UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2022/23
Subject (*)	Quality of the Electric Service		Code	730547013
Study programme	Máster Universitario en Eficiencia Enerxética e Sustentabilidade			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	2nd four-month period	First	Optional	3
Language	SpanishGalician			
Teaching method	Face-to-face			
Prerequisites				
Department	Enxeñaría Industrial			
Coordinador	Graña Lopez, Manuel angel	E-mail	manuel.grana@udc.es	
Lecturers	Graña Lopez, Manuel angel Méndez Sanmartín, Cristian	E-mail	manuel.grana@udc.es cristian.mendez@udc.es	
Web	https://moodle.udc.es/			
General description	In this subject studies the quality of the electrical service from the point of view of the legislation and rule at present valid.			

Study programme competences / results	
Code	Study programme competences / results
A1	CE1 - Apply methodologies and regulations for efficient energy management
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
C1	CT1 - Express themselves correctly, both orally and in writing, in the official languages of the autonomous community

Learning outcomes			
Learning outcomes	Study programme competences / results		
The student will know how to analyze the different disturbances (frequency, amplitude or symmetry) that occur in an Electrical System, recognizing their causes, effects, indicators, forms of measurement and regulations that affect them, as well as the possible corrective measures to take into account.	AC1	BC9 BC13 BC15	CC1

Contents	
Topic	Sub-topic
Introduction	Presentation of the subject Previous knowledges
Continuity of the supply	Definition Types of interruptions TIEPI NIEPI

Quality of the product	Frequency Overvoltages/Undervoltages Flicker Voltage unbalance Harmonic distortion Interharmonics Noise Interruptions Sags (dips)/Swells Transients
Quality of the attention to the consumer	Definition Indexes of individual quality
ANNEXES	Basic regulations Electromagnetic compatibility. Measurement of the quality of supply. The Spanish electricity market. Contracting of the electricity supply. Measurement and billing of electric power. Claims. Connection systems for the neutral and the earth ground. Electrotechnical regulations. NOTE: The annexes are not subject of examination.

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A1 B15	9	18	27
Laboratory practice	B9 B13	12	6	18
Supervised projects	B9 C1	0	12	12
Objective test	B9 B13	3	12	15
Personalized attention		3	0	3
(*)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	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.
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.
Objective test	Proof of evaluation where the student will have to show his degree of learning of an objective way.

Personalized attention	
Methodologies	Description

Laboratory practice Supervised projects Objective test	Tutorials.

Assessment			
Methodologies	Competencies / Results	Description	Qualification
Laboratory practice	B9 B13	The practical are compulsory, and is necessary to have them realised to be able to surpass the asignatura. The practices represent 10% 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.	10
Supervised projects	B9 C1	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. The works tutelados, are 50% 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.	50
Objective test	B9 B13	In the dates fixed officially by the centre, realised this final proof. The proof can alternate ask type problem or theoretical questions, and represents 40% of the final note of the matter.	40

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

Sources of information	
Basic	- (). . Real Decreto 1955/2000, de 1 de diciembre, por el que se regulan las actividades de transporte, distribución, comercialización, suministro y procedimientos de autorización de instalaciones de energía eléctrica. (BOE nº 310, de 27 de diciembre de 2000).Orden ECO/797/2002, de 22 de marzo, por la que se aprueba el procedimiento de medida y control de la continuidad del suministro eléctrico. (BOE nº 89, de 13 de abril de 2002).Norma UNE-EN 50160: 2011, Características de la tensión suministrada por las redes generales de distribución.Norma UNE-EN 61000-4-30: 2015, Compatibilidad Electromagnética (CEM). Parte 4-30: Técnicas de ensayo y de medida. Métodos de medida de la calidad del suministro.
Complementary	

Recommendations
Subjects that it is recommended to have taken before
Efficiency of Electric Systems/770523013
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
Other comments

<p>Prior knowledge of circuit analysis in DC, AC and three-phase circuits as well as symmetrical components is required.</p><p>In another order of things, to help achieve a sustained immediate environment and meet the goal of action number 5: "Healthy and sustainable environmental and social teaching and research" of the "Green Campus Ferrol Action Plan":</p><p>   The delivery of the documentary works that are made in this matter:</p><p>   ? Will be requested in virtual format and / or computer support</p><p>   ? It will be done through Moodle, in digital format without the need to print them</p><p>   ? If it is necessary to make them on paper:</p><p>   - Plastics will not be used</p><p>   - Double-sided prints will be made.</p><p>   - Recycled paper will be used.</p><p>   - Printing of drafts will be avoided.</p><p>? There must be a sustainable use of resources and the prevention of negative impacts on the natural environment.</p>