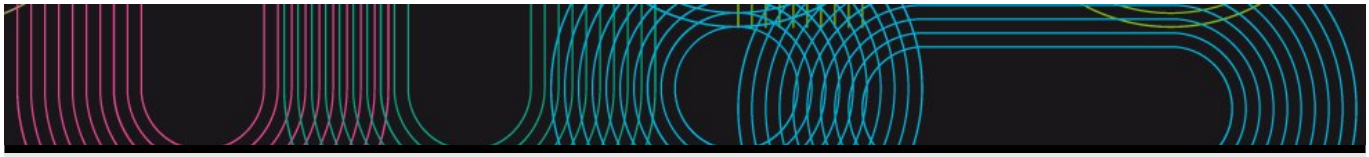

IDENTIFYING DATA				
Power lines and electric energy transmission				
Subject	Power lines and electric energy transmission			
Code	V12G320V01703			
Study programme	Grado en Ingeniería Eléctrica			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	4th	1st
Teaching language	Spanish			
Department				
Coordinator	Fernández Otero, Antonio			
Lecturers	Fernández Otero, Antonio			
E-mail	afotero@uvigo.es			
Web	http://moovi.uvigo.gal/			
General description	(*)O obxectivo desta materia é proporcionar ao alumno os coñecementos necesarios para ser capaz de planificar, xestionar, deseñar e calcular as instalacións eléctricas de alta tensión que constitúen a estrutura básica das redes de transporte e distribución da enerxía eléctrica. Nunha primeira parte da materia, desenvólvese o cálculo e deseño das devanditas instalacións de alta tensión, empezando polas liñas eléctricas de alta tensión, tanto aéreas como subterráneas para a continuación, abordar a descrición das instalacións de transformación e/ou *interconexión coñecidas como subestacións eléctricas. Unha segunda parte do programa dedícase á análise das redes eléctricas de alta tensión en condicións de falta e a tratar os conceptos básicos de coordinación de illamento ligados cos problemas de *sobretensiones que se producen neste tipo de sistemas. Finalmente, nun último tema introdúcense os aspectos básicos do transporte da enerxía eléctrica mediante sistemas de corrente continua.			

Training and Learning Results	
Code	
B3	CG3 Knowledge in basic and technological subjects that will enable students to learn new methods and theories, and provide them the versatility to adapt to new situations.
C23	CE23 Ability to calculate and design of power lines and electricity transmission.
D1	CT1 Analysis and synthesis.
D2	CT2 Problems resolution.
D6	CT6 Application of computer science in the field of study.
D10	CT10 Self learning and work.
D16	CT16 Critical thinking.
D17	CT17 Working as a team.

Expected results from this subject	Training and Learning Results		
New	B3	C23	D1 D2 D6 D10 D16 D17
New	B3	C23	D1 D2 D6 D10 D16 D17

Contents	
Topic	
1. Introduction to the electric power systems	1) Structure and description of an electric power system b) Models of the fundamental elements of an electric power system -Electric lines, transformers, generators, motor and generic loads
2. Analysis of faults in electric systems	a) Balanced faults b) Unbalanced faults - symmetrical Components - sequence networks
3. High Voltage electric lines	a) Electrical models of lines - Parameters - Equivalent Circuits - Steady-state - Transient state b) Mechanical calculation of overhead lines - Conductors - Supports - Insulators
4. Overvoltages and insulation coordination	a) Types of overvoltages b) Insulations coordination c) Overvoltage protection devices
5. Substations	a) Configuration types b) Substation components c) Grounding systems in high voltage installations

Planning	Class hours	Hours outside the classroom	Total hours
Lecturing	18	36	54
Problem solving	12.5	25	37.5
Practices through ICT	18	36	54
Essay questions exam	4.5	0	4.5

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

Methodologies	Description
Lecturing	Exhibition by part of the professor of the theoretical concepts of each subject to all the group in the schedule of classroom established by the centre. It will boost the active participation of the students in shape of questions and answers in both senses.
Problem solving	Approach and resolution by part of the professor of exercises basic type of practical application of the theoretical contents previously developed.
Practices through ICT	They will propose practical cases of greater dimension and complexity like application of the contents of the subject and that they have to be resolved by the students in the computer classroom with the utilisation of tools of commercial software and/or of own development. This type of exercises usually are posed and initiated in the computer classroom and finalised by the student of autonomous form. They will be delivered before the following practical.

Personalized assistance	
Methodologies	**Description**
Problem solving	It will resolve any question or doubt that arise him to the student of personalised form in the schedule of *tutorías established, in the dispatch of the professor. Also they will attend the queries of punctual type via email.
Practices through ICT	It will resolve any question or doubt that arise him to the student of personalised form in the schedule of *tutorías established, in the dispatch of the professor. Also they will attend the queries of punctual type via email.

Assessment			
	Description	Qualification	Training and Learning Results

Problem solving	Examination during the *cuatirmestre of theoretical type-practical with short questions and resolution of exercises of application of the concepts of the matter. Minimum note of 3.5 on 10 in this part to approve the matter.	40	B3	C23	D1 D2 D6 D10 D16 D17
Practices through ICT	It will evaluate the correct resolution and delivery in time and form of a work of practical type proposed and developed like application of the classes of problems and of practices. Minimum note of 3.5 on 10 in this part to approve the matter.	20			
Essay questions exam	Examination at the end of the *cuatrimestre of theoretical type-practical with short questions and resolution of exercises of application of the concepts of the matter. Minimum note of 3.5 on 10 in this part to approve the matter.	40	B3	C23	D1 D2 D6 D10 D16 D17

Other comments on the Evaluation

The *evaluaciÃ*n continuous in first opportunity consists of the 3 proofs mentioned.

The *evaluaciÃ*n continuous in second opportunity stateÃ of an examination of type youÃrich-*prÃ*ctico with short questions and *resoluciÃ*n of exercises of *aplicaciÃ*n of the concepts of the matter with a value of 100% of the note.

The *evaluaciÃ*n global for the students that renounce to the *evaluaciÃ*n continuous makes by means of an examination of all the matter of type youÃrich-*prÃ*ctico with short questions and *resoluciÃ*n of exercises of *aplicaciÃ*n of the concepts of the matter with a value of 100% of the note.

Commitment Ã*tico:&**nbsp;it expects that the present student a behaviour Ã*tico suitable. In the case to detect a behaviour no Ã*tico (copy, plagiarism, *utilizaciÃ*n of devices *electrÃ*nicos unauthorised, and others) considerÃ that the student no *reÃ*ne the necessary requirements to surpass the matter. In this case the *calificaciÃ*n global in the present course *acadÃ*mico beÃ of suspense (0.0).

No allowÃ the *utilizaciÃ*n of *ningÃ*n device *electrÃ*nico during the proofs of *evaluaciÃ*n except *autorizaciÃ*n expresses. The fact to enter a device *electrÃ*nico *nn authorised in the classroom of examination beÃ considered reason of no *superaciÃ*n of the matter in the present course *acadÃ*mico and the *calificaciÃ*n global beÃ of suspense (0.0)

Sources of information

Basic Bibliography

Pascual Simón Comín y otros, **Cálculo y Diseño de Líneas Eléctricas de Alta Tensión**, Garceta,

A. G. Exposito, **Análisis y Operación de Sistemas de Energía Eléctrica**, McGraw Hill,

J. Moreno Mohino y otros, **Reglamento de Líneas de Alta Tensión y sus fundamentos**, Paraninfo,

J. A. Martínez Velasco, **Coordinación de aislamiento en redes eléctricas de alta tensión**, McGraw Hill,

Complementary Bibliography

Recommendations

Subjects that continue the syllabus

Electric power systems/V12G320V01802

Subjects that it is recommended to have taken before

Electrical engineering/V12G320V01401
Basics of circuit analysis and electrical machines/V12G320V01304
Electrical machines/V12G320V01504