

COURSE GUIDE

2025/26

Faculty345 - Faculty of Engineering - Bilbao

Cycle.

DegreeGITECI30 - Bachelor`s Degree in Industrial Technology Engineering

YearFourth year

COURSE

27324 - Environmental Science & Technology

Credits, ECTS:6

COURSE DESCRIPTION

This course in Environmental Science and Technology is a compulsory 6 ECTS credit course taught during in the 2nd semester. It belongs to the common module entitled "Industrial Technology". 4th year students from the Bachelor`s Degree in Industrial Technology Engineering may sign up for it. The aim of this course is to develop the basic knowledge and skills that allow participants to apply monitoring, control and management technologies to the industrial production systems as well as to implement sustainable practices by optimizing the consumption of natural resources and energy. Based on the previous knowledge and skills, it is possible to address the analysis, evaluation and correction of environmental impacts of different activities. The process of Environmental Impact Assessment (EIA) stated in the applicable regulations is analyzed. The structure and contents of the Environmental Impact Assessment (EIA) and the most common methods and indicators for evaluating environmental impacts are described.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

This course is intended to make students proficient in the following module skill:
R10-Basic knowledge and application of environmental technologies and sustainability
The expected learning outcome of this course is the consideration of environmental aspects and sustainability in the design of structures, machines and processes and in industrial plant projects.

Theoretical and Practical Contents

- 1.Introduction to the Environmental Science and Technology. Industry and Environment. Human impact on the Environment. Environmental quality improvement.
- 2.Air pollution. Characterization. Primary and secondary air pollutants. Chemical and physical transformations. Dispersion of air pollutants. Particle and gas emissions reduction and control technologies.
- 3.Water pollution. Characterization. Wastewater treatment technologies. Water purification and conditioning. Sludge Treatments.
- 4.Waste management. Characterization. Collection systems. Material Recovery Facilities. Waste treatment technologies.
- 5.Environmental management in industry. Environmental Systems for Environmental Management: ISO 14001 and EMAS. Environmental audits. Life-cycle Assessment. Carbon footprint.
- 6.Environmental Impact Assessment. Regulation and Legislation. Environmental Impact Review. Environmental actions and factors. Environmental Impact Statement. Monitoring programs.

TEACHING METHODS

The course is delivered by means of Lectures or Master Classes (MC) and Practical sessions (PA), complemented with Computer Practices (PO).
MC will be used to explain the basic contents as well as to do a wide variety of practical activities (problems, case studies, tests and discussions) both individually and in small groups to expand knowledge and understanding in the students. MC and PA are supported by audiovisual aids to make them effective.
Computer practices (PO) will also be carried out. During PO sessions, students will visit some relevant websites on Environmental Science to examine the latest laws related to the topic, use different programs/software to represent figures and design treatment technologies using models, among others.
eGela virtual platform will be used during the course to assist the teaching-learning process, completion of tasks and active participation.

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	37,5		15		7,5				
Horas de Actividad No Presencial del Alumno/a	56,25		22,5		11,25				

Legend: M: Lecture-basedS: SeminarGA: Applied classroom-based groups
GL: Applied laboratory-based groupsGO: Applied computer-based groupsGCL: Applied clinical-based groups
TA: WorkshopTI: Industrial workshopGCA: Applied fieldwork groups



Evaluation methods

- End-of-course evaluation

Evaluation tools and percentages of final mark

- Written test, open questions 30%
- Multiple choice test 60%
- Exercises, cases or problem sets 10%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Final Evaluation System

-Continuous Assessment System

-Tools and qualification percentages:

Written test to develop (problems (%): 30 Multiple choice test (%): 60

Individual work (computer labs) (%): 10 ORDINARY CALL

The acquisition of the skills and the achievement of the learning outcomes are ensured through students' continuous work throughout the semester. A continuous assessment system has been designed with two objectives: (i) to distribute the students' effort throughout the semester; and (ii) to promote the improvement of their learning results.

The continuous evaluation includes the following sections:

-A first written test that will take place in the middle of the semester. This grade represents 50% of the final grade for the subject, which will include a multiple choice test (30%) and problems (20%). It is required to pass this test with a minimum grade of 6.0 (out of 10) to release this subject for the final written test. This grade will be considered both in the ordinary and extraordinary call for this course.

-A second written test that will be carried out in the ordinary exam call. The mark of this test will suppose 40% of the final qualification of the subject. It will include a multiple choice test (30%) and problems (10%). It is essential to pass this part (minimum grade of 5.0 out of 10.0) to average it with the grade obtained in the first written test.

-Finally, 10% of the final grade for the subject corresponds to computer labs, the attendance to which is mandatory in order to be able to deliver the corresponding report. This grade is kept for the extraordinary call of this course and for the following course. To take into account the qualification of these labs, the previous written tests must be passed.

In case of not attending or not passing the first written test that will be held in the middle of the semester, the student must take a written test of the total content of the subject in the ordinary exam call. This written test will account for 90% of the final grade (60% multiple choice test and 30% problems), and all the skills that are expected to be acquired will be evaluated, except of those related to computer labs. It is essential to pass this exam (minimum grade of 5.0 out of 10) to pass the subject and to compute the grade corresponding to the computer labs.

The students, who want to waive the continuous assessment, and choose to be evaluated through the final assessment, must submit a letter to the faculty responsible for the subject indicating their resignation before the ninth week after the beginning of the subject, as establishes the regulations of the UPV/EHU. In this case, the student must perform:

- a)An individual final written test (90% of the final grade). It is essential to pass this test (minimum grade of 5.0 out of 10) to pass the subject and to compute the grade corresponding to the computer lab test.
- b)A computer lab test (10% of the final grade).
- c)The student will pass the subject as long as it is guaranteed that the result of the formula of the ordinary call is equal to or greater than 5.0 (out of 10).

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

For the extraordinary call, the grades of the first part will be kept as long as they are equal to or greater than the minimum required (6.0 out of 10). The grades corresponding to the computer labs will also be saved regardless of the grade obtained.

The student who has failed the written test must be examined only for this part, having to obtain a grade equal to or greater than 5.0 out of 10 to pass the exam. The student will pass the subject as long as it is guaranteed that the result of the qualification formula of the ordinary call is equal to or greater than 5.0 (out of 10).

The evaluation of the part of computer labs or other deliverables will be carried out through an oral or written test in this extraordinary call.

To calculate the final grade, the same formula and criteria than in the ordinary call will be used.

MANDATORY MATERIALS

- Lecture notes, available through the virtual platform eGela.
- Exercise collection.
- Computer lab guides.

BIBLIOGRAPHY

Basic bibliography

- Arévalo, M. (2019) Gestión Ambiental. Ed. Síntesis.
- Claver, E. (2005) Gestión de la calidad y gestión medioambiental. Ed. Pirámide.
- Davis, M. L. y Masten, S.J. (2005) Ingeniería y Ciencias Ambientales. ed. McGraw-Hill.
- Hernández, A., Hernández, P. y Gordillo, A.J. (2006) Manual para la evaluación de impactos ambientales. Inncive.
- Kiely, G. (1999) Ingeniería Ambiental, McGraw-Hill.
- Masters, G. y Ela, W. (2008) Introducción a la ingeniería medioambiental. Ed. Pearson.
- Mihelcic, J.R. (2001) Fundamentos de Ingeniería Ambiental. Ed. Limusa.
- Marañón, E., Mahamud, M., Castrillón, L. y Sastre, H. (2001) Problemas de ingeniería ambiental. Servicio de publicaciones Universidad de Oviedo.
- Morales Correas, N. (2003). Manual de referencia de la ingeniería ambiental. Ed. McGraw-Hill

Detailed bibliography

- Vallero, D. (2008) Fundamentals of air pollution. Elsevier.
- Dullien, F.A.L. (1989) Industrial gas cleaning, Academic Press.
- Metcalf & Eddy, Inc. (1995) Tratamiento y depuración de las aguas residuales. Labor.
- Snoeyink y Jenkins (1996). Química del agua. Limusa.
- Tchobanoglous (1994). Gestión integral de residuos sólidos. McGraw-Hill.
- Wentz, C. (1995). Hazardous Waste Management. McGraw-Hill.
- Canter, L. (1997). Evaluación del impacto ambiental. McGraw-Hill.

Journals

- Environmental Science and Technology
- Environmental Progress
- Journal of the Air and Waste Management Association
- Water, Air and Soil pollution
- Atmospheric Environment
- Atmospheric Chemistry and Physics
- Water Science and Technology
- Residuos
- Tecnología del agua
- Science of the Total Environment

Web sites of interest

- American Academy of Environmental Engineers. <http://www.aaee.net>
- US Environmental Protection Agency <http://www.epa.gov>
- European Environment Agency <https://www.eea.europa.eu/en>
- Ministerio para la transición ecológica y el reto demográfico: <https://www.miteco.gob.es/es/>
- Gobierno Vasco. Departamento de Desarrollo Económico, Sostenibilidad y Medio Ambiente: <https://www.euskadi.eus/gobierno-vasco/departamento-desarrollo-economico-infraestructuras/>
- Sociedad Pública IHOBE. <http://www.ihobe.es>
- Diario Oficial de las Comunidades Europeas <http://europa.eu.int/eur-lex/>
- Boletín Oficial del Estado <http://www.boe.es>
- Boletín Oficial del País Vasco http://www.euskadi.net/cgi-bin_k54/bopv_00?C

OBSERVATIONS