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| POLI ESCOLA SUPERIOR TECNOLOGIA GESTÃO TÉCNICO GUARDA | SUBJECT DESCRIPTION | MODELO PED.013.03 |
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| Course | Mechanics and Industrial Informatics | | | | | |
| Subject | Industrial Eletronics | | | | | |
| Academic year | 2023-2024 | Curricular year | 3rd | Study period | 1st semester | |
| Type of subject | Compulsory | Student workload (H) | Total: 175.5 | Contact: 60 | ECTS | 6,5 |
| Professor(s) | Adérito Neto Alcaso | | | | | |
| <input checked="" type="checkbox"/> Area/Group Coordinator <input type="checkbox"/> Head of Department | (select) | Rui Pitarma Ferreira | | | | |

PLANNED SUBJECT DESCRIPTION

1. LEARNING OBJECTIVES

It is intended that the students become aware of the importance of electronics, in particular for high power applications in the industrial context, identifying devices and technologies of electronic energy/power converters, in order to be able to select, install, configure, operate and maintain these systems, and namely:

- O1 Identify the need and applications of electronics in energy and industrial systems;
- O2 Identify the most common power electronic devices and their properties;
- O3 Identify the most common electronic structures used in power converters;
- O4 Characterize main aspects of the operation and application of power electronic systems.

2. PROGRAMME

P1 – POWER SEMICONDUCTOR DEVICES

- Semiconductors, PN junction and diodes
- Thyristors and triacs
- Bipolar, FET and IGBT transistors
- Command, operation and application of power semiconductor devices

P2 - AC-DC CONVERTERS

- Single-phase and three-phase rectifiers
- Half-wave and full-wave rectifiers
- Controlled and uncontrolled rectifiers
- Association of rectifiers
- Command, operation, application and maintenance and rectifiers

P3 - DC-DC CONVERTERS

- Reducing choppers (buck)
- Elevator choppers (boost)
- Reducing-elevator choppers (buck-boost)
- Command, operation, application and maintenance of DC-DC converters

P4 - DC-AC CONVERTERS

- Single-phase and three-phase voltage inverters
- Voltage and current inverters
- Association of inverters and multilevel converters
- Command, operation, application and maintenance of corrugators

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P5 - AC-AC CONVERTERS

- Single-phase and three-phase converters
- Graders, cycloconverters and matrix converters
- Command, operation, application and maintenance of AC-AC converters

3. COHERENCE BETWEEN PROGRAMME AND OBJECTIVES

Objective 1 (O1) is transversal to all contents, O2 is mainly related to Chapter 1 (P1), with O3 and O4 mainly associated with contents from P2 to P5.

4. MAIN BIBLIOGRAPHY

Mandatory:

- Teacher's 'notes.

Recommended:

- Y. Rozanov, S. Ryykin, E. Chaplygin, P. Voronin, "Power Electronics Basics", (2016), CRS Press (ISBN: 99781482298802);
- Daniel Hart "Power Electronics", (2011), McGraw-Hill, (ISBN: 9780073380674), (available at site academia.edu).

5. TEACHING METHODOLOGIES (INCLUDING EVALUATION)

Teaching methodologies:

- Expository method using a video projector of the teacher's notes and online simulators;
- Experimental demonstrative method using demonstrations and laboratory work related with programmes P2 to P5.

Evaluation methodologies:

- Continuous evaluation grade: written test*50%+ laboratory work*40% + behaviour *10% To approve in continuous evaluation the student must have a grade higher than 7 in written test and to 9.5 in laboratory work.
- Exam evaluation grade: best value between continuous evaluation and written exam evaluation. In any case approval requires a final grade or equal or higher than 9.5.

6. COHERENCE BETWEEN TEACHING METHODOLOGIES AND OBJECTIVES

1- The expository method allows to present the principles and applications associated with electronics applied in the industrial scope.

- The demonstration method, virtual and in laboratory, allows the analyse and test of the operation of power/energy converters.

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7. ATTENDANCE

There are no minimum requirements, but attendance is considered for evaluation.

DATE

2 de outubro de 2024

SIGNATURES

Professor(s), Area/Group Coordinator or Head of Department signatures

Professor



(signature)

Area/Group Coordinator

(signature)