



## Teaching Guide

Teaching Guide				
Identifying Data				2023/24
Subject (*)	Electric Mobility		Code	730547010
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	Chouza Gestoso, Jesus Diego		E-mail	jesus.chouza@udc.es
Lecturers	Chouza Gestoso, Jesus Diego		E-mail	jesus.chouza@udc.es
Web	cas-saml.udc.es/login?service=https%3A%2F%2Fcampusvirtual.udc.gal%2Flogin%2Findex.php			
General description	The different drive systems used in electric mobility are studied, identifying the advantages and analyzing the necessary control systems.			
	The characteristics and operation of the different types of machines used in electric vehicle are studied.			

## Study programme competences

Code	Study programme competences
A1	CE1 - Apply methodologies and regulations for efficient energy management
A2	CE2 - Analyze and implement energy saving and efficiency measures in the industrial, tertiary and residential sectors
A5	CE5 - Analyze energy consumption and its associated costs
A13	CE13 - Analyze, apply and optimize energy use systems
A15	CE15 - Develop a project in the scope of the master
A16	CE16 - Search, analyze, identify and apply new sources of electrical energy or new electricity management techniques under criteria such as efficiency, sustainability or cooperation, as well as the use of these on new applications
B9	CG4 - Extract, interpret and process information, from different sources, for use in the study and analysis
B11	CG6 - Acquire new knowledge and skills related to the professional field of the master's degree
B12	CG7 - Critically analyze your own internship experience
B13	CG8 - Apply theoretical knowledge to practice
B16	CG11 - Evaluate the application of emerging technologies in the field of energy and the environment
B17	CG12 - Develop the ability to advise and guide on the best way or channel to optimize energy resources in relation to renewable energies
B18	CG13 - Pose and solve problems, interpret a set of data and analyze the results obtained; in the field of energy efficiency and sustainability
C2	CT2 - Master the oral and written expression and comprehension of a foreign language
C4	CT4 - Develop for the exercise of a respectful citizenship with the democratic culture, human rights and the gender perspective
C5	CT5 - Understand the importance of entrepreneurial culture and know the means available to entrepreneurs

## Learning outcomes

Learning outcomes	Study programme competences		
Know the different types of electric vehicles	AC1	BC9	CC2
	AC5	BC11	CC4
	AC16	BC12	CC5
		BC13	
		BC16	



Understand and know how to apply systems approaches to problems related to electric vehicles	AC2 AC5	BC12 BC13 BC17 BC18	CC2 CC4 CC5
Analyze and know how to design electric traction/propulsion systems	AC1 AC13 AC16	BC9 BC12	CC4 CC5
Understand the needs of users in the selection of electric traction/propulsion systems	AC2 AC5 AC15 AC16	BC9 BC11 BC12 BC13 BC18	
Know the different processes, products and equipment related to the design of electric traction/propulsion systems	AC1 AC2 AC5 AC16	BC9 BC11 BC12 BC13 BC16 BC17 BC18	CC2 CC4 CC5

Contents	
Topic	Sub-topic
Introduction to electric mobility. Energy needs, efficiency, advantages and disadvantages	Analysis of the different types of vehicles: self-recharging hybrids, plug-in hybrids and pure electric.
Different traction systems, analysis, advantages and disadvantages	-Induction motors. -Synchronous motors. -Permanent magnet synchronous motors. -Synchronous motors with permanent magnets and magnetic reluctance.

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student's personal work hours	Total hours
Guest lecture / keynote speech	A1 A2 A5 A13 A15 A16 B9 B11 B12 B13 B16 B17 B18 C2 C4 C5	9	20	29
Laboratory practice	B9 B11 B12 B13 B18	6	2	8
Problem solving	A1 A5 A13 A15 A16 B9 B11 B12 B13 B16 B17 B18 C5	12	8	20
Practical test:	A1 A2 A5 A13 A15 A16 B9 B11 B12 B13 B16 B17 B18 C2	4	12	16
Personalized attention		2	0	2

(\*)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 the fundamental concepts of the subject will be explained, through an oral presentation, complemented with audiovisual and multimedia media to facilitate learning.



Laboratory practice	In the electrical laboratory. They will consist of justifying and analyzing the most relevant modes of behavior of electrical machines.
Problem solving	The most relevant problems are explained and solved in a systematic way, analyzing the difficulties that may arise, solving doubts in order to provide the student with the necessary resources for their subsequent resolution in an autonomous way.
Practical test:	It allows the evaluation of the work, skills and abilities acquired by the students, promoting their autonomous work

Personalized attention	
Methodologies	Description
Laboratory practice Problem solving	They are very small groups and it is possible to track the work done. Analyze the fundamental points and defend the proposals adopted.

Assessment			
Methodologies	Competencies	Description	Qualification
Laboratory practice	B9 B11 B12 B13 B18	They will consist of justifying and analyzing the most relevant modes of behavior of electrical machines.	10
Problem solving	A1 A5 A13 A15 A16 B9 B11 B12 B13 B16 B17 B18 C5	The student must solve and analyze with critical thinking, identifying the needs and looking for the correct solutions, integrating the concepts acquired in the subject, the different proposed problems.	60
Practical test:	A1 A2 A5 A13 A15 A16 B9 B11 B12 B13 B16 B17 B18 C2	It consists of the resolution of different proposals by the teacher or the student, where they must demonstrate their skills, competencies and knowledge acquired.	30

Assessment comments
It will be carried out in the official calls. However, throughout the course, a personalized follow-up will be carried out, assessing the degree of achievement of the objectives by the students. Class attendance is recommended, so that it is possible to monitor the achievement of the objectives.- The evaluation criteria will be the same for the 1st and 2nd opportunity and the extraordinary calls. similar tests.- The fraudulent performance of the tests or evaluation activities, once verified, will directly imply the qualification of suspense in the call in which it is committed: the student will be qualified with "suspense" (numerical note 0) in the corresponding call of the academic year, whether the commission of the offense occurs on the first opportunity or on the second. For this, their qualification will be modified in the first opportunity certificate, if necessary.

Sources of information	
<b>Basic</b>	<ul style="list-style-type: none"> <li>- KRAUSE, P.C. ; WASYNCZUK, O.; SUDHOFF, S.D. (March 5th 2002). Analysis of Electric Machinery and Drive Systems. Wiley-IEEE Press. Piscataway. N.J</li> <li>- KRISHNAN, R. (2001). Electric Motor Drives Modeling, Analysis, And Control. Prentice Hall. Pearson Education. Upper Saddle River. N.J.</li> <li>- Mohamed El-Sharkawi (2018). Fundamentals of Electric Drives. CL Engineering</li> <li>- El-Sharkawi, Mohamed (2017). Wind Energy: An Introduction. Editorial: CRC Press</li> <li>- (). .</li> </ul>
<b>Complementary</b>	

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.