



## Teaching Guide

| Identifying Data         |  |        |           | 2022/23 |
|--------------------------|--|--------|-----------|---------|
| Subject (*)              | Renewable Systems  | Code   | 770523005 |         |
| Study programme          | Mestrado Universitario en Eficiencia e Aproveitamento Enerxético   |        |           |         |
| Descriptors              |  |        |           |         |
| Cycle                    | Period   | Year   | Type      | Credits |
| Official Master's Degree | 1st four-month period  | First  | Optional  | 3       |
| Language                 | Spanish  |        |           |         |
| Teaching method          | Face-to-face   |        |           |         |
| Prerequisites            |  |        |           |         |
| Department               | Enxeñaría Industrial   |        |           |         |
| Coordinador              |  | E-mail |           |         |
| Lecturers                |  | E-mail |           |         |
| Web                      | moodle.udc.es/   |        |           |         |
| General description      | It aims to train students to : designing assemble and maintain household or industrial installations that take advantage of renewable energy. Fundamentally mini hydro , geothermal and ocean energy |        |           |         |

## Study programme competences / results

| Code | Study programme competences / results   |
|------|---|
| A1   | Análise e aplicación de metodoloxías e normativa para unha xestión eficiente da enerxía.  |
| A9   | Tener conocimiento de los fundamentos, potencial, tecnología, aplicaciones y normativa de fuentes de energía renovables.  |
| A10  | Capacidad para analizar e incluír enerxías renovables en diferentes instalaciónes.  |
| A13  | Capacidad para analizar, aplicar y optimizar los sistemas de aproveitamiento energético.  |
| A15  | Capacidad para desenvolver un proxecto en el ámbito del máster.   |
| A16  | Capacidad para buscar, analizar, identificar y aplicar nuevas fontes de enerxía eléctrica o novas técnicas de xestión de la electricidade baixo criterios como eficiencia, sostenibilidade o cooperación, así como el emprego de éstas sobre novas aplicaciónes.  |
| B1   | Que los estudiantes sepan aplicar los conocimientos adquiridos y su capacidad de resolución de problemas en entornos nuevos o poco conocidos dentro de contextos máis amplios (o multidisciplinares) relacionados con su área de estudio.   |
| B2   | Que los estudiantes sean capaces de integrar conocimientos y enfrentarse a la complejidad de formular juicios a partir de una información que, siendo incompleta o limitada, incluya reflexiones sobre las responsabilidades sociales y éticas vinculadas a la aplicación de sus conocimientos y juicios. |
| B3   | Poseer y comprender conocimientos que aporten una base u oportunidad de ser originales en el desarrollo y/o aplicación de ideas, a menudo en un contexto de investigación.  |
| B6   | Buscar y seleccionar alternativas considerando las mejores soluciones posibles.   |
| B7   | Desarrollar las capacidades de análisis y síntesis; fomentar la discusión crítica, la defensa de argumentos y la toma de conclusiones.  |
| B9   | Extraer, interpretar y procesar información, procedente de diferentes fontes, para su empleo en el estudio y análisis.  |
| B15  | Conocer la legislación vigente y reglamentación aplicable al sector de las enerxías renovables y de la eficiencia energética.   |
| B16  | Valorar la aplicación de tecnologías emergentes en el ámbito de la enerxía y el medio ambiente.   |
| B17  | Desarrollar la capacidad para asesorar y orientar sobre la mejor forma o cauce para optimizar los recursos energéticos en relación con las enerxías renovables.   |
| B18  | Plantear y resolver problemas, interpretar un conjunto de datos y analizar los resultados obtenidos; en el ámbito de la eficiencia energética y la sostenibilidade.   |
| C1   | Adquirir la terminología y nomenclatura científico-técnica para exponer argumentos y fundamentar conclusiones.  |
| C2   | Fomentar la sensibilización hacia temas medioambientales.   |
| C3   | Aplicar una metodología que fomente el aprendizaje y el trabajo autónomo.   |
| C4   | Desarrollar el pensamiento crítico  |
| C5   | Adquirir la capacidad para elaborar un trabajo multidisciplinar   |

## Learning outcomes



| Learning outcomes  | Study programme competences / results |                     |                   |
|--|---------------------------------------|---------------------|-------------------|
| Common knowledge of the energetic use of hydro, marine , geothermal and small hydro  | AJ1<br>AJ9<br>AJ13<br>AJ16            | BC15<br>BC17        | CC1<br>CC2<br>CC5 |
| Evaluate the potential hydraulic , geothermal and marine .   | AJ10                                  | BC1<br>BC16<br>BC18 | CC4               |
| Knowing the different methodologies used its operation and control as well as different types of systems that exist for exploiting renewable energy systems by employing marine hydro , small hydro and geothermal . | AJ1<br>AJ9<br>AJ10                    | BC3<br>BC7          | CC3<br>CC5        |
| Knowing the rules affecting systems using renewable sources .  | AJ9<br>AJ10<br>AJ13<br>AJ15           | BC2<br>BC6<br>BC9   | CC1<br>CC2        |

| Contents  |   |
|---|---|
| Topic   | Sub-topic   |
| ?Hydropower and small hydropower . Fundamentals. Normative. | hydroelectric flows and heights.<br>Types of dams and configuration of exploitations .<br>Types of turbines and elements that make up a mini hydraulic system .<br>Dela integration possibilities mini hydraulics. Small Grids.<br>Applicable regulations |
| Marine energy . Fundamentals. Normative.                    | Wave power<br>Tidal energy and ocean currents .<br>Prototypes of exploitations .<br>Legislation   |
| Geothermal Energy : Fundamentals. Fundamentals. Normative   | Geothermal energy<br>Fundamentals of geothermal utilization .<br>Normative.   |

| Planning                       |  |                                      |                               |             |
|--------------------------------|--|--------------------------------------|-------------------------------|-------------|
| Methodologies / tests          | Competencies / Results                 | Teaching hours (in-person & virtual) | Student?s personal work hours | Total hours |
| Guest lecture / keynote speech | A1 A9 A13 B1 B2 B15<br>B16 C1 C2 C3 C4 | 18                                   | 18                            | 36          |
| Supervised projects            | A10 A13 A15 A16 B3<br>B2 B6 B7 B9 C5   | 15                                   | 15                            | 30          |
| Field trip                     | B16 B17 B18 C2 C4                      | 5                                    | 0                             | 5           |
| Personalized attention         |  | 4                                    | 0                             | 4           |

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

| Methodologies                  |   |
|--------------------------------|---|
| Methodologies                  | Description   |
| Guest lecture / keynote speech | Description explanation of the mini - hydraulic systems and geothermal sea and forms of use , its components, maintenance and commissioning |
| Supervised projects            | Proposals for work on mini hydropower facilities , sea and geothermal   |



|            |   |
|------------|---|
| Field trip | Site visits generation mini hydro, geothermal and sea and manufacturing facilities of its |
|------------|---|

### Personalized attention

| Methodologies  | Description   |
|--|---|
| Supervised projects<br>Field trip<br>Guest lecture /<br>keynote speech | Professor will be prepared in their classes and tutoring hours to resolve any problem that the student present . The face either telephone or email |

### Assessment

| Methodologies                     | Competencies / Results                 | Description   | Qualification |
|-----------------------------------|--|---|---------------|
| Supervised projects               | A10 A13 A15 A16 B3<br>B2 B6 B7 B9 C5   | Presentation on time and marked the traballos                                 | 25            |
| Field trip                        | B16 B17 B18 C2 C4                      | Assistance to field trips and delivery of abstracts marked                    | 25            |
| Guest lecture /<br>keynote speech | A1 A9 A13 B1 B2 B15<br>B16 C1 C2 C3 C4 | Written test problem solving, theory and issues on the agenda of the contents | 50            |

### Assessment comments

### Sources of information

|               |  |
|---------------|--|
| Basic         |  |
| 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.