Teaching Guide				
Identifying Data				2023/24
Subject (*)	Audit and Energy Services		Code	730547009d
Study programme	Máster Universitario en Eficiencia Enerxética e Sustentabilidade (a distancia)			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	2nd four-month period	First	Optional	3
Language	SpanishGalician			
Teaching method	Non-attendance			
Prerequisites				
Department	Enxeñaría Industrial			
Coordinador	Masdias y Bonome, Antonio	E-mail	antonio.masdias@udc.es	
Lecturers	Masdias y Bonome, Antonio Saa Filgueiras, Carlos	E-mail	antonio.masdias@udc.es carlos.saa@udc.es	
Web				
General description	The knowledge that is sought with this subject is aligned with the requirements demanded to exercise the professional activity of energy auditor according to Royal Decree 56/2016 by which it is transposed from Directive 2012/27/UE of energy efficiency, in relation to energy audits, energy service providers and efficiency promotion.			

Study programme competences	
Code	Study programme competences
A1	CE1 - Apply methodologies and regulations for efficient energy management
A2	CE2 - Analyze and implement energy saving and efficiency measures in the industrial, tertiary and residential sectors
A3	CE3 - Prepare Energy Audits
A4	CE4 - Apply data analysis methods for the creation of efficient energy systems
A5	CE5 - Analyze energy consumption and its associated costs
A9	CE9 - Make decisions in a technological environment where materials are used in efficiency applications
B1	CB6 - Possess and understand knowledge that provides a foundation or opportunity to be original in the development and/or application of ideas, often in a research context
B2	CB7 - That students know how to apply the knowledge acquired and their ability to solve problems in new or little-known environments within broader (or multidisciplinary) contexts related to their area of study
B4	CB9 - That students know how to communicate their conclusions and the knowledge and ultimate reasons that support them to specialized and non-specialized audiences in a clear and unambiguous way
B5	CB10 - That students have the learning skills that allow them to continue studying in a way that will be largely self-directed or autonomous
B6	CG1 - Search and select alternatives considering the best possible solutions
B8	CG3 - Incorporate their own vocabulary to express themselves accurately in effective communication, both written and oral
B9	CG4 - Extract, interpret and process information, from different sources, for use in the study and analysis
B13	CG8 - Apply theoretical knowledge to practice
B15	CG10 - Know the current legislation and regulations applicable to the renewable energy and energy efficiency sector
B16	CG11 - Evaluate the application of emerging technologies in the field of energy and the environment
B17	CG12 - Develop the ability to advise and guide on the best way or channel to optimize energy resources in relation to renewable energies
C1	CT1 - Express themselves correctly, both orally and in writing, in the official languages of the autonomous community
C2	CT2 - Master the oral and written expression and comprehension of a foreign language
C3	CT3 - Use the basic tools of information and communication technologies (ICT) necessary for the exercise of their profession and for learning throughout their lives
C4	CT4 - Develop for the exercise of a respectful citizenship with the democratic culture, human rights and the gender perspective
C5	CT5 - Understand the importance of entrepreneurial culture and know the means available to entrepreneurs
C6	CT6 - Gain life skills and healthy habits, routines, and lifestyles
C7	CT7 - Develop the ability to work in interdisciplinary or transdisciplinary teams, to offer proposals that contribute to sustainable environmental, economic, political and social development

C8	CT8 - Value the importance of research, innovation and technological development in the socioeconomic and cultural progress of society
C9	CT9 - Have the ability to manage time and resources: develop plans, prioritize activities, identify criticism, set deadlines and meet them

Learning outcomes			
Learning outcomes	Study programme competences		
Knowledge of the regulations and legislation necessary to carry out Energy Audits	AC1	BC2 BC9 BC15	CC5
Detect and evaluate the different savings opportunities by contracting Energy Services and their impact on energy and maintenance costs, as well as other benefits and associated costs	AC1 AC2	BC13 BC17	
Obtain real knowledge of energy consumption and its associated costs	AC3 AC5	BC4 BC17	
Identify and characterize the factors that affect energy consumption in facilities	AC5	BC6 BC16	
Know, design, manage and maintain the different Services that an Energy Service Provider can provide	AC1 AC4 AC5 AC9	BC4 BC5	CC1 CC2 CC3 CC4 CC5 CC6 CC7 CC8 CC9
Quantification and verification of savings of the Energy Service Companies (ESC)	AC1 AC2 AC5	BC1 BC2 BC8	
Apply methodologies and programs for efficient energy management, through the implementation of Energy Management Systems (EMS)	AC1 AC2 AC4	BC2	CC5

Contents	
Topic	Sub-topic
Legislative framework and rules involved.	Marco Legislativo, estructura. Directivas Europeas. Legislación Nacional. Real Decreto 56/2016. Normas Aplicadas. Instalaciones consumidoras de energía.
Energy Audits: Structure, design and methodologies for their preparation.	Requisitos Generales. Estructura de una Auditoria. Diseño, Equipos y metodologías. Auditorias en Edificios, Procesos y Transporte.
Energy Management Systems (EMS) and their implementation.	Evolución y Alcance actual. Sistemas SGE. Desarrollo e Implantación.
Energy Service Providers.	Clasificación y categorías. Creación de Servicios Energéticos Proveedores de Servicios Energéticos.

Planning

Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Case study	A1 A2 A3 A4 A5 A9 B1 B2 B4 B5 B6 B8 B9 B15 B16 B17 C1 C2 C3 C4 C5 C6 C7 C8 C9	0	13	13
Objective test	A1 A2 A3 A5 B16 C2 C3 C4 C5	1	10	11
ICT practicals	A1 A2 A3 A5 B2 B4 B5 B6 B8 B9 B13 B15 B16 B17 C1 C2 C3 C4 C5	0	20	20
Workbook	A1 A2 A3 A5 B2 B4 B5 B6 B8 B9 B15 B16 B17 C1 C2 C3 C4 C5	0	30	30
Personalized attention		1	0	1
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.				

Methodologies	
Methodologies	Description
Case study	It includes the study, analysis of solutions and their implementation.
Objective test	There will be an exam at the end of the course.
ICT practicals	It includes the elaboration of the practices that will be both in the laboratory or specialized equipment for recording or measuring consumption, as well as with the assistance of T.I.C.
Workbook	Exhibition through master session and support from T.I.C.

Personalized attention	
Methodologies	Description
Case study	Both in the case study and in the practices, personalized attention and follow-up will be carried out, which may be not only in person but also through the use of ICT or email.

Assessment			
Methodologies	Competencies	Description	**Qualification**
Case study	A1 A2 A3 A4 A5 A9 B1 B2 B4 B5 B6 B8 B9 B15 B16 B17 C1 C2 C3 C4 C5 C6 C7 C8 C9	It includes the study, analysis of solutions and their implementation.	30
Objective test	A1 A2 A3 A5 B16 C2 C3 C4 C5	There will be an exam at the end of the course.	40
ICT practicals	A1 A2 A3 A5 B2 B4 B5 B6 B8 B9 B13 B15 B16 B17 C1 C2 C3 C4 C5	It includes the elaboration of the practices that will be both in the laboratory or specialized equipment for recording or measuring consumption, as well as with the assistance of T.I.C.	30

Assessment comments

Full-time and part-time students will be evaluated equally, both in 1st comma and in 2nd opportunity. The student is reminded of the importance of deadlines when submitting work, as well as the importance of complying with the rules and regulations of the UDC, and referencing all documentation and content not prepared by the student. Specifically, the fraudulent performance of the tests or evaluation activities, once verified, will directly imply the qualification of failing "0" in the subject, in the corresponding call, thus invalidating any qualification obtained in all the evaluation activities for the extraordinary summons

Sources of information	
Basic	- AENOR (2016). Especificación AE0055 sobre eficiencia energética. Madrid- AENOR (2011). Sistemas de Gestión de la Energía ISO 50001:2011.- AENOR (2014). Auditorias Energéticas Parte 1 a 4 UNE 16247.- EFICIENCIA ENERGETICA DE LOS EDIFICIOS. SISTEMA DE GESTION ENERGETICA ISO 50001. AUDITORIAS ENERGETICAS. FRANCISCO JAVIER REY MARTINEZ. Paraninfo.- DTIE 17.04 Instrumentación y medición. Asociación Técnica Española de Climatización y Refrigeración ATECYR. Vicente Quiles, Pedro G.- Auditorías energéticas. Asociación Técnica Española de Climatización y Refrigeración ATECYR. García San José, Ricardo.
Complementary	

Recommendations
Subjects that it is recommended to have taken before
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
Other comments

(*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.