Course guide
820125 - IEBAT1EE - Low and High Voltage Electrical Installations I

Last modified: 30/01/2026

Unit in charge: Barcelona East School of Engineering
Teaching unit: 709 - DEE - Department of Electrical Engineering.

Degree: BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Compulsory subject).

Academic year: 2025 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: JORGE EL MARIACHET CARREÑO

Others: Primer quadrimestre:
JORGE EL MARIACHET CARREÑO - Grup: T11, Grup: T12
EDORTA LÓPEZ URZAINQUI - Grup: T11, Grup: T12

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
4. Carry out calculations for the design of low and medium voltage electrical installations.
CEELE-22. Carry out calculations for the design of high voltage electrical installations.

Transversal:
1. SELF-DIRECTED LEARNING - Level 2: Completing set tasks based on the guidelines set by lecturers. Devoting the time needed to complete each task, including personal contributions and expanding on the recommended information sources.
2. TEAMWORK - Level 2. Contributing to the consolidation of a team by planning targets and working efficiently to favor communication, task assignment and cohesion.

TEACHING METHODOLOGY

The subject uses the expository methodology, project-based learning (PBL) and/or challenge-based learning (CBL). For PBL and CBL the techniques of the flipped classroom and "Jigsaw" can be used
The expository sessions may consist of theoretical explanations accompanied by illustrative examples.
PBL and/or CBL learning may involve total or partial attendance. It must be carried out in teams and students must implement specific solutions (at the teacher's suggestion or their own), including the needs to be met, alternatives studied, justification of the adopted solution and calculations.
In the practical work sessions in the classroom, the teacher will guide students in the analysis, approach and selection of solutions, promoting critical thinking, feasibility and sustainability.
Students must study autonomously to assimilate the concepts and solve the proposed exercises.

LEARNING OBJECTIVES OF THE SUBJECT

The subject aims to:
· Introduce the aspects to be considered in the realization of low voltage electrical installations.
· Present the regulations and standards that are specific to its subject.
· Present the basic equipment used (Functions, main characteristics and main applications).
· Present the electrical symbols and basic connection diagrams (load power supply and distribution).
· Present and analyze the defects and disturbances, the effects and the protection methods.
· Present the criteria and calculation methods for the dimensioning and selection of the different elements that make up the installation.
- Introduction to Artificial Intelligence techniques applied to Low Voltage Installations.

STUDY LOAD

Type	Hours	Percentage
Hours large group	45,0	30.00
Self study	90,0	60.00
Hours small group	15,0	10.00

Total learning time: 150 h

CONTENTS

Unit 1. Low Voltage Electrical Installations: Generalities

Full-or-part-time: 6h
Theory classes: 3h
Self study : 3h

Unit 2. Interior installations for houses

Description:
Electrification levels. Points of use, number and characteristics of circuits. Basic circuits. Switchgear.

Related activities:
Lab Practice: 1. The Electrical Panel
Activity 1: Electrical Installation in a Standard Home

Full-or-part-time: 12h
Theory classes: 3h
Laboratory classes: 2h
Self study : 7h

Unit 3. Industrial Automation: Fundamentals

Description:
Basic diagrams. Power devices. Command and control equipment.

Full-or-part-time: 15h 30m
Theory classes: 3h
Laboratory classes: 4h
Self study : 8h 30m

Unit 4. Electrical power and Energy

Full-or-part-time: 14h
Theory classes: 3h
Laboratory classes: 1h
Self study : 10h

Unit 5. Grid connection: Regulations.

Full-or-part-time: 21h
Theory classes: 4h 30m
Self study : 16h 30m

Unit 6. Conductor Sizing

Description:
Criteria for: Imax, voltage drop, and short-circuit currents. Conductor protection coordination.

Full-or-part-time: 20h 30m
Theory classes: 6h
Self study : 14h 30m

Unit 7. Power Quality

Full-or-part-time: 3h
Theory classes: 1h 30m
Self study : 1h 30m

Unit 8. Protection elements

Full-or-part-time: 16h
Theory classes: 6h
Laboratory classes: 2h
Self study : 8h

Unit 9. Ground connection

Description:
Neutral regime, modeling and analysis of insulation defects and their protection. Earthing in LV installations.

Specific objectives:
Presentation and study of insulation defects and protection systems according to the neutral treatment used. Legal requirements. Study of LV earthing.

Full-or-part-time: 13h
Theory classes: 4h 30m
Laboratory classes: 2h
Self study : 6h 30m

Unit 10. Interior or Load installations

Full-or-part-time: 20h
Theory classes: 6h
Laboratory classes: 4h
Self study : 10h

Unit 11. Shortcircuit analysis

Full-or-part-time: 9h
Theory classes: 4h 30m
Self study : 4h 30m

GRADING SYSTEM

Assessment Methodology: This subject follows a continuous assessment methodology that consists of 4 independent assessment acts, each with a percentage weight equal to or greater than 16.66%.
The subject does not have a reassessment test.
Assessment instruments:
1. Continuous Assessment Tests (PAC) (30%): Completion of multiple-choice or T/F questionnaires, with possible penalty for incorrect answers.
2. Partial Controls (30%): Written tests (minimum 2) on solving problems in the design, calculation and dimensioning of electrical installations, with or without multiple-choice questions. If there are multiple-choice questions, incorrect questions may be penalized.
3. Activities (20%): Deliverables of exercises, problems or challenges, carried out in teams, may require in-person attendance
4. Laboratory practices (20%): Evaluation of the work carried out in the laboratory and of the technical reports derived from the practical sessions.

EXAMINATION RULES.

PAC: They can be done within the scheduled time or asynchronously online.
Controls: Face-to-face, within the scheduled time, only a non-programmable calculator is allowed. Other documentation, to be determined on the day of the test.
Activities: Deliverable, in groups of minimum 3, maximum 4 members. Can be online or on paper.
Laboratory Practices: Depending on the type of practice, to be determined by the Laboratory teacher.

BIBLIOGRAPHY

Basic:
- Schmelcher, Theodor; Guillén, Jorge. Manual de baja tensión : indicaciones para la selección de aparatos de maniobra, instalaciones y distribuciones. Berlin; Munich: Siemens-Aktiengesellschaft, [Abt. Verl.], 1984. ISBN 3800913976.

RESOURCES

Audiovisual material:
- Atenea