High voltage switchgear and power lines

Academic Year: (2024 / 2025) **Review date: 28-04-2024**

Department assigned to the subject: Electrical Engineering Department

Coordinating teacher: CASTRONUOVO , EDGARDO DANIEL

Type: Electives ECTS Credits : 6.0

Year : 4 Semester :

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Electrical power engineering fundamentals.

SKILLS AND LEARNING OUTCOMES

CB1. Students have demonstrated possession and understanding of knowledge in an area of study that builds on the foundation of general secondary education, and is usually at a level that, while relying on advanced textbooks, also includes some aspects that involve knowledge from the cutting edge of their field of study
CB2. Students are able to apply their knowledge to their work or vocation in a professional manner and possess the competences usually demonstrated through the development and defence of arguments and problem solving within their field of study.
CB3. Students have the ability to gather and interpret relevant data (usually within their field of study) in order to make judgements which include reflection on relevant social, scientific or ethical issues.
CB5. Students will have developed the learning skills necessary to undertake further study with a high degree of autonomy.
CG1. Ability to solve problems with initiative, decision-making, creativity, critical reasoning and to communicate and transmit knowledge, skills and abilities in the field of Industrial Engineering.
CG3. Ability to design a system, component or process in the field of Industrial Technologies to meet the required specifications
CG4. Knowledge and ability to apply current legislation as well as the specifications, regulations and mandatory standards in the field of Industrial Engineering.
CG5. Adequate knowledge of the concept of company, institutional and legal framework of the company. Organisation and management of companies.
CG6. Applied knowledge of company organisation.
CG8. Knowledge and ability to apply quality principles and methods.
CG9. Knowledge and ability to apply computational and experimental tools for the analysis and quantification of Industrial Engineering problems.
RA1. Knowledge and understanding: Have basic knowledge and understanding of science, mathematics and engineering within the industrial field, as well as knowledge and understanding of Mechanics, Solid and Structural Mechanics, Thermal Engineering, Fluid Mechanics, Production Systems, Electronics and Automation, Industrial Organisation and Electrical Engineering.
RA2. Engineering Analysis: To be able to identify engineering problems within the industrial field, recognise specifications, establish different resolution methods and select the most appropriate one for their solution
RA5. Engineering Applications: To be able to apply their knowledge and understanding to solve problems and design devices or processes in the field of industrial engineering in accordance with criteria of cost, quality, safety, efficiency and respect for the environment.

OBJECTIVES

1. Ability to represent and operate a high voltage power line and a substation.
2. Basic knowledge about the elements used in high voltage overhead power lines and electrical substations.
3. Ability to select key elements in high voltage overhead power lines and electrical substations.
4. Skill in consulting regulations and technical documents related to high voltage installations.

DESCRIPTION OF CONTENTS: PROGRAMME

The course is structured in the following blocks:

a) Representation of overhead electric power lines:
* Models in AC and DC.
* Power line parameters.

b) Operation of overhead electric power lines:
* Transport capacity.
* Tension control.
* Traveling waves.

c) Selection of elements of overhead power lines:
* Mechanical calculation of conductors.
* Selection of Insulators.
* Types of pylons.

d) Substations:
* Types of substations, characteristics and use.
* Substation switchgear.
* Selection of cutting and protection elements.

LEARNING ACTIVITIES AND METHODOLOGY

- Master classes.
- Resolution of numerical examples in the classroom.
- Laboratory lessons.

ASSESSMENT SYSTEM

% end-of-term-examination:	0
% of continuous assessment (assigments, laboratory, practicals…):	100

ORDINARY CALL:
Continuous evaluation:
- Questions and exercises in classroom

CONVOCATORIA EXTRAORDINARIA:
Final Exam

Note: Laboratories are mandatories to approve the subject.

BASIC BIBLIOGRAPHY

- Bacigalupe Camarero, Fernando Líneas aéreas de media y baja tensión : cálculo mecánico, Paraninfo.

- Checa L.M. Líneas de transporte de energía, Marcombo Boixareu Editores, 1988

- Ministerio de Industria, Turismo y Comercio Reglamento sobre condiciones técnicas y garantías de seguridad en líneas de alta tensión : Real Decreto 223/2008, de 15 de febrero. BOE, BOE.

- Moreno Clemente, Julián Cálculo de líneas eléctricas aéreas de alta tensión, Moreno, J..

- Pascual Simón, Fernando Garnacho, Jorge Moreno, Alberto González Cálculo y diseño de líneas eléctricas de alta tensión, Garceta, 2011

- Tora Galván J.L. Transporte de la Energía Eléctrica, Universidad Pontificia de Comillas, 1997