

SUBJECT TEACHING GUIDE

G1674 - Medium and Low Voltage Electrical Installations

Degree in Electrical Engineering

Academic year 2024-2025

1. IDENTIFYING DATA					
Degree	Degree in Electrical Engineering			Type and Year	Compulsory. Year 3
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Subject Area: Energy Generation, Transport and Distribution. Module: Electrical Technology				
Course unit title and code	G1674 - Medium and Low Voltage Electrical Installations				
Number of ECTS credits allocated	6	Term	Semester based (1)		
Web					
Language of instruction	English	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. INGENIERIA ELECTRICA Y ENERGETICA				
Name of lecturer	CARMELA ORIA ALONSO				
E-mail	carmela.oria@unican.es				
Office	E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 3. DESPACHO PROFESORES (S3066)				
Other lecturers	SERGIO ORTEGA ALBA				

3.1 LEARNING OUTCOMES

- The students will be able to design industrial, commercial or residential electrical installations. They will be able to provide solutions to problems that could occur during the operation of electrical systems. They will interpret and apply the legislation regarding electrical installations. Besides, they will have sufficient resources to manage the implementation of an electrical installation with full safety guarantee for the users.

4. OBJECTIVES

To introduce students to the design, calculation and execution of industrial, commercial or residential electrical installations. Knowledge of the most important aspects of the legislation applicable to electrical installations. The most common wiring diagrams and dimensioning of the power conductors will be studied. The most common electrical switchgear is also described, with emphasis on safety purposes. Major issues, such as reactive power compensation in electrical installations, will be also treated. Finally, the basics of power quality will be explained, given its importance in the current facilities.

Regarding the development of transversal skills, teamwork will be encouraged for the development of projects, which will be valued as part of the continuous assessment of the subject. An evaluation will be made of the students' improvement in competences in the English language (acquisition of technical vocabulary, improvement in reading comprehension capacity, written expression and oral expression in English).

6. SUBJECT PROGRAM

CONTENTS

1	Introduction to Electric Power Distribution and Electrical Installations in Medium and Low Voltage.
2	Electrical switchgear for medium and low voltage.
3	Design and calculation of electrical installations in medium and low voltage for conductor protection.
4	Selectivity in medium and low voltage.
5	Short-circuit current calculation.
6	Medium and low voltage substations.
7	Protection of human beings in electrical installations.
8	Electric rates and reactive power compensation in medium and low voltage. Electric power quality.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Assessment 1	Written exam	No	Yes	35,00
Assessment 2	Written exam	No	Yes	35,00
Assessment 3	Work	No	No	30,00
TOTAL				100,00
Observations				

Students can pass the course in two ways:

1. CONTINUOUS EVALUATION

Students must achieve a minimum average grade of 5 out of 10 in assessments 1, 2, and 3.

- Assessment 1, A1, (First exam):

Theoretical-practical exam covering lessons 1-4 (end of October). The minimum grade to average with the rest of the grades will be 4/10.

- Assessment 2, A2, (Second exam):

Theoretical-practical exam covering lessons 5-8 (December). The minimum grade to average with the rest of the grades will be 4/10.

The partial exams (Assessment 1 and 2) can be retaken independently in ordinary or extraordinary sessions, on dates set by the center's management.

- Assessment 3, A3, (Continuous evaluation tasks):

To be able to carry out these continuous evaluation tasks, attendance of at least 80% of the presential activities of the course is necessary. Positive attendance evaluation will consider aspects such as attitude and active participation in class, exercise resolution, timely submission of assigned tasks, etc.

Specifically, 'Assessment 3' will consist of written work(s) (assignments, exercises, laboratory practice reports, etc.) and oral presentation to be done individually or in groups. No minimum grade is required for this assessment. The activities proposed will fit into the subject's teaching schedule and aim to encourage students' active participation throughout the semester. Due to their nature, these activities will not be recoverable.

The weighted average grade of students following the continuous evaluation of the subject will be calculated as: $0.35 \cdot A1 + 0.35 \cdot A2 + 0.3 \cdot A3$.

If the minimum required grade is not achieved in the partial exams (A1 or A2), the grade will be the lowest grade between the weighted average of the grades and 4.9.

2. FINAL EVALUATION

Students who have not followed continuous evaluation and have attended less than 80% of presential activities may take the partial exams of the subject A1 and A2 under the same conditions as students following continuous evaluation. However, they cannot score in the continuous evaluation tasks section.

In the ordinary session, their grade will be calculated with the expression: $0.35 \cdot A1 + 0.35 \cdot A2$, and to pass, they must achieve a grade greater than or equal to 5 with that expression.

In the extraordinary session, they can obtain 100% of the grade without the need to perform continuous evaluation activities, and their grade will be calculated with the expression: $0.5 \cdot A1 + 0.5 \cdot A2$.

To pass the subject through final evaluation, a minimum grade of 4/10 must also be obtained in each Assessment (A1 and A2), and a weighted average grade equal to or greater than 5/10 with the previous expressions.

LABORATORY PRACTICES: Attendance to at least 80% of the laboratory practice hours is mandatory to pass the course, both for students who follow continuous assessment and those who opt for the final assessment. Laboratory practices may be evaluated through questions in the exams (Assessments 1 and/or 2) and/or submission of assignments or reports (included within Assessment 3).

Remote evaluation of works, laboratory practical exercises, and written tests is foreseen in the event of a new COVID-19 health alert making it impossible to conduct face-to-face evaluation.

Observations for part-time students

Part-time students will be assessed on the same basis as full-time students.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Overvoltage protection of low voltage systems / Peter Hasse.
Analysis and design of low-voltage power systems : an engineer's field guide / Ismail Kasikci.
High-voltage engineering : theory and practice / edited by M. Khalifa.
Conejo, Antonio. Instalaciones Eléctricas. ED. McGraw Hill, 2007.
Martín Sánchez, Franco. Instalaciones Eléctricas en la Edificación. Ed. A. Madrid Vicente, 1997.
Guerrero Fernández A. Instalaciones Eléctricas en las Edificaciones. Ed. McGraw-Hill, 1996.
Reglamento electrotécnico para baja tensión.
Esquemas eléctricos y electrónicos : lectura e interpretación / Francisco Ruiz Vassallo 2005.
Colección de normas UNE.