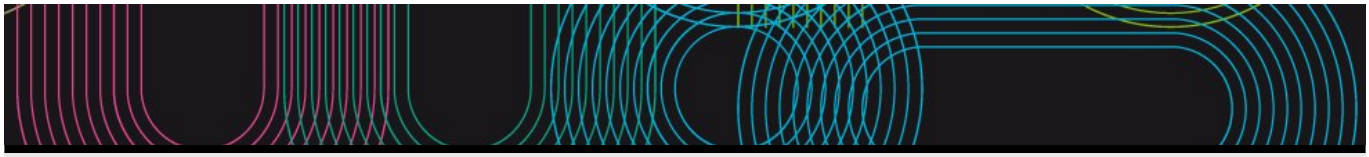

IDENTIFYING DATA				
Electrical energy management				
Subject	Electrical energy management			
Code	V09G290V01707			
Study programme	Degree in Energy Engineering			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	9	Optional	4th	1st
Teaching language	Spanish Galician English			
Department				
Coordinator	Villanueva Torres, Daniel			
Lecturers	Parajo Calvo, Bernardo José Villanueva Torres, Daniel			
E-mail	dvillanueva@uvigo.es			
Web	http://faitic.uvigo.es			
General description	Electrical Energy Management			

Competencies	
Code	
C45	Op8 Capacity to manage energy installation audits.
C48	Op11 Capacity to analyze the economics of electrical energy production system operations. Knowledge of the electrical energy market.
C49	Op12 Knowledge of regulations concerning energy efficiency and capacity to apply them.
D1	Capacity to interrelate all the acquired knowledge and interpret it as components in a body of knowledge with a clear structure and strong internal coherence
D2	Capacity to develop a complete project in any field included in this type of engineering, suitably combining acquired knowledge, accessing necessary information sources, undertaking the necessary enquiries and integrating into inter-disciplinary work teams.
D3	Propose and develop practical solutions, which develop suitable strategies based on theoretical knowledge, for problem phenomena and situations that arise as everyday realities in engineering
D5	Know what sources are available for ongoing and continual updating of all the information required to undertake their work, with access to all the current and future tools for seeking information and adapting it in the light of technological and social changes
D6	Know and handle legislation applicable to the sector, know the social and business environment and know how to work together with the Administration and use acquired knowledge to draw up engineering projects and develop any of the aspects of professional work required
D7	Capacity to organise, interpret, assimilate, create and manage all the information needed to organise their work, handling the I.T., mathematical, physical and other tools required
D8	Conceive engineering within a framework of sustainable development with an awareness of environmental issues
D9	Know the importance of the security aspects and be able to transmit this information to the stakeholders.
D10	Become aware of the need for training and continual improvement in quality, developing the values associated with scientific thinking and showing a flexible, open and ethical attitude towards diverse opinions and situations, particularly in matters of non-discrimination on the grounds of gender, race or religion, respect for fundamental rights, accessibility, etc

Learning outcomes	
Expected results from this subject	Training and Learning Results

To know how the electrical market works	C48	D1 D3 D5 D6 D7 D9 D10
To master the current techniques for energetic analisys (buy/sale) on the electrical market	C48	D1 D3 D5 D6 D7
To know the regulations related to the quality of the electrical supply	C48	D1 D3 D5 D6 D7 D9
To know the methodology and outcomes of a energetic audit	C45	D1 D2 D3 D5 D6 D7 D8 D9 D10
To know the procedures for energetic management in the industrial environment	C49	D1 D2 D3 D5 D6 D7 D8

Contents	
Topic	
OPERATION OF THE ELECTRICAL POWER SYSTEMS.	States of the electrical system. Analysis of contingencies. Analysis of contingencies based in Load Flow.
OPTIMUM OPERATION OF THE GENERATION.	Economic dispatch of units of generation. Time programming and hydrothermal coordination
OPERATION OF THE ELECTRICAL MARKETS.	Operation of the electrical market. Subjects of the market. Match procedures. Analysis of options of purchase of energy.
QUALITY OF THE ELECTRICAL PROVISION	Reliability. Index of quality of electricla provision. Standards.
ENERGY AUDIT: METHODOLOGY AND RESULTS	Basic concepts: luminotechnics, quality of wave, design installations. Energetic efficiency in the installations: Illumination, photovoltaic solar contribution. Standards.
SYSTEMS OF MANAGEMENT OF ELECTRICAL ENERGY. INDUSTRIAL AND TERTIARY STATES.	Contribution to the energy efficiency of the systems of management. Energy performance concept. Standards.

Planning			
	Class hours	Hours outside the classroom	Total hours
Lecturing	25	50	75
Problem solving	10	10	20
Autonomous problem solving	0	29.4	29.4
Seminars	3.8	3.8	7.6
Practices through ICT	37.5	37.5	75
Essay	0	8	8
Essay questions exam	2	8	10

*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 expose the content of the matter.
Problem solving	The teacher will carry out exercises and problems of the contents of the matter, and the students will do problems and exercises of the same type.
Autonomous problem solving	The student will have to solve several exercises and problems proposed
Seminars	Some problems and specific practical exercises will be performed considering computer support, research of information, use of programs of calculation, ...
Practices through ICT	Problems and practical exercises will be performed considering computer support, research of information, use of programs of calculation, ...

Personalized assistance	
Methodologies	**Description**
Practices through ICT	For all the modalities of teaching, the sessions of tutorials would be made by telematic means (email, videoconference, forums of FAITIC, ...) By means of previous concertation. The realisation of the practices will be individual, with the help of the teachers when the student needs it and this can be performed during the hours of practices, during the tutorials and/or through email.
Seminars	The seminars will consist of the realisation of practices in small groups, in such a way that the attention by part of the teachers can be higher. The teachers will try, during them, that the students can solve more general doubts, concepts or base-knowledge issues, in case they exist.

Assessment				
	Description	Qualification	Training and Learning	Results
Practices through ICT	Delivery of the summary of the process developed during the practices. Learning outcomes: -Know the electrical market working. -Catch up the current techniques to analyze the buy/sell bids in the electrical market. -Know the standards and the concepts related to the quality of the electrical supply. -Know the methodology and the obtainable results of the energy audits. -Know the procedures for the energy management in the industrial environment.	10	C48	D2 D5 D6 D7 D9 D10
Essay	The teachers will propose several projects to the student providing solution to complex problems. Learning outcomes: -Know the electrical market working. -Catch up the current techniques to analyze the buy/sell bids in the electrical market. -Know the standards and the concepts related to the quality of the electrical supply. -Know the methodology and the obtainable results of the energy audits. -Know the procedures for the energy management in the industrial environment.	30	C45 C49	D1 D2 D3 D5 D6 D7 D8 D9 D10
Essay questions exam	The teachers will propose global problems to the students, where they will have to realise an approach, some operations and give a solution. Learning outcomes: -Know the electrical market working. -Catch up the current techniques to analyze the buy/sell bids in the electrical market. -Know the standards and the concepts related to the quality of the electrical supply. -Know the methodology and the obtainable results of the energy audits. -Know the procedures for the energy management in the industrial environment.	60	C48 C49	D1 D3 D5 D7

Other comments on the Evaluation

The practices can be recovered in any one of the two editions of the final exam of the subject

The mark of any one of the parts is saved along the course, but won't be saved for the following academic years.
Exam schedule. Verify / check this information in the website of the school:
http://minaseenerxia.uvigo.es/gl/docencia/exames

Sources of information

Basic Bibliography

Grainger, John J.; Stevenson, William D., **Análisis de sistemas de potencia**, 1ª Edición, McGraw Hill, 1996

Gómez Expósito, Antonio, **Análisis y operación de sistemas de energía eléctrica**, 1ª Edición, McGraw Hill, 2002

Duncan Glover, J; Sarma, Mulukutla S., **GSistemas de potencia**, 3ª edición, Thomson, 2003

Complementary Bibliography

Padiyar, K. R., **Power System Dynamics**, 1ª Edición, John Wiley and Sons, 1996

Duncan Glover, J; Sarma, Mulukutla S.; Overbye, Thomas J., **Power System Analysis and Design**, 4ª edición, Thomson, 2008

Wadhwa, C. L., **Electrical Power Systems**, 2ª edición, John Wiley and Sons, 1991

Recommendations

Subjects that continue the syllabus

Final Year Dissertation/V09G290V01991

Subjects that it is recommended to have taken before

Electrotechnology/V09G290V01301
Renewable energy installations/V09G290V01604
Electrical technology I/V09G290V01504
Electrical technology II/V09G290V01602

Contingency plan

Description

Considering the uncertain and unpredictable evolution of the health alert caused by COVID-19, the University establishes an extraordinary planning that will be activated when the administrations and the institution determine it. It is based on safety, health and responsibility, and it guarantees teaching in an online or semi-presential modalities. These already planned measures will guarantee, at the required time, the development of teaching in a more agile and effective way, because they will be known in advance by students and teachers through the standardized tool for teaching guides DOCNET.

1. Semi-presential modality
Once the semi-presential teaching is required, it would mean a reduction of the capacity of the teaching spaces used in the face-to-face modality. Therefore, as the first measure of the centre, the capacity of the teaching spaces would be reformulated and informed to the teachers, in order to proceed to reorganize the formative activities for the rest of the semester. It should be noted that the reorganization will depend on the moment throughout the semester in which this semi-presential modality is activated. For the reorganization of the teaching activities, the following guidelines would be followed:

Through the FaiTIC platform, all the students will be informed about the new conditions under which the formative activities and assessment tests will be carried out at the end of the semester.

The tutorial sessions will be carried out by telematic means (email, videoconference, FAITIC forums, ...) with prior agreement.

Once some of the students have carried out experimental or computer laboratory practices in the face-to-face modality, if it is possible, the rest of the students will have the possibility to perform the same or equivalent activities in the same modality.

For the rest of the activities until the end of the semester, it should be done a proper identification of those formative activities which can be done under face-to-face modality and those which will be carried out remotely.

Regarding the potential tools to be applied for the formative activities during the online mode, CampusRemoto and the FaiTIC platform will be used.

2. Online modality
In the event that the non-face-to-face teaching modality is required (suspension of all face-to-face formative and assessment

activities), the tools currently available at the University of Vigo, CampusRemoto and the FaiTIC platform will be used. The reorganization will depend on the moment throughout the semester in which this online modality is activated. In the reorganization of the teaching activities, the following guidelines would be followed:

2.1. Communication
Through the FaiTIC platform, all the students will be informed about the new conditions under which the formative activities and assessment tests will be carried out at the end of the semester.

2.2. Adaptation and / or modification of teaching methodologies
As the teaching methodologies have been conceived for the face-to-face teaching modality, the teaching methodologies that would be kept and those which would be modified or replaced in the online modality are indicated below.

The teaching methodologies that would be kept, since they can be used in face-to-face and online teaching mode:
All would be kept.

The teaching methodologies that would be modified are the following:
None would be modified.

2.3. Adaptation of tutorial sessions and personalized attention
The tutorial sessions may be carried out by telematic means (email, videoconference, FAITIC forums, ...) with prior agreement.

2.4. Evaluation
The type of assessment tests and their weight in the final assessment would not be modified.

2.5. Bibliography or additional material to facilitate self-learning
Not applicable.