



GENERAL INFORMATION

Data of the subject	
Subject name	Low and Medium Voltage Installations
Subject code	DIE-MII-632
Main program	Official Master's Degree in Industrial Engineering
Involved programs	Máster Universitario en Ingeniería Industrial y Máster Universitario en Sistemas Ferroviarios [Second year] Máster Universitario en Ingeniería Industrial + Máster en Industria Conectada / in Smart Industry [Second year] Máster Universitario en Ingeniería Industrial [Second year] Máster Universitario en Ingeniería Industrial y Máster Universitario en Sector Eléctrico [Second year]
Credits	4,5 ECTS
Type	Obligatoria
Department	Department of Electrical Engineering

Teacher Information	
Teacher	
Name	María Teresa Sánchez Carazo
Department	Department of Electrical Engineering
Office	Alberto Aguilera 25 [D-124]
E-Mail	tsanchez@icai.comillas.edu
Phone	2401

DESCRIPTION OF THE SUBJECT

Contextualization of the subject

Course contents

Contents
Chapter1: Low Voltage and Medium Voltage Electrical Network <ol style="list-style-type: none">1. Electrical Network architecture. Concepts. Graphical Representation and Symbols. LV and MV design criteria. Definition and sizing of Power Transformation Centers.2. MV switchgear. Smart Grids. Present MV networks.3. Cables and isolated conductors: Overview. Underground networks, maximum currents, correction factors.4. Single and Three Phase Power distribution lines calculations. Uniform size open distribution, variable size open distribution, two-ends distribution arrangement. Ring arrangement. DC lines. Maximum installed power. Power losses.5. LV overhead electrical installations. Access points. Joints and derivations. Clearance distances. Earthing system. Supports. Wall mounted installations.



6. LV underground networks. Access points. Joints and derivations. Earthing system. Trenches and conducts.

Chapter 2: Power Transformation Centers (PTC)

1. General Overview
2. Electrical Schemes. Standardized electrical company arrangements.
3. In door PTC arrangements. Clearing and operational distances
4. PTC cooling: Concepts, air natural, air forced, nomograph.
5. Earthing system; General concepts, elements to be connected. Safety grounding, service earth system. Inteconnexions. Electrical magnitudes being involved. Step Voltage, Contact voltage, and maximum applied voltages calculations. Ground resistivity. UNESA Method calculations. Constructive details.
6. LV and MV earth fault calculations. Isolated network, grounded network, clearance times. Short circuit overcurrents calculations. Actual installation visit.

Chapter 3: LV Installations Design.

1. Installation characteristics. Nominal voltages.
2. Service installations. Concepts. General characteristics . CGP, CGM, LGA Schemes. Measurement devices. CGPM. Voltage drop.
3. ITC-BT-18 earthing system. Concepts; Ground resistivity; Earthing resistivity.
4. ITC-BT-19 general prescriptions. Overview; conductors; circuit separation. Isolation.
5. Installation systems ITC-BT-20
6. Conducts and tubes ITC-BT-21; Characteristics; Installation; Overcurrent protection. LV switchgear. Basic functions. General characteristics and classification. Nominal parameters for protection, operation and control devices.

Chapter 4: Indoor Installations.

1. Electrical consumers. Illumination, heating, motors, transformers, reactances and capacitors.
2. Installed capacity. Concepts. Estimates. Simultaneity factors.
3. Home installations. Protections. General Protection; circuits, connection points; installation mounting; Special installations (baths, etc.)
4. Electrical Vehicle charging points; definitions; type of connections; schemes. General prescriptions and standards.
5. Electrical network disturbances. Harmonics.
6. Domotics.

Chapter 5: Illumination

1. Outdoor illuminations: REEA 2008; Road and rail illumination. Methods.
2. Illumination installations ITC-BT-09: Requisites, service connections; circuit protections; illumination networks. Earthing system.
3. Energy efficiency: Outdoor illumination.
4. New technologies for outdoor illumination.

Chapter 6: Photovoltaic Installations for consumers.

1. General overview
2. Present standards and regulation. RD-15-2018
3. Technical conditions. Installation configuration. Protections. Operation and maintenance.

EVALUATION AND CRITERIA

Evaluation activities	Evaluation criteria	Weight



Quaterly exam	Test	40
Electrical Installation Project	Global Qualification composed by: <ul style="list-style-type: none">• Project documentation (40%)• Tutorial checking (30%)• Individual enquiry (30%)	50
Test	Individual checking should be made along the course by quick question test	10

Grading

Ordinary Call

Global qualification= 40% Final Test+10% Cheking tests + 50% Group Work

Extraordinary Call

Global qualification = 75% Written test + 25% Group Work

Final course qualification is to be done weather Work Group and mean exam qualifications be both 5 as a minimum (both calls).

85% class attendance required, otherwise there is no right to be examined. (Article 93.3 of General Regulation, articles 7.2 and 7.3 of Academic Rules.

WORK PLAN AND SCHEDULE

Activities	Date of realization	Delivery date
Electrical Installation Project	First 12 weeks	Week 12
Chapter 1 and work presentation	Weeks 1 and 2	
Chapter 2 and work tutorials	Weeks 3 and 4	
Chapter 3 and work tutorials	Weeks 5 and 6	
Chapter 4 and work tutorials	Weeks 7 and 8	
Chapter 5 and work tutorials	Weeks 9 and 10	
Chapter 6 and work tutorials	Weeks 11 and 12	



COMILLAS

UNIVERSIDAD PONTIFICIA

ICAI

ICADE

CIHS

Syllabus
2024 - 2025

Completion of the work	Week 13	
Individual questions of the work	Week 14	

BIBLIOGRAPHY AND RESOURCES

Basic References

Standards and Regulations

- Guía Técnica Aplicación REBT.pdf
- MIE-RAT.pdf
- RAT.pdf
- REBT.pdf

In compliance with current regulations on the **protection of personal data**, we would like to inform you that you may consult the aspects related to privacy and data that you have accepted on your registration form by entering this website and clicking on "download"

<https://servicios.upcomillas.es/sedelectronica/inicio.aspx?csv=02E4557CAA66F4A81663AD10CED66792>