INSTITUTO POLITÉCNICO DE BRAGANÇA

Course Unit	Electrical Networks and Installations			Field of study	Energy		
Bachelor in	Renewable Energy Engineering			School	School of Technology and Management		
Academic Year	2022/2023	Year of study	2	Level	1-2	ECTS credits	6.0
Type	Semestral	Semester	1	Code	9910-743-2105-00-22		

Workload (hours)	162	Contact hours	T	TP	PL	TC	S	E	OT	O
			-	30	24	4	2	-	-	-

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s): Orlando Manuel de Castro Ferreira Soares, Luís Manuel Montenegro de Araújo Pizarro

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:
1. Know materials for electrical wiring and apparatus, have deep understanding about rules of Low Voltage electrical installations conception and electrical wiring protection and sizing;
2. Know about the constitution of primary and distribution substations and to have skills about MV/LV underground networks, envisaging the investigation, project, execution and inspection;
3. Know communications networks materials in urbanisations and sizing telecommunications infrastructure, envisaging the investigation, project, execution and inspection;
4. Know about the electrical energy tariff systems and to apply knowledge about techniques of rational usage of electrical energy.

Prerequisites

Before the course unit the learner is expected to be able to:
1. Analyse electrical energy systems in “per unit”.
2. Solve power flow and short-circuit problems.
3. Utilise CAD tools and spreadsheets.

Course contents

Electrical infrastructures of public service and/or private lots or urbanizations. Feeding systems. MV/LV underground networks. The electrical and telecommunication project – rules for the conception, approval and network connection. Elaboration of electrical and telecommunication infrastructures projects of lots or urbanisations. Energy management in buildings.

Course contents (extended version)

1. Electrical infrastructures of lots or urbanisations of public service and/or private initiative.
   - Materials for electrical wiring and apparatus.
   - Calculation techniques for electrical installations.
   - Sizing and protection of electrical wiring.
2. Feeding systems
   - Power substations and switching substations
   - Distribution substations
3. Underground MV/LV networks
   - Electrical energy distribution networks and public lightning.
   - Several categories of electrical installations.
4. Electrical project – conception rules, approval and connection to the grid.
5. Development of electrical infrastructures of public service or private lots or urbanisations
   - Constituent parts of an infrastructures electrical project.
   - Proceedings
   - Written parts and drawn parts.
6. Telecommunications infrastructures in urbanisations.
   - Communication networks in urbanisations – The ITUR project.
   - Installation – Technical conditions of the work execution.
7. Development of exterior communication infrastructures project of an urbanisation.
8. Tariff systems and electricity cost build up.
   - Actions and techniques for rational usage of electrical energy.
   - Control and improvement of power factor.

Recommended reading

1. Regulamentos de segurança e disposições regulamentares aplicáveis.
2. Guias e cadernos técnicos, catálogos e outros documentos normativos.
3. Projectos tipo dos Postos de Transformação, DGEG; Legislação e Normas.
4. Regras Técnicas das Instalações Eléctricas de Baixa Tensão, Portaria nº 949-A/2006 de 11 de Setembro/ 1ª edição anotada: Vol. I, II e III, DGGE/CERTIEL, 2006
5. Textos de apoio, cópias de lições, de acetatos e de elementos de estudo.

Teaching and learning methods

Lectures and problem-solving classes: Presentation of concepts connected to different contents. Application of expositive and interrogative method. Problem-solving, project or laboratory classes: solving application exercises and working problems. Application of active and interrogative method. Frequent use of catalogues and manufacturers tables.

Assessment methods

1. Alternative 1 - (Regular, Student Worker) (Final, Supplementary)
   - Practical Work - 60%
   - Final Written Exam - 40% (Minimum score of 7 in the exam (on a scale of 20) to obtain approval for the course.)
2. Alternative 2 - (Regular, Student Worker) (Special)
   - Final Written Exam - 100%

Language of instruction

Portuguese

Electronic validation

Orlando Manuel de Castro Ferreira Soares	José Luís Sousa de Magalhaes Lima	Ana Maria Alves Queiroz da Silva	Paulo Alexandre Vara Alves
10-10-2022	16-10-2022	18-10-2022	24-10-2022