



## IDENTIFYING DATA

### Electrical engineering

Subject	Electrical engineering			
Code	O01G281V01602			
Study programme	Grado en Ingeniería Agraria			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	3rd	2nd
Teaching language	Spanish			
Department				
Coordinator	Albo López, Ana Belén			
Lecturers	Albo López, Ana Belén			
E-mail	aalbo@uvigo.es			
Web				
General description	(*)Os obxectivos que se perseguen con esta materia son: - Adquisición dos coñecementos referidos a símbolos, magnitudes, principios, elementos básicos e leis da electricidade. - Coñecemento de técnicas e métodos de análise de circuitos con excitación continua e en réxime estacionario senoidal. - Descrición de sistemas trifásicos. - Coñecemento dos principios de funcionamento e características das distintas máquinas eléctricas. - Coñecementos básicos de instalacións e sistemas eléctricos.			

## Training and Learning Results

Code	
A3	Students will be able to gather and interpret relevant data (normally within their field of study) that will allow them to have a reflection-based considered opinion on important issues of social, scientific and ethical nature.
A4	Students will be able to present information, ideas, problems and solutions both to specialist and non-specialist audiences.
B1	Students will be able to develop analysis, synthesis and information-management skills for application in the agricultural, food and environmental sectors.
B2	Students will acquire and apply teamwork abilities and skills.
C17	Ability to understand and use the principles of engineering of rural environment: electrotechnics.
D2	Analysis, organization and planning skills.
D3	Oral and written communication skills in local and foreign languages.
D4	Independent-learning and information-management skills.
D5	Problem-solving and decision-making skills.
D8	Interdisciplinary teamwork skills.

## Expected results from this subject

Expected results from this subject	Training and Learning Results			
Capacity to analyse electrical circuits and its application in the resolution of real problems in the rural environment. RA1	A3	B1 B2	C17	D2 D4 D5 D8
Basic knowledge of electrical machines and their utilization in the agricultural engineering. RA2	A3 A4	B1 B2	C17	D2 D3 D4 D5 D8

Capacity to design and calculate basic electrical installations in the agricultural engineering. RA3 A3 B1 C17 D2  
A4 B2 D4  
D5  
D8

## Contents

Topic	
Subject I: Introduction and axioms.	Load, current, electrical potential, energy and electrical power, law of Ohm, law of Joule and laws of Kirchoff. Ideal elements: Sources, resistance, coil, condenser and transformer. Real elements: Sources, resistance, coil and condenser.
Subject II: Continuous current circuits.	Analysis of electrical circuits of continuous current. Association of elements in series and parallel, star and triangle.
Subject III: Alternating current circuits: single-phase.	Characteristic values of the sine functions. Concept of phasor. Behaviour of the elements in alternating current. Combinations of elements. Powers: complex, apparent, active, reactive. Theorem of Boucherot.
Subject IV: Alternating current circuits: three-phases	Values of line and phase. Reduction to the equivalent single-phase circuit.
Subject V: Electrical machines.	Transformers: constitution, operation in empty and in load, equivalent circuit, time index. Asynchronous machines: constitution, generation of the rotating field, in no-load operation and in load, equivalent circuit, characteristic curves, manuevers.
Subject VI: Electrical installations.	Introduction to the electrical power systems. Low-voltage electrical installations. Constitutive elements. Workload Estimate. Introduction to the installation calculation

## Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	28	56	84
Autonomous problem solving	0	20	20
Problem solving	6	18	24
Laboratory practical	8	0	8
Report of practices, practicum and external practices	0	3	3
Essay questions exam	0	2	2
Essay questions exam	0	1	1
Essay	0	8	8

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

## Methodologies

	Description
Lecturing	The teacher will present the contents of the subject in large group classes. Themes will be exposed with the help of presentation and detailed explanations on the blackboard. Student will handle bibliographic sources, looking for information not provided in class to encourage the autonomous learning.
Autonomous problem solving	It is highly recommended that the student try to solve on their own exercises and questions of the subject proposed by the teachers.
Problem solving	Problems and standard exercises will be exposed and solved in the classroom classes as a guide for the students.
Laboratory practical	Practical assemblies corresponding to the contents seen in the classroom will be made in the laboratory, or complementary aspects not treated in the theoretical classes will be treated.

## Personalized assistance

Methodologies	Description
Lecturing	The professor will personally attend the doubts and queries of the students.
Problem solving	The professor will personally attend the doubts and queries of the students.
Autonomous problem solving	The student will be able to attend tutorials to resolve any question related to the proposed problems.
Laboratory practical	The professor will personally attend the doubts and queries of the students.
Tests	Description
Report of practices, practicum and external practices	The student will be able to attend tutorials to resolve any question related to the report of practices.

<b>Assessment</b>						
	Description	Qualification	Training and Learning Results			
Report of practices, practicum and external practices	<p>The fulfillment of the practices and the resolution of a questionnaire regarding the assembly, results obtained and interpretation of the same, will be valued positively.</p> <p>The fulfillment of each practice and presentation of the internship report will value between 0 and 10 points. For that it is essential to attend the practice the day and time set at the beginning of the course. There will be no recovery of practices.</p> <p>The evaluation of the set of practices is the arithmetic mean of the obtained scores.</p> <p>Not attending a practice is associated with a score of zero points in practice, regardless of whether the student submits the corresponding report.</p> <p>The deadline for the presentation of each practice will be established once it has been made.</p> <p>The planned practices are as follows:                      Practice 1: Laboratory Safety Standards.                      Practice 2: Direct Current.                      Practice 3: Alternating Current.                      Practice 4: Electrical Machines.</p> <p>Expected learning outcomes: RA1-RA2-RA3</p>	20	A3 A4	B1 B2	C17	D2 D3 D4 D5 D8
Essay questions exam	<p>There will be a general examination with two sections, one corresponding to the contents of circuit theory and the other corresponding to machines and electrical installations, which may include both theoretical and application exercises.</p> <p>Each section will be valued from 0 to 10 points. The final qualification of this examination will be calculated using the arithmetic mean of both sections, although a minimum of a 3 in each of the parts will be required to overcome the matter.</p> <p>At the request of the students and with the approval of the Direction, a partial examination corresponding to the Theory of Circuits part (Topics I to IV of the section of Contents), might take place out of the usual matter hours.</p> <p>To pass this partial exam, the grade obtained will be equal or higher than 5 points out of 10, and they will have two options to introduce themselves to final exam:</p> <ul style="list-style-type: none"> <li>- Only the second section: electrical machines and installations (Topic V and VI of the section of Contents). In this case the partial exam qualification will be retained.</li> <li>- Doing the complete exam (two sections), if wanting to improve the grade in the first section. In this case, the score will correspond to the obtained in each of the sections of the complete examination, not keeping the partial exam qualification.</li> </ul> <p>In case the partial examination is not carried out or the student does not pass it, directly apply paragraphs 1 and 2 of this same section (examination general).</p> <p>Expected learning outcomes: RA1-RA2-RA3</p>	35	A3 A4	B1	C17	D2 D4 D5
Essay questions exam	<p>(*)- Segundo examen: el día del examen final, correspondiente a los contenidos de máquinas e instalaciones eléctricas (Parte II).                      Se valorará de 0 a 10 puntos.                      Resultados de aprendizaje esperados: RA1-RA2-RA3</p>	35	A3 A4	B1	C17	D2 D4 D5
Essay	<p>(*)El estudiante deberá realizar un trabajo a lo largo del curso sobre "Instalaciones Eléctricas".                      Resultados de aprendizaje esperados: RA1-RA2-RA3</p>	10	A3	B1	C17	D2 D4 D5

**Other comments on the Evaluation**

**Sources of information**

**Basic Bibliography**

V. M. Parra, A. Pérez, A. Pastor, J. Ortega, **Teoría de Circuitos Vol. I y II**, Universidad Nacional de Educación a Distancia, 2003

A. Colmenar, J.L. Hernández, **Instalaciones Eléctricas en Baja Tensión. Diseño, cálculo, dirección, seguridad y montaje**, 2ª, Universidad Nacional de Educación a Distancia, 2012

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Suarez Creo J. y Miranda Blanco B.N, **Máquinas Eléctricas. Funcionamiento en régimen permanente**, 84-8408-392-6, 4ª, Editorial Tórculo, 2006

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Luis Luna Sánchez y otros, **Instalaciones eléctricas de baja tensión en el sector agrario y agroalimentario**, 978-84-8476-324-6, Ediciones Mundi- Prensa, 2008

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#### **Complementary Bibliography**

Jesús Fraile Mora, **Circuitos eléctricos**, Prentice Hall, 2015

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#### **Recommendations**

##### **Subjects that continue the syllabus**

Engineering projects/O01G281V01701

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##### **Subjects that it is recommended to have taken before**

Physics: Overview of physics/O01G281V01202

Physics: Physics/O01G281V01102

Mathematics: Overview of mathematics/O01G281V01204

Mathematics: Mathematics/O01G281V01103

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