Home and building electronic systems and lighting

Academic Year: **(2023 / 2024)**   **Review date: 09-05-2023**

Department assigned to the subject: Electrical Engineering Department

Coordinating teacher: DOMINGUEZ GONZALEZ-SECO, ESTEBAN PATRICIO

Type: Electives ECTS Credits : 6.0

Year :   Semester :

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.
COCIN1. Ability to draft, sign and develop projects in the area of industrial engineering for construction, renovation, repair, preservation, demolition, manufacture, installation, assembly or operation of: structures, mechanical equipment, energy installations, electrical and electronic installations, industrial plants and installations and automation and manufacturing processes.
COCIN4. Ability to resolve problems with initiative, decision-making, creativity, and critical reasoning skills and to communicate and transmit knowledge, skills and abilities in the Industrial Engineering field.
COCIN5. Knowledge to perform measurements, calculations, assessments, appraisals, surveys, studies, reports, work plans and other similar jobs.
CEP1. Capacity to design a system, component or process in the area of electrical engineering in compliance with required specifications.
CEP2. Knowledge and ability to apply computational and experimental tools for analysis and quantification of electrical engineering problems.
CEP3. Ability to design and carry out experiments to analyze and interpret data obtained.
ECRT3. Capacity for calculation and design of low and medium voltage electrical installations.

By the end of this content area, students will be able to have:
RA1.3. Coherent knowledge of the branch of electrical engineering including some at the forefront of their branch in electric power facilities.
RA2.1. The ability to apply their knowledge and understanding to analyse engineering products, processes and methods.
RA3.2. An understanding of design methodologies, and an ability to use them.
RA4.3. Workshop and laboratory skills.
RA5.1. The ability to select and use appropriate equipment, tools and methods in electric power facilities.
RA6.3. Demonstrate awareness of the health, safety and legal issues and responsibilities of engineering practice, the impact of engineering solutions in a societal and environmental context, and commit to professional ethics, responsibilities and norms of engineering practice.

OBJECTIVES

This course provides:
- Understanding the importance of electric power efficiency in home automation and lighting systems.
- Understanding the importance of planning and knowledge of basic tools for designing and controlling lighting devices.
- Understanding the importance of planning and knowledge of basic tools for designing the lighting systems either indoor, outdoor or in the street.
- Understanding the most important home and building automation systems and their differences.

DESCRIPTION OF CONTENTS: PROGRAMME

This course will be mainly practical. Students will receive information about certain aspects of electrical installations. In particular, home and building automation systems and electrical installations for lighting.

OBJECTIVES:
- To know the principles and applications of light and vision.
- To describe the different sources of light and the elements of the lightning system (lamps, ballasts, lamps, etc..).
- To know the criteria for a lighting project.
- To manage the tools to design a lighting installation.
- To know the basic concepts regarding electric power efficiency.
- To analyze the different home and building automation systems, their characteristics, their different configurations, their application areas, etc.
- To set up systems for home and building automation, using the standard system European Installation Bus.
- To diagnose faults in home and building automation installations.

PROGRAMME:
MODULE 1: INTRODUCTION TO LIGHTING SYSTEMS
1. Design of electrical lighting: scope and objectives.
2. Lighting: incandescent lamps and special lamps.
3. Interior lighting project.
4. Lighting control

MODULE 2: DESIGN OF CONTROL SYSTEMS
5. Introduction to electrical energy efficiency and home and building automation systems.
6. Overview of the most important home and building automation systems.

LEARNING ACTIVITIES AND METHODOLOGY
Students should read each lesson before each class and study it immediately thereafter.
They must also resolve questions and practice exercises before each practical session.

Various visits will be planned to facilities or companies.

The tutorials are set up via email.

ASSESSMENT SYSTEM
The student assessment is based on:
- Tests. There will be four tests over the course and a final evaluation;
- Practice sessions (development work using specific calculation software).

The weight of the five evaluations and practices is as follows:
- First test: 35 %
- Second test: 35 %
-Practice sessions: 30%

They may pass the course provided a minimum of 5 points in each of the five parties that form the continuous assessment is obtained.

% end-of-term-examination: 50

% of continuous assessment (assigments, laboratory, practicals…):   50

BASIC BIBLIOGRAPHY

 - LON-Nutzerorganisation LONWORKS installation handbook : LONWORKS in practice for electrical technicians , VDE, 2005
 - Miguel Moro Vallina INSTALACIONES DOMÓTICAS, A. MADRID VICENTE, EDICIONES, 2014

 - ROJAS RODRIGUEZ, S., RUIZ CELMA, A Instalaciones de Iluminación, Servicio Publicaciones de la ETSII (UPM), 1998
 - William Bolton Instrumentación y control industrial, Paraninfo, 2015