



IDENTIFYING DATA

Energy Efficiency: Sustainability and Certification

Subject	Energy Efficiency: Sustainability and Certification			
Code	V09G291V01413			
Study programme	Grado en Ingeniería de la Energía			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	2nd
Teaching language	#EnglishFriendly Spanish Galician			
Department				
Coordinator	Pérez Orozco, Raquel			
Lecturers	Pérez Orozco, Raquel			
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Web	http://moovi.uvigo.gal			
General description	Subject of the English Friendly program. The international students will be able to request to the teaching staff: a) materials and bibliographical references for following the subject in English, b) attend to the tutorials in English, c) tests and evaluations in English.			

Training and Learning Results

Code	
B1	Ability to draw links between the different elements of all the knowledge acquired, understanding them as components of a body of knowledge with a clear structure and strong internal cohesion.
B3	To suggest and develop practical solutions, using the relevant theoretical knowledge, to phenomena and problems-situations of ordinary reality that are specific to engineering, developing appropriate strategies.
B5	To be familiar with the relevant sources of information, including constant updating, in order to practice one's profession competently, accessing all the present and future tools of information search, constantly adapting to technological and social changes.
C39	Ability to manage audits of energy facilities.
C40	Understanding and ability to use concepts pertaining to energy efficiency and saving, as well as their management and application for solving problems specific to the field of energy engineering.
C41	Ability to innovate in the development of new lines, projects and products in the field of energy engineering.
C47	Ability to analyze the performance of facilities from the perspective of wave quality and efficiency.
D1	To be familiar with and to be able to use the legislation applicable in this sector, to be acquainted with the social and business environments and to be able to deal with the relevant administration, integrating this knowledge into the drawing up of engineering projects and into the implementation of every aspect of their professional work.
D2	Ability to organize, understand, assimilate, produce and handle all the relevant information to develop their professional work, using appropriate computing, mathematics, physics tools, etc. when these are required.
D3	Understanding engineering within a framework of sustainable development with environmental awareness.
D5	To become aware of the need for continuous training and the constant improvement of quality, developing the values that are characteristic of scientific thinking, showing flexible, open and ethical attitudes in the face of different situations and opinions, particularly as regards non-discrimination on the grounds of gender, race or religion, respect for fundamental rights, accessibility, etc.

Expected results from this subject

Expected results from this subject	Training and Learning Results		
To know the technological basis on which the most recent research in energy saving is based.	B4	C1	D1
	B5	C2	D1
	B6	C4	D2
		C40	D2
		C41	

To dominate the concepts of Footprint of Carbon and Ecological Footprint.	B1 B3 B5	C40 C41	D1 D2 D3 D5
To dominate the existing techniques and software for energetic certification.	B1 B3	C40 C47	D1 D2 D3 D5
Understanding Efficient Buildings evaluation methods.	B1 B3 B5	C39 C40 C41 C47	D1 D2 D3 D5
To know the standards and regulations that apply to buildings and thermal installations.	B1 B5	C39 C47	D1 D3
Project an energy saving system through the integration of processes and technologies.	B1 B3	C39 C40 C41	D1 D2 D3 D5
Using the concepts of Circular Economy and Sustainable Building.	B1 B5	C40 C41	D1 D2 D3 D5

Contents

Topic	
Carbon Footprint	Calculation, mitigation and compensation of the Carbon footprint. Ecological footprint. CO2 emission allowances market. Techniques for minimizing GHG emissions
Building Energy Certification	Introduction to the CTE. Tools for energy certification of buildings
Sustainable construction	Buildings of zero consumption, net zero consumption and energy plus. Introduction to bioclimatic buildings.
Energetic valorization of waste	Viability of the energetic use of residues. Circular economy. Real case studies.
High performance thermal installations	Storage of thermal energy and solar cooling

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	18	40	58
Problem solving	6	10	16
Practices through ICT	20	8.5	28.5
Case studies	4	0	4
Mentored work	0	39	39
Presentation	2	0	2
Essay questions exam	2.5	0	2.5

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Lecturing	Presentation by the teacher of the contents of the subject of study, theoretical bases and/or guidelines for a project, exercise that the student has to develop.
Problem solving	Activity in which problems and/or exercises related to the subject are formulated. The student must develop the appropriate or correct solutions by means of the exercise of routines, the application of formulas or algorithms, the application of transformation procedures of the available information and the interpretation of the results. It is recommended to be used as a complement to the master class.
Practices through ICT	Activities for applying knowledge in a given context and acquiring basic and procedural skills in relation to the subject, through ICT.
Case studies	Analysis of a fact, problem or real event with the aim of understanding it, interpreting it, solving it, generating hypotheses, contrasting data, reflecting, completing knowledge, diagnosing it and training in alternative solution procedures.
Mentored work	Students, individually or in groups, prepare a document on the subject matter or prepare seminars, research, reports, essays, summaries of readings, lectures, etc.

Presentation	Presentation by the students to the teacher and/or a group of students of a topic on the contents of the subject or the results of a work, exercise, project... It can be carried out individually or in a group.
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Personalized assistance

Methodologies	Description
Lecturing	The teaching staff will personally attend to students' questions and queries during class and during tutorial time. For all teaching modalities, tutoring sessions can be carried out by telematic means (e-mail, remote campus, Moovi...) by prior arrangement.
Problem solving	The teaching staff will personally attend to students' questions and queries during class and during tutorial time. For all teaching modalities, tutoring sessions can be carried out by telematic means (e-mail, remote campus, Moovi...) by prior arrangement.
Practices through ICT	The teaching staff will personally attend to students' questions and queries during class and during tutorial time. For all teaching modalities, tutoring sessions can be carried out by telematic means (e-mail, remote campus, Moovi...) by prior arrangement.
Case studies	The teaching staff will personally attend to students' questions and queries during class and during tutorial time. For all teaching modalities, tutoring sessions can be carried out by telematic means (e-mail, remote campus, Moovi...) by prior arrangement.
Mentored work	The teaching staff will personally attend to students' questions and queries during class and during tutorial time. For all teaching modalities, tutoring sessions can be carried out by telematic means (e-mail, remote campus, Moovi...) by prior arrangement.
Presentation	The teaching staff will personally attend to students' questions and queries during class and during tutorial time. For all teaching modalities, tutoring sessions can be carried out by telematic means (e-mail, remote campus, Moovi...) by prior arrangement.
Tests	Description
Essay questions exam	The teaching staff will personally attend to students' questions and queries during class and during tutorial time. For all teaching modalities, tutoring sessions can be carried out by telematic means (e-mail, remote campus, Moovi...) by prior arrangement.

Assessment

	Description	Qualification	Training and Learning Results
Lecturing	Tests of multiple-choice questions through the distance learning platform, throughout the four-month period. Expected results from this subject: To know the technological basis on which the most recent research in energy saving is based. To dominate the concepts of Carbon Footprint and Ecological Footprint. To dominate the existing techniques and software for energetic certification. Understanding Efficient Buildings evaluation methods. To know the standards and regulations that apply to buildings and thermal installations. Using the concepts of Circular Economy and Sustainable Building.	20	B1 C39 D1 B3 C40 D2 B5 C41 D3 C47 D5
Practices through ICT	Internship reports. The evaluation is subject to attendance at the sessions. Expected results from this subject: To know the technological basis on which the most recent research in energy saving is based. To dominate the concepts of Carbon Footprint and Ecological Footprint. To dominate the existing techniques and software for energetic certification. Understanding Efficient Buildings evaluation methods. To know the standards and regulations that apply to buildings and thermal installations. Using the concepts of Circular Economy and Sustainable Building.	10	B1 C39 D1 B3 C40 D2 B5 C41 D3 C47 D5
Mentored work	Work/project on energy and sustainability certification. Expected results from this subject: To know the technological basis on which the most recent research in energy saving is based. To dominate the concepts of Carbon Footprint and Ecological Footprint. To dominate the existing techniques and software for energetic certification. Understanding Efficient Buildings evaluation methods. To know the standards and regulations that apply to buildings and thermal installations. Using the concepts of Circular Economy and Sustainable Building. Project an energy saving system through the integration of processes and technologies.	40	B1 C39 D1 B3 C40 D2 B5 C41 D3 C47 D5

Presentation	Oral presentation of the mentored work to be carried out during class hours in the last week of the four-month period. Expected results from this subject: All the learning results will be evaluated.	10	B1 C39 D1 B3 C40 D2 B5 C41 D3 C47 D5
Essay questions exam	Written test of objective questions, to be taken on the official exam date. Expected results from this subject: All the learning results will be evaluated	20	B1 C39 D1 B3 C40 D2 B5 C41 D3 C47 D5

Other comments on the Evaluation

Continuous evaluation - First opportunity:

Students will be assessed according to the scales set out in the table above. To pass the subject, students must obtain a grade equal to or higher than 5 out of 10 points in each of the assessable items.

Continuous evaluation - Second opportunity:

The marks of the tests and work carried out during the first evaluation will be saved. Students must submit those assignments and practical reports that were not previously submitted. Students who so request may be re-evaluated in the multiple-choice and/or objective questions tests, which will be held on the official exam date of the second evaluation. To pass the subject, a grade equal to or higher than 5 out of 10 points must be obtained in each of the assessable items.

Global evaluation (first and second opportunities):

Students who avoid continuous evaluation will be assessed as follows:

- Supervised work: 50% of the grades. It must be submitted before the official exam date. Students must obtain a grade equal to or higher than 5 points out of 10 (2.5 out of 5) to pass the subject.
- Test of multiple-choice and essay questions: 50% of the grades. Students must obtain a grade equal to or higher than 5 points out of 10 (2.5 out of 5) to pass the subject.

Exam Timetable . Exam dates and rooms must be verified in the official webpage of the school:

(<http://minaseenerxia.uvigo.es/es/docencia/examenes/>).

Sources of information

Basic Bibliography

Mathis Wackernagel, Bert Beyers, **Ecological Footprint. Managing our biocapacity budget**, 978-0865719118, New Society Publishers, 2019

López Martínez, Gabriel et al., **Economía circular: fundamentos y aplicaciones**, 9788413900629, Aranzadi, 2021

Complementary Bibliography

Amend, Thora; Barbeau, Bree; Beyers, Bert, **A Big Foot on a Small Planet? Accounting with the Ecological Footprint**, 9783-925064-64-7, 2, GTZ, 2010

Almond, R.E.A.; Grooten M.; Juffe Bignoli, D. y Petersen, T, **Informe Planeta vivo 2022. Hacia una sociedad con la naturaleza en positivo.**, WWF, 2020

Juan Luis Doménech Quesada, **Huella ecológica y desarrollo sostenible**, 9788481436563, 2, AENOR, 2009

Francisco Javier Rey Martínez, Eloy Velasco Gómez, Javier M. Rey Hernández, **Eficiencia energética de los edificios: certificación energética**, Paraninfo, 2018

Vidales Barriguete, Alejandra ; Ferrández Vega, Daniel, **Innovación tecnológica y desarrollo sostenible en la edificación**, 9788411228503, Dykinson, 2022

Recommendations

Subjects that it is recommended to have taken before

Generation and distribution of conventional and renewable thermal energy/V09G291V01303

Thermal Energy Management/V09G291V01401