Trani, Antonio)
A field evaluation case study of the environmental and energy impacts of traffic calming (Ahn, Kyoungho ; Rakha, Hesham)
Road vehicle emission factors development: a review (Franco, Vicente ; Kousoulidou, Marina ; Muntean, Marilena ; Ntziachristos, Leonidas ; Hausberger, Stefan ; Dilara, Panagiota)