Universidad Zaragoza

Year : 2019/20

28809 - Environmental engineering

Syllabus Information

Academic Year: 2019/20
Subject: 28809 - Environmental engineering
Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia
Degree: 424 - Bachelor's Degree in Mechatronic Engineering
ECTS: 6.0
Year: 1
Semester: Second semester
Subject Type: Compulsory
Module: ---

1.General information

1.1.Aims of the course

The subject and its expected results respond to the following approaches and objectives:

To show the basic concepts of analysis of environmental factors and their interrelation between them.

To show the concepts that allow the analysis of the interactions between human activity and the environment.

To show the tools for identification, assessment and mitigation of environmental impacts.

Show the general principles of the tools available for good environmental management.

To make known the existing basic environmental regulations (European, national and autonomous).

1.2.Context and importance of this course in the degree

The environment is a constant concern in our society. The environmental factors, the interrelation between them, the interactions of the human species with its environment are the object of studies and analysis. One of the major interactions that occur between humans and their environment is linked to industrial activity.

This course is primarily aimed at training qualified engineers to identify the environmental aspects and impacts of industry, in order to minimize, prevent and solve them. In order to do this, we begin by describing and studying the links between the company and the environment. All the vectors of pollution and environmental technology for each of them are then studied.

Finally, a basic knowledge of environmental management (Environmental Regulations, Environmental Management Systems, Environmental Impact Assessment) is given so that the student knows the most useful and effective environmental tools for industry.

The subject of Environmental Engineering is part of the Degrees taught by EUPLA, within the group of subjects that make up the module called Basic. This is a first-year subject located in the second semester and of a compulsory nature (OB), with a teaching load of 6 ECTS credits.

The need for the subject within the curriculum of this degree is more than justified since being a subject with a marked transversal character influences the approach of the rest of the subjects taught, adding the environmental variable.

1.3.Recommendations to take this course

The development of the subject of Environmental Engineering requires to bring into play knowledge and strategies from subjects related to:

- Social Sciences.
- Natural Sciences

This subject is part of the basic training to be taken in this Grade and does not have any normative prerequisite nor does it require specific complementary knowledge. Therefore, the above is understood from a formal point of view, although it is necessary to be clear that an adequate training base is needed in the disciplines indicated above.

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

Strong interaction between the teacher/student. This interaction is brought into being through a division of work and responsibilities between the students and the teacher. Nevertheless, it must be taken into account that, to a certain degree, students can set their learning pace based on their own needs and availability, following the guidelines set by the teacher.

The current subject is conceived as a stand-alone combination of contents, yet organized into three fundamental and complementary forms, which are: the theoretical concepts of each teaching unit, the solving of problems or resolution of questions and laboratory work, at the same time supported by other activities

The organization of teaching will be carried out using the following steps:

- **Lectures**: Theoretical activities carried out mainly through exposition by the teacher, where the theoretical supports of the subject are displayed, highlighting the fundamental, structuring them in topics and or sections, interrelating them.
- **Practice Sessions**: The teacher resolves practical problems or cases for demonstrative purposes. This type of teaching complements the theory shown in the lectures with practical aspects.
- **Laboratory Workshop**: The lecture group is divided up into various groups, according to the number of registered students, but never with more than 20 students, in order to make up smaller sized groups.
- **Individual Tutorials**: Those carried out giving individual, personalized attention with a teacher from the department. Said tutorials may be in person or online.

4.2.Learning tasks

Involves the active participation of the student, in a way that the results achieved in the learning process are developed, not taking away from those already set out, the activities are the following:

? **Face-to-face generic activities**:

? **Theory Classes**: The theoretical concepts of the subject are explained and illustrative examples are developed as a support to the theory when necessary.

? **Practical Classes**: Problems and practical cases are carried out, complementary to the theoretical concepts studied.

? **Laboratory Workshop**: This work is tutored by a teacher, in groups of no more than 20 students.

? **Generic non-class activities**:

? Study and understanding of the theory taught in the lectures.

? Understanding and assimilation of the problems and practical cases solved in the practical classes.

? Preparation of seminars, solutions to proposed problems, etc.

? Preparation of laboratory workshops, preparation of summaries and reports.

? Preparation of the written tests for continuous assessment and final exams.

The subject has 6 ECTS credits, which represents 150 hours of student work in the subject during the trimester, in other words, 10 hours per week for 15 weeks of class.

A summary of a weekly timetable guide can be seen in the following table. These figures are obtained from the subject file in the Accreditation Report of the degree, taking into account the level of experimentation considered for the said subject is moderate.

Activity	**Weekly school hours**
Lectures	3
Laboratory Workshop	1
Other Activities	6

4.3.Syllabus

The course will address the following topics:

1.- THEORETICAL CONTENTS

The subject is developed around the following thematic blocks:

Subject 1 Introduction to the Environment. Environmental Regulations.

- Introduction: environment and sustainable development
- Risk and globalization
- Environmental crisis and analysis perspectives
- Environmental problems, human problems

Subject 2 Environment and business.

- Introduction
- Environmental economics
- The evolution of environmental problems in economic thought
- Environmental economics: principles and applications
- Neoclassical internationalization of externalities: PIGOU and COASE models
- Ecological economy vs environmental economics
- The environmentalization of the company
- Life cycle analysis
- The green economy

Subject 3 Waste, atmospheric pollution, and water.

- The atmospheric pollution
- Water Pollution
- Waste

Subject 4 Environmental Policies.

- Environmental law and the right to sustainability
- Environmental Law in the EU
- Environmental law in Spain

- Environmental responsibility law
- Law on integrated pollution prevention and control
- Project environmental impact assessment law

Subject 5 Environmental Management

- Environmental management systems (EMS)
- Advantages and disadvantages of the application of an EMS
- UNE standard in ISO 14.001 and European regulation (EMAS)

2.- PRACTICAL CONTENTS

Each topic presented in the previous section is associated with practical exercises on real cases of application in different companies in the sector: engineering, industry and the free exercise of the profession.

4.4.Course planning and calendar

The planning orientation is shown below

Week/Topic

- 1st Introduction.
- 2nd Introduction.
- 3rd Introduction.
- 4th Environment and Business.
- 5th Environment and Business.
- 6th Atmospheric Pollution.
- 7th Atmospheric Pollution
- 8th Atmospheric Pollution
- 9th Waste
- 10th Water.
- 11th Water
- 12th Environmental Policies.
- 13th Environmental Policies.
- 14th Environmental Management Systems
- 15th Environmental Management Systems

MATERIAL RESOURCES

Material	Format
Topic theory notes Topic problems	Paper/repository
Topic theory notes Topic presentations Topic problems Related links	Digital/Moodle E-Mail
_Educational software_____	_____Web page_____

The timetables and dates of the final exams will be those published officially at:

https://eupla.unizar.es/asuntos-academicos/calendario-y-horarios

https://eupla.unizar.es/asuntos-academicos/examenes

4.5.Bibliography and recommended resources

http://biblos.unizar.es/br/br_citas.php?codigo=28809&year=2019