

Academic Year/course: 2021/22

29629 - Electric motor drives

Syllabus Information

Academic Year: 2021/22

Subject: 29629 - Electric motor drives

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 430 - Bachelor's Degree in Electrical Engineering

ECTS: 6.0

Year: 3

Semester: Second semester

Subject Type: Compulsory

Module:

1. General information

1.1. Aims of the course

The main goal of the course is that the student is able to select and control the most suitable electric drive for an specific industrial application. Both the classic and the latest control techniques are studied; Emphasizing, above all, the practical aspects

1.2. Context and importance of this course in the degree

To take it requires a solid knowledge of "Fundamentals of Electrotechnics" (1st), Analysis of Electrical Circuits (2nd), Fundamentals of Electronics (2nd), Automatic Systems (2nd), Electrical Machines I (2nd), Electrical Machines II (3rd) and Power Electronics (3rd).

1.3. Recommendations to take this course

It is recommended to have passed the course Electrotechnics, Analysis of Electrical Circuits, Fundamentals of Electronics, Automatic Systems, Electrical Machines I and II, Power Electronics.

The study and continued work, from the first day of the course, are essential to overcome the subject with the maximum advantage.

It is important to resolve any doubts that may arise as soon as possible, for which the student has the advice of the teacher, both during classes and in the hours of tutoring dedicated to it.

2. Learning goals

2.1. Competences

Upon passing the subject, the student will be more competent to ...

Generic skills:

Ability to conceive, design and develop Electrical Engineering projects in the field that is intended for the Degree (C1)

Ability to combine basic and specialized knowledge of Electrical Engineering to generate innovative and competitive proposals in professional activity (C3)

Ability to solve problems and make decisions with initiative, creativity and critical reasoning (C4)

Ability to communicate and transmit knowledge, abilities and skills in Spanish (C6)

Ability to use the techniques, skills and tools of Electrical Engineering necessary to practice it (C7)

Ability to analyze and assess the social and environmental impact of technical solutions acting with ethics, professional responsibility and social commitment, always seeking quality and continuous improvement (C8)

Ability to work in a multidisciplinary group and in a multilingual environment (C9)

Ability to manage information, manage and apply the technical specifications and legislation necessary for the practice of Electrical Engineering (C10)

Specific competences:

Ability to know and understand basic knowledge about the use and programming of computers, operating systems, databases and computer programs with engineering application (C14)

Knowledge of control of machines and electrical drives and their applications (C31)

2.2. Learning goals

The student, to pass this subject, must demonstrate the following results ...

Has the ability to apply quantitative methods and computer programs to the analysis and design of electrical machines to solve engineering problems.

Understands and knows how to apply system approaches to engineering problems related to the control of electrical machines.

He has the aptitude to investigate and define a problem and identify restrictions in the analysis, design and operation of electrical machines.

It includes the needs of the user and consumer in the selection of electrical machines, the corresponding drives, and / or in the design of said machines.

Use creativity to establish innovative solutions in the control of electric machine drives.

Learn about the characteristics of materials, equipment, processes and products related to the design and operation of electrical machines.

He has laboratory and workshop work skills.

Includes the use of technical literature and other sources of information.

2.3. Importance of learning goals

From the industrial point of view, the drives of electrical machines are present in all manufacturing processes, so knowledge of them is essential for a Graduate in Electrical Engineering and must be able to make a correct selection for a specific application .

3. Assessment (1st and 2nd call)

3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

In order to encourage the student's continued work, a global evaluation system will be applied, made up of the assessment of the following activities:

1) Final Exam (60%)

Composed of theory and problems. There will be a written exam at each official call.

The qualification of this activity will be from 0 to 10 points and will suppose 60% of the student's global qualification.

To pass the course, it is necessary to obtain a minimum score of 3.5 points out of 10.

2) Laboratory Practices (10%)

Laboratory practices are compulsory and will be assessed in the laboratory session itself.

The qualification of this activity will be from 0 to 10 points and will suppose 10% of the global qualification of the student.

To pass the subject, it is necessary to obtain a minimum score of 4.5 points out of 10.

The student who attends an official examination without having completed or passed the practices in ordinary sessions, must pass a practical exam in the laboratory to pass the subject, and must obtain at least 5 points out of 10.

3) Evaluable Activities (30%)

In order to encourage continuous student work, in addition to laboratory practices, other evaluable activities will be carried out throughout the semester. These activities consist of:

- Resolution and defense of two practical theoretical works. The overall rating of this activity will be from 0 to 10 points, assuming 20% of the overall rating.

- Weekly works for continuous evaluation. 5 control works must be carried out to be delivered weekly. Its evaluation will serve together with the theoretical-practical works for a possible evaluation of the subject in case the face-to-face activity cannot be carried out

Extraordinary global assessment

Those students who do not follow the ordinary assessment, detailed in the previous 3 sections, will take a written exam and a practical laboratory exam. The assessment of the written exam will be 75% and that of the practical laboratory exam, 25% of the overall grade. In both tests they must obtain at least 5 points out of 10.

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The teaching process will be developed in three main levels: theory classes, problems and laboratory, with increasing level of

student participation. In theory classes the fundamentals of the subject will be exposed, illustrated with different examples. In the problem classes, exercises and type cases will be developed. Laboratory practices will be carried out in small groups, where the student will put into practice the knowledge acquired in the theory and problem classes.

4.2. Learning tasks

The program offered to the student to help him achieve the expected results includes the following activities ...
work with the classroom teacher: 2.4 ECTS (60 hours)

Master classes (35 hours).

Exhibition sessions and content explanation. The concepts and foundations of the analysis of industrial drives will be presented, illustrating them with real examples. Student participation will be encouraged through questions and short discussions.

Practical classes of problems (10 hours).

Problems and cases will be developed with the participation of the students, coordinated at all times with the theoretical contents. Students will be encouraged to previously work on problems. Part of these hours may be devoted to the evaluable learning activities specified in each course.

Laboratory (15 hours).

The student will calculate, simulate, assemble and check the operation of the different industrial drives studied in class. You will have a script of the practice, which you will have to prepare beforehand. A part of these hours may be devoted to the evaluable learning activities specified in each course.

Other evaluable activities.

They may have a non-face-to-face part (personal work of the student) and a face-to-face / non-face-to-face part (whose hours are already counted in the Practical Problems and Laboratory classes).

self-employment: 3.6 ECTS (90 hours)

Supervised works (26 hours not in person).

Periodically exercises and cases to be developed on their own will be proposed to the student. These may be obtained from the Digital Teaching Ring (<http://moodle.unizar.es>). This section also includes the preparation of laboratory practices and additional activities.

Individual study (60 non-contact hours).

Continuous student work will be promoted through the homogeneous distribution throughout the semester of the various learning activities.

Assessment (4 hours).

In addition to the qualifying function, the evaluation is also a learning tool with which the student checks the degree of understanding and assimilation that has been achieved.

Tutorships. Direct attention to the student, identification of learning problems, orientation in the subject, attention to exercises and work

4.3. Syllabus

The course will address the following topics:

- 1. General aspects of industrial drives
 - 1.1. Optimal selection
 - 1.2. Overview of power electronics devices used in industrial drives
- 2. Industrial drives for DC machines
 - 2.1. AC/DC converter
 - 2.2. DC/DC converter
 - 2.3. DC brushless drives
- 3. Industrial drives for AC induction machines with squirrel cage
 - 3.1. Soft starter
 - 3.2. AC/DC/AC converters with DC link
 - 3.3. AC/AC converters
 - 3.4. Vector Control
- 4. Industrial drives for AC induction machines with double fed

4.4. Course planning and calendar

The master classes and problems and the practical sessions in the laboratory are given according to the schedule established by the center and it is published before the course start date (<http://eina.unizar.es>).

Each teacher will report their tutoring hours.

The rest of the activities will be planned according to the number of students and will be announced well in advance. It will be available at <http://moodle.unizar.es>

The detailed calendar of the various activities to be carried out will be established once the University and the Center have approved the academic calendar (which may be consulted on the center's website).

The relationship and date of the various activities, along with all kinds of information and documentation on the subject, will be published at <http://moodle.unizar.es/> (Note. To access this website the student must be enrolled).

4.5. Bibliography and recommended resources

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=29629&Identificador=14512>