UNIVERSIDADE DA CORUÑA

Teaching Guide					
Identifying Data					2019/20
Subject (*)	Electrical engineering			Code	730G05014
Study programme	Grao en Enxeñaría Naval e Oceánica				
Descriptors					
Cycle	Period	Year		Type	Credits
Graduate	1st four-month period	Second		Obligatory	6
Language	Spanish				
Teaching method	Face-to-face				
Prerequisites					
Department	Enxeñaría Industrial				
Coordinador	Menacho Garcia, Carlos Miguel		E-mail	miguel.menacho@udc.es	
Lecturers	Menacho Garcia, Carlos Miguel Vazquez Rodriguez, Santiago		E-mail	miguel.menacho@udc.es santiago.vazquez@udc.es	
Web	moodle.udc.es				
General description	In this course, the analysis of electrical circuits and a brief introduction to the operation of electric machines is studied.				

Study programme competences	
Code	Study programme competences
A9	Knowledge of the theory of circuits and of the characteristics of you hatch them electrical and ability to carry out calculations of systems that these elements take part in.
B2	That the students know how to apply its knowledge to its work or vocation in a professional way and possess the competences that tend to prove itself by the elaboration and defense of arguments and the resolution of problems in its area of study
B3	That the students have the ability to bring together and to interpret relevant data (normally in its area of study) to emit judgments that include a reflection on relevant subjects of social, scientific or ethical kind
B4	That the students can transmit information, ideas, problems and solutions to a public as much specialized as not specialized
B5	That the students developed those skills of learning necessary to start subsequent studies with a high degree of autonomy
B6	Be able to carrying out a critical analysis, evaluation and synthesis of new and complex ideas.
C1	Using the basic tools of the technologies of the information and the communications (TIC) necessary for the exercise of its profession and for the learning throughout its life.
C2	Coming across for the exercise of a, cultivated open citizenship, awkward, democratic and supportive criticism, capable of analyzing the reality, diagnosing problems, formulating and implanting solutions based on the knowledge and orientated to the common good.
C3	Understanding the importance of the enterprising culture and knowing the means within reach of the enterprising people.
C4	Recognizing critically the knowledge, the technology and the available information to solve the problems that they must face.
C5	Assuming the importance of the learning as professional and as citizen throughout the life.

Learning outcomes			
Learning outcomes	Study programme competences		
Apply Ohm's law and Kirchhoff's laws. Use correct general methods of analysis of DC circuits. Analyze any direct current circuit using the most appropriate method.	A9	B2 B3 B4 B5 B6	C1 C2 C3 C4 C5
Interpret and differentiate between different types of AC power. Use correctly general methods of analysis of alternating current circuits. Analyzing any AC circuit using the most appropriate method.	A9	B2 B3 B4 B5 B6	C1 C2 C3 C4 C5

To analyze the operation of the three-phase balanced and unbalanced circuits. Interpret, differentiate and measure various types of power present in three-phase circuits.	A9	B2 B3 B4 B5 B6	C1 C2 C3 C4 C5

Contents	
Topic	**Sub-topic**
Analysis of DC circuits	Basics Circuit elements Association of elements Waveforms Mesh analysis Nodal analysis Circuit Theorems
Analysis of AC circuits	Basics Analysis of circuits in sinusoidal steady state Power and energy steady state sinusoidal Theorems steady state sinusoidal
Analysis three-phase circuits	Overview Balanced and unbalanced three-phase circuits Power in three-phase circuits Measurement of power in three-phase circuits
Circuit analysis transient	Basics First order circuits Second order circuits Laplace Transform
Introduction to the operation of electric machines	Magnetic circuits and energy conversion General principles of electrical machines

Planning				
Methodologies / tests	**Competencies**	**Ordinary class hours**	**Student?s personal work hours**	**Total hours**
Introductory activities	A9 C5	1.5	2.5	4
Guest lecture / keynote speech	A9 B2 B3 B4 B5 B6 C1 C2 C3 C4 C5	30	30	60
Problem solving	A9 B2 B3 B4 B5 B6 C1 C2 C3 C4 C5	30	30	60
Laboratory practice	A9 B2 B3 B4 B5 B6 C1 C2 C3 C4 C5	10	10	20
Mixed objective/subjective test	A9 B2	2.5	2.5	5
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**
Introductory activities	Presentation of the subject, in large group (GG).

Guest lecture / keynote speech	Oral presentation complemented the use of media and the introduction of questions aimed at motivating students, in order to impart knowledge and facilitate learning. Corresponds to the kind of theory, large group (GG).
Problem solving	Technique by to be solved a particular problem situation, from the knowledge and procedures that have been studied and worked. Corresponds to the class of problems, medium group (GM).
Laboratory practice	Methodology that allows students to apply the knowledge acquired through the completion of practical activities. It is for the workshop exercises, small group (GP).
Mixed objective/subjective test	Esta proba consiste na resolución de problemas e/ou ítems.

Personalized attention	
Methodologies	**Description**
	Tutorials review. In the case of part-time students, they will have exam sessions before each continuous assessment exam. In addition, they will be given a collection of objective tests and problems to solve throughout the course.

Assessment			
Methodologies	**Competencies**	**Description**	**Qualification**
Mixed objective/subjective test	A9 B2	Esta proba consiste na resolución de problemas e / ou elementos, e será valorada entre 10 puntos. En prácticas de laboratorio: No exame de xaneiro, a nota será a suma da nota correspondente á asistencia e avaliación das prácticas do taller, que se avaliará entre 0 e 5 puntos, ea nota do exame final (proba mixta), que tamén será avaliada. entre 0 e 5 puntos. . Na sesión de xullo, a nota coincidirá co correspondente exame final (proba mixta), que se valorará entre 0 e 10 puntos.	70
Laboratory practice	A9 B2 B3 B4 B5 B6 C1 C2 C3 C4 C5	The qualification will be the sum of the corresponding note to the assistance and evaluation of the practices of workshop, that will value between 0 and 5 points.	30

Assessment comments
To pass the subject it is necessary to approve the part of theory and problems and the part of laboratory practices. The subject will also be approved if it reaches a mark of more than or equal to 3'5 points in the note of laboratory practices, compensate with the part of theory and problems. The final grade is the sum of the (theory and problems note) * 0'80 and the (laboratory practice note) * 0'20. In the presentation of the subject (first day of class) may indicate additional activities whose assessment will add to the note of the objective test of the part of theory and problems. In any case, the note of this part can not be more than 10 points. In the case of part-time students, a periodic and continuous evaluation will be made, with objective tests and problems, after imparting each topic of the subject. At the second opportunity, all subjects will enter the exam. Attendance at theory and problem classes is not mandatory (100% waiver), although you will be offered full flexibility to assist the group of your choice; however, attendance at the workshop practice class is necessarily mandatory (0% waiver), although you will also be offered full assistance flexibility.

Sources of information	
Basic	- Fraile Mora, J. (2012). Circuitos eléctricos. Madrid: Pearson - Alexander, C.K. y Sadiku, M.N.O. (2013). Fundamentos de circuitos eléctricos. Méjico: McGraw-Hill - Parra, V. et al. (1976). Unidades didácticas de teoría de circuitos (2 vols.). Madrid: UNED - Fraile Mora, J. (2008). Máquinas eléctricas. Madrid: McGraw-Hill - Eguiluz Morán, L.I. (1986). Pruebas objetivas de ingeniería eléctrica. Madrid: Alhambra - Eguiluz Morán, L.I. et al. (2001). Pruebas objetivas de circuitos eléctricos. Barañáin (Navarra): EUNSA - Eguiluz Morán, L.I. y Sánchez Barrios, P. (1989). Pruebas de examen de teoría de circuitos. Santander: Universidad de Cantabria - Sánchez Barrios, P. et al. (2007). Teoría de circuitos: problemas y pruebas objetivas orientadas al aprendizaje.. Madrid: Pearson/Prentice Hall - Humet, L., Alabern, X. y García, A. (1997). Tests de Electrotecnia. Fundamentos de circuitos. Barcelona: Marcombo - Paul, C.R. (2001). Fundamentals of electric circuits analysis. USA: John Willey and Sons
Complementary	

Recommendations
Subjects that it is recommended to have taken before
Calculus /730G03001 Linear Algebra/730G03006 Physics II/730G03009
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
Fundamentals of Electronic Circuits/730G03016 Installations for Industrial Plants/730G03031
Other comments
"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":   The delivery of the documentary works that are made in this matter: ? Will be requested in virtual format and / or computer support   ? It will be done through Moodle, in digital format without the need to print them   ? If it is necessary to make them on paper: - Plastics will not be used   - Double-sided prints will be made.   - Recycled paper will be used.   - Printing of drafts will be avoided.? There must be a sustainable use of resources and the prevention of negative impacts on the natural environment.