

Course Unit	Distribution Grids and Special Electrical Installations	Field of study	Energy Systems
Bachelor in	Electrical and Computers Engineering	School	School of Technology and Management
Academic Year	2025/2026	Year of study	3
Type	Semestral	Semester	2
Level	1-3	ECTS credits	6.0
Code	9112-852-3203-00-25		
Workload (hours)	162	Contact hours	T - , TP 30, PL 24, TC 4, S - , E - , OT - , O -

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

#### 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, Special)
  - 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 Alexandre de Carvalho Gonçalves	José Luís Sousa de Magalhaes Lima	Maria Olga de Amorim Sá Ferreira
19-02-2026	19-02-2026	25-02-2026	09-03-2026