



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). Auditorías 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.