

Course guide

340668 - IEEE - Electrical Installations and Energy Efficiency

Last modified: 17/05/2023

Unit in charge: Vilanova i la Geltrú School of Engineering
Teaching unit: 709 - DEE - Department of Electrical Engineering.

Degree: BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Optional subject).

Academic year: 2023 **ECTS Credits:** 6.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: Ramon Caumons Sangrà

Others: Ramon Caumons Sangrà

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

1. CE21. Ability to design and calculate electrical installations of low or middle tension.

Transversal:

3. SUSTAINABILITY AND SOCIAL COMMITMENT - Level 3. Taking social, economic and environmental factors into account in the application of solutions. Undertaking projects that tie in with human development and sustainability.

4. TEAMWORK - Level 3. Managing and making work groups effective. Resolving possible conflicts, valuing working with others, assessing the effectiveness of a team and presenting the final results.

TEACHING METHODOLOGY

- In the lectures will be presented and developed the theoretical foundations of programmed materials. Consist of theoretical explanations complemented by activities to encourage participation, discussion and critical analysis by students.
- In the kinds of problems were raised and solved exercises for the areas covered. Students have to solve, individually or in groups, indicating problems.
- Within hours of laboratory practice, students will take the required and delivered its report of the activity along with appropriate calculations and critical considerations.
- It will realised group work during the year related to a specific topic of the course.

LEARNING OBJECTIVES OF THE SUBJECT

This subject deals with the design of protections for equipment and people, the type of neutral connection in the distribution in BT, as well as the grounding of electrical installations.

It also deals with energy efficiency and lighting savings, as well as electric power pricing.

Finally, the use of existing regulations and regulations, as well as the use of calculation software, is encouraged.

STUDY LOAD

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

Total learning time: 150 h

CONTENTS

(ENG) TEMA 1: Low voltage electric appliance

Description:

- Electrical appliance: definition, function and classification.
- Characteristic values.
- Automatic switches.
- Fuses.
- Contactors.

Full-or-part-time: 25h

Theory classes: 7h 30m

Laboratory classes: 2h 30m

Self study : 15h

(ENG) TEMA2:SYSTEM OF NEUTRAL AND PROTECTION OF THE PEOPLE

Description:

- Importance of neutral treatment in BT distribution. TT system.
- Introduction to the protection of people. The 5 golden rules.
- Classification of electrical accidents.
- Sensitivity of the human body to the passage of electric current. Physiological effects.
- Protection against direct and indirect contacts.
- The differential switch.
- The terrain as a conductor: measurement of resistivity.
- Measurement of the resistance of a grounding. More common low voltage electrodes.

Full-or-part-time: 25h

Theory classes: 7h 30m

Laboratory classes: 2h 30m

Self study : 15h

(ENG) TEMA 3: INSTALLATION AND PROTECTION OF ELECTRICAL SYSTEMS

Description:

- General.
- Calculation of the drivers section. Design criteria.
- Calculation of protective devices.
- Selectivity.
- Regulations.
- Calculation software.

Full-or-part-time: 25h

Theory classes: 7h 30m

Laboratory classes: 2h 30m

Self study : 15h

(ENG) TEMA 4: Introduction to the BT Power Installation Project

Description:

- General. Classification of electrical installations.
- Regulations.
- Parts of a low-voltage electrical installation
- Types of supplies for low voltage.
- Load forecast. Concurrency coefficients.
- The Electric Project. Methodology to follow.

Full-or-part-time: 25h

Theory classes: 7h 30m

Laboratory classes: 2h 30m

Self study : 15h

(ENG) TEMA 5: Energy efficiency in interior lighting.

Description:

- Fundamental magnitudes.
- Light generation through electrical power. LED lamps.
- Photometry.
- Interior lighting. Regulations.
- Energy efficiency of indoor lighting installations.
- Calculation software.

Full-or-part-time: 25h

Theory classes: 7h 30m

Laboratory classes: 2h 30m

Self study : 15h

(ENG) TEMA 6: Electricity pricing.

Description:

- General on the billing of electricity. Liberalization of the electricity sector.
- Energy billing. Invoice optimization.
- Practical considerations on reactive energy compensation.
- Compensation types: Global, partial and individual.
- The counter. Measurement schemes.

Full-or-part-time: 25h

Theory classes: 7h 30m

Laboratory classes: 2h 30m

Self study : 15h

(ENG) PRACTICES

Description:

1. Protective and grounding appliance. Field measurements.
2. Design and protection of electrical installations. Using calculation software.
3. Efficient interior lighting design. Using calculation software.



GRADING SYSTEM

60 % theory
40 % practices.

REEVALUATION:

If EPSEVG establishes a re-evaluation for this matter, it shall be done in accordance with its rules. The reassessable part would be the one for the exams (60%).

EXAMINATION RULES.

- The written tests are classroom and individual.
- In classes of problems and / or laboratory practices will be assessed, where appropriate, previous work together with presentation of results of the activity.

BIBLIOGRAPHY

Basic:

- Bueno, Benilde. Reglamento electrotécnico para Baja Tensión. última. Marcombo, ISBN 9788474742916.
- Barrero, Fermín. Sistemas de energía eléctrica. Madrid: Thomson, 2004. ISBN 9788497322836.
- Villar Burke, Rafael; Sorribes Gil, Marta; Jiménez González, Daniel; Sobaler Rodríguez, Jesús. DB HE 2019 : guía de aplicación [on line]. Madrid: Centro de Publicaciones, Secretaría General Técnica, Ministerio de Transportes, Movilidad y Agenda Urbana, 2020 [Consultation: 07/03/2022]. Available on: https://www.codigotecnico.org/pdf/GuiasyOtros/Guia_aplicacion_DBHE2019.pdf. ISBN 9788449810466.
- Sá Lago, Alfred. Aplicaciones del led en diseño de iluminación [on line]. Barcelona: Marcombo, 2015 [Consultation: 21/03/2024]. Available on : https://search-ebscohost-com.recursos.biblioteca.upc.edu/login.aspx?direct=true&AuthType=ip,uid&db=nlebk&AN=2749580&site=ehost-live&ebv=EB&ppid=pp_Cover. ISBN 9788426718051.
- Gago Calderón, Alfonso; Fraile, Jorge. Iluminación con tecnología LED. Madrid: Paraninfo, 2012. ISBN 9788428333689.
- Espanya. jurisdicció promulgadora. Código técnico de la edificación. 8a ed. Madrid: Editorial Tecnos (Grupo Anaya), 2017. ISBN 9788430971701.