| Teaching Guide | | | | | |
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| Identifying Data | | | | | 2019/20 |
| Subject (*) | Efficiency of Electric Systems | | | Code | 770523013 |
| Study programme | Mestrado Universitario en Eficiencia e Aproveitamento Enerxético | | | | |
| Descriptors | | | | | |
| Cycle | Period | Year | | Type | Credits |
| Official Master's Degree | 2nd four-month period | First | | Optional | 3 |
| Language | SpanishGalicianEnglish | | | | |
| Teaching method | Face-to-face | | | | |
| Prerequisites | | | | | |
| Department | Enxeñaría Industrial | | | | |
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| Web | moodle.udc.es | | | | |
| General description | To achieve that the electrical installations and the receptors that constitute them, work of a correct way and that work of an efficient way from an electrical point of view, have to firstly identify and afterwards quantify of a correct way the ineficiencias that can find us presents in any electrical system, such as the desfases between the tension and the current, the fault of symmetry and the fault of linealidad in his circuits, once established these ineficiencias, showed the devices that allow us correct them, so that it attain an improvement in the efficiency of the installation or circuit. | | | | |

| Study programme competences / results | |
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| Code | Study programme competences / results |
| A1 | Análise e aplicación de metodoloxías e normativa para unha xestión eficiente da enerxía. |
| 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. |
| B11 | Adquirir nuevos conocimientos y capacidades relacionados con el ámbito profesional del máster. |
| B15 | Conocer la legislación vigente y reglamentación aplicable al sector de las energías renovables y de la eficiencia energética. |
| C3 | Aplicar una metodología que fomente el aprendizaje y el trabajo autónomo. |

| Learning outcomes | | | |
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| Learning outcomes | Study programme competences / results | | |
| The student will know to identify the diverse phenomena (reactive, disequilibriums, harmonic), that can find in an electrical installation, that diminish his efficiency. | AJ1 | BC3<br>BC11<br>BC15 | |
| The student will know to quantify the importance of the ineficiencias of the system and proceed to pose the best solution for the same, so that the system was from the electrical point of view more efficient, all this attending to the norms and reglamentación valid. | AJ1 | BC6<br>BC7 | CC3 |

| Contents | |
|---|---|
| Topic | Sub-topic |
| Introduction to the ineficiencias in the electrical systems. | Introduction.<br>The Unified Theory of Electrical Power. |
| Compensation of the reactive power. | Introduction.<br>Characterisation and measure of the reactive energy.<br>Devices of compensation of the cos fi. |

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|---|---|
| Balanced three- and four-wire electrical systems. | Introducción. Theorem of Stokvis-Fortescue.<br>Characterization and measurement of power imbalances<br>Equivalent circuits of receptors and installations.<br>Elimination of imbalances. Filters of sequence. |
| Non linear loads. | Introduction.<br>Origin of non-sinusoidal periodic waves.<br>Factors periodic signals.<br>Limits of harmonics.<br>Distortion power. |
| Correction disturbances. | Introduction.<br>UNE-EN-61642. Filters of harmonic.<br>Filters of Rejection.<br>Filters of Absorption. |

| Planning | | | | |
|---|---|---|---|---|
| Methodologies / tests | Competencies / Results | Teaching hours (in-person & virtual) | Student?s personal work hours | Total hours |
| Objective test | A1 | 3 | 7.65 | 10.65 |
| Laboratory practice | B6 B15 | 14 | 7 | 21 |
| Supervised projects | B3 C3 | 4 | 8 | 12 |
| Guest lecture / keynote speech | B7 B11 | 10 | 20 | 30 |
| Personalized attention | | 1.25 | 0 | 1.25 |
| (*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students. | | | | |

| Methodologies | |
|---|---|
| Methodologies | Description |
| Objective test | Proof of evaluation where the student will have to show his degree of learning of an objective way. |
| Laboratory practice | You practise them of laboratory are a fundamental activity for the learning of this matter. They consist in practical suppositions where the student will have to show the theoretical knowledges purchased |
| Supervised projects | They develop tasks, that allow to settle the theoretical and practical knowledges, that can go from formulating problems and brief works the simple until others with some complexity. |
| Guest lecture / keynote speech | Face-to-face activity in the classroom, where will establish the fundamental concepts of the matter. It will realise by means of an oral exhibition, complemented with audiovisual and multimedia means, is whose end transmit the knowledges and facilitate the learning. |

| Personalized attention | |
|---|---|
| Methodologies | Description |
| Supervised projects<br>Guest lecture / keynote speech<br>Laboratory practice | They realise in the corresponding tutorías, where to initiative of the student resolve , or clear the possible doubts. |

| Assessment | | | |
|---|---|---|---|
| Methodologies | Competencies / Results | Description | Qualification |

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|---|---|---|---|
| Supervised projects | B3 C3 | Will be able to realise to varied cape works tutelados along the course, being his compulsory delivery and that treated on problems or practical suppositions related with the matter.<br><br>The works tutelados, are 30% of the final note of the matter, that will be added to the note obtained in the objective proof, whenever this was described with at least 3.0 points on 10.0 points. | 30 |
| Objective test | A1 | In the dates fixed officially by the centre, realised this final proof.<br><br>The proof can alternate ask type problem or theoretical questions, and represents 40% of the final note of the matter. | 40 |
| Laboratory practice | B6 B15 | The practical are compulsory, and is necessary to have them realised to be able to surpass the asignatura.<br><br>The practices represent 30% of the final note of the matter, and added to the note obtained in the theoretical proof whenever this was upper to 3.0 points on 10.0 points. | 30 |

| Assessment comments |
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| All the activities that contribute to the final note of the student, will be qualified on 10.0 points. |

| Sources of information | |
|---|---|
| Basic | - León Martínez, Vicente; Montañana Romeu, Joaquín (2001). Ineficiencias de los Sistemas Eléctricos. Universidad Politécnica de Valencia<br>- Bacells, Josep y otros (2011). Eficiencia en el uso de la Energía Eléctrica. Marcombo<br>- León Martínez, V; Montañana Romeu, J. (2017). Circuitos Conductivos Lineales. Universidad Politénica de Valencia<br>- (). .<br><br> |
| Complementary | - Félice, E. (2001). Perturbaciones Armónicas. Paraninfo Thomson<br>- Sastry Vadam, R; Sarma, Mulukutla (2009). Power Quality. VAR Compensation in Power Systems. CRC Press<br>- Hofman, Wolfgang; Schlabbach, J. (2012). Reactive Power Compensation. Wiley&Sons<br>- Singh, Bhim; Chandra Ambrish (2015). Power Quality. Problems and Mitigation Techniques. Wiley&Sons<br><br> |

| Recommendations |
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| Subjects that it is recommended to have taken before |
| Electric Drive/770523011<br>Renewable Systems/770523005<br>Wind Systems/770523009 |
| Subjects that are recommended to be taken simultaneously |
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| Subjects that continue the syllabus |
| Quality of the Electric Service/770523014 |
| Other comments |
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**(*)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.**