

820735 - EQE - Electrical Equipment

Coordinating unit: 240 - ETSEIB - Barcelona School of Industrial Engineering
Teaching unit: 709 - DEE - Department of Electrical Engineering
Academic year: 2019
Degree: MASTER'S DEGREE IN ENERGY ENGINEERING (Syllabus 2013). (Teaching unit Compulsory)
MASTER'S DEGREE IN ENERGY ENGINEERING (Syllabus 2013). (Teaching unit Compulsory)
ECTS credits: 5 Teaching languages: English

Teaching staff

Coordinator: Aragüés Peñalba, Mònica
Others: Aragüés Peñalba, Mònica

Opening hours

Timetable: Contact by email to agree on day and time.

Prior skills

- Mathematical calculation
- Complex numbers
- Ordinary differential equations

Requirements

- Basic physics
- Basic mechanics

Degree competences to which the subject contributes

Specific:

- CEMT-2. Identify and describe the components of electrical systems (production, transportation, distribution, markets, procurement and consumption) and evaluate the technological solutions used in the production of electricity.
CEMT-6. Employ technical and economic criteria to select the most appropriate electrical equipment for a given application, dimension thermal equipment and facilities, and recognise and evaluate the newest technology applications in the field of production, transport, distribution, storage and use of electric energy.

Transversal:

- CT5. FOREIGN LANGUAGE: Achieving a level of spoken and written proficiency in a foreign language, preferably English, that meets the needs of the profession and the labour market.

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Teaching methodology

Teaching methodology:

The course teaching methodologies are as follows:

- Lectures and conferences: presentation of knowledge by lecturers or guest speakers.
- Participatory sessions: collective resolution of exercises, debates and group dynamics, with the lecturer and other students in the classroom; classroom presentation of an activity individually or in small groups.
- Theoretical/practical supervised work (TD): classroom activity carried out individually or in small groups, with the advice and supervision of the teacher.
- Homework assignment of reduced extension: carry out homework of reduced extension, individually or in groups.
- Homework assignment of broad extension: design, planning and implementation of a project or homework of broad extension by a group of students, and writing a report that should include the approach, results and conclusions.
- Evaluation activities (EV).

Training activities:

The course training activities are as follows:

- Face to face activities
 - o Lectures and conferences: learning based on understanding and synthesizing the knowledge presented by the teacher or by invited speakers.
 - o Participatory sessions: learning based on participating in the collective resolution of exercises, as well as in discussions and group dynamics, with the lecturer and other students in the classroom.
 - o Presentations (PS): learning based on presenting in the classroom an activity individually or in small groups.
 - o Theoretical/practical supervised work (TD): learning based on performing an activity in the classroom, or a theoretical or practical exercise, individually or in small groups, with the advice of the teacher.
- Study activities
 - o Homework assignment of reduced extension (PR): learning based on applying knowledge and presenting results.
 - o Homework assignment of broad extension (PA): learning based on applying and extending knowledge.
 - o Self-study (EA): learning based on studying or expanding the contents of the learning material, individually or in groups, understanding, assimilating, analysing and synthesizing knowledge.

Learning objectives of the subject

Objectives

Acquire comprehensive knowledge of the most common electrical equipment.

Learning outcomes

Upon completing the course, the student should:

- Understand the role of electrical equipment in production and service sectors, as well as its importance in the energy chain: processing, transportation, distribution and end use and efficiency of electrical energy.
- Have the knowledge, skills and elements of analysis necessary to select the most appropriate electrical equipment from an energetic standpoint for each application (industrial or service) as well as the ability to analyse the behaviour of computer operation, make a diagnosis on the operating system and establish measures aimed at the improvement of the energy itself.
- Have the knowledge, skills and analytical elements needed to plan a project of basic or fundamental engineering level, related to the design, sizing and/or the use of electrical equipment in different industrial and service sectors.
- Be able to propose transferable results in most electrical equipment by developing novel ideas.

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Study load

Total learning time: 125h	Hours large group:	30h	24.00%
	Guided activities:	15h	12.00%
	Self study:	80h	64.00%

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Content

<p>Introduction and basic concepts</p>	<p>Learning time: 4h Theory classes: 4h</p>
<p>Description: Introduction to the course and review of basic concepts necessary for the proper development of the course</p> <p>Related activities:</p> <p>Specific skills:</p> <p>CE1. Understand, describe and analyse, in a clear and broad way, the entire chain of energy conversion, from its state as a source of energy to its use as an energy service. Identify, describe and analyse the situation and characteristics of different energy sources and end use of energy in its economic, social and environmental dimensions and make valuable judgments.</p> <p>CE4. Efficiently obtain data on renewable energy and its statistical treatment and apply knowledge and assessment criteria in the design and evaluation of technological solutions for the use of renewable energy for both grid-connected and isolated systems. Recognise and evaluate new technological applications in the field of the use of renewable energy.</p> <p>CE6. Apply technical and economic criteria to the selection of electrical equipment best suited for a particular application. Size equipment and electrical installations. Recognise and assess the new technological applications in the fields of production, transport, distribution, storage and use of electricity.</p> <p>CE7. Analyse the behaviour of equipment and operating facilities in order to develop a diagnostic evaluation on the regime of exploitation and establish measures aimed at improving the energy efficiency of the equipment and operating facilities.</p> <p>Specific objectives:</p> <p>Basic and general competences:</p> <p>CG1. Integrate and apply mathematical, analytical, scientific, instrumental, technological and management knowledge acquired in university education, as well as the ability to solve problems in the field of power engineering.</p> <p>CG3. Intervene in the process of research, development and innovation in energy technologies and the use of energy in production and service sectors, providing new knowledge and technological breakthroughs and innovative solutions in multidisciplinary teams, national or international.</p> <p>CG4. Critically analyse the regional, national and supranational policies and apply the legislation to energy material in the fields of power engineering and energy management.</p> <p>CG6. Carry out opinions and technical advice in the field of power engineering.</p>	
<p>Power system review and main components</p>	<p>Learning time: 4h Theory classes: 4h</p>
<p>Description: Brief review of the electrical power system: key elements, characteristics and evolution</p> <p>Specific objectives: To have an overview of the electrical power system and how it is operated</p>	

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Electric installations and cable selection	Learning time: 46h Theory classes: 46h
<p>Description: Elements and characterization of electrical installations. ? Sizing an installation and its cables. General criteria, parts and materials involved, Maximum current criterion, maximum voltage drop criterion and maximum short circuit current criterion</p>	
Faults and protections in electric installations	Learning time: 43h Theory classes: 43h
<p>Description: content english</p>	
Transformers	Learning time: 28h Theory classes: 28h
<p>Description: Operation principles, rated values, tests</p>	

Qualification system

Written test (PE). 70%
Work performed individually or in groups (TR). 30%

Regulations for carrying out activities

Individual. Use of formula sheet and calculator allowed. The assignments cannot be turned in in pencil.

Bibliography

Complementary:

Ras Oliva, Enrique. Transformadores de potencia, de medida y de protección. 7ª ed. Barcelona: Marcombo, cop. 1988. ISBN 8426706908.

Sanjurjo Navarro, Rafael. Máquinas eléctricas [on line]. Ed estudiantes (EEES). Madrid [etc.]: García Maroto, 2011 [Consultation: 19/11/2019]. Available on:
<http://www.ingebook.com/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=193>. ISBN 8476153252.

Others resources: