Universidad Zaragoza
1542

Year : 2018/19

60813 - Electrical machinery

Syllabus Information

Academic Year:	2018/19
Subject:	60813 - Electrical machinery
Faculty / School:	110 -
Degree:	532 - Master's in Industrial Engineering
ECTS:	6.0
Year:	
Semester:	First semester
Subject Type:	Optional
Module:	---

General information

Aims of the course

Context and importance of this course in the degree

Recommendations to take this course

Learning goals

Competences

Learning goals

Importance of learning goals

Assessment (1st and 2nd call)

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

Methodology, learning tasks, syllabus and resources

Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. It promotes continuous work and focuses on the basic theoretical aspects necessary to understand, analyse and apply to solve real problems. A wide range of teaching and learning tasks are implemented, such as

- Lectures, where the whole group receives the theoretical concepts of the course complemented with

problem-solving tasks.
- Laboratory sessions, which will be carried out in groups of two or three students. The goal of these sessions is to apply the knowledge acquired in lectures, paying special attention to the connection of circuits, electrical measurements and the connection and use of electrical machines. With these sessions the students will become familiar with electrical apparatus and machines, get manual experience, and strengthen their theoretical knowledge.
- Along the course, students will carry out some assignments supervised by the lecturer.

Classroom materials will be available via Moodle. These include a repository of the lecture notes used in class, the course syllabus, as well as other course-specific learning materials.

Learning tasks

The course includes the following learning tasks:

- **Lectures** (45 hours). Explanatory sessions of the theoretical concepts will be carried out, related to the different types of electrical machines (constructive parts, operation principles, connections, etc.). The student will have material prepared by the lecturers available on the Moodle platform (http://moodle.unizar.es/), which will help following the theory sessions. Additionally, problems and practical cases related to lectures will be solved (circuit analysis, electrical machines selection, etc.)
- **Laboratory sessions** (15 hours). The student will have a set of task guidelines for each session available on Moodle (http://moodle.unizar.es/). They must be read prior to each session, and they will include the annotations made by the student during the session.
- **Guided assignments** (15 hours). At the end of each topic, the students will be offered the possibility of solving problems and practical cases proposed by the lecturer, similar to the ones solved in lectures. The problems will be available on Moodle.
- **Autonomous work and study** (72 hours). Distribution of coursework along the 15 weeks of the course. Continuous work will be encouraged, distributing learning task in a homogeneous way along this period.
- **Assessment** (3 hours). Besides its grading function, evaluation is also a learning tool for the student to assess the degree of understanding and assimilation of the acquired knowledge and abilities.

Syllabus

The course will address the following topics:

Unit 1. Transformers

- Introduction. Ideal transformer. Constructive aspects. Equivalent circuit. Efficiency. Three-phase transformers. Angular displacement. Parallel operation. Autotransformers. Measurement and protection transformers.

Unit 2. Asynchronous machines

- Introduction. Constructive aspects, short-circuit rotor and wound rotor. Rotating magnetic fields generated by single phase and three-phase systems. Operating principle as motor, brake and generator. Equivalent circuit. Power balance. Mechanical characteristic. Asynchronous motor starting. Asynchronous motor speed control.

Unit 3. Synchronous machines

- Introduction. Constructive aspects. Operation principle of a synchronous generator. No-load operation, loaded operation. Armature reaction. Phasor diagram. Equivalent circuit. Operation connected to an infinite power grid. Operation connected to an isolated grid.

Unit 4. Direct current machines

- Introduction. Constructive aspects. Operation principle. D.C. motors. D.C. generators.

Course planning and calendar

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course, will be provided on the first day of class or please refer to the EINA website and the Moodle platform (http://moodle.unizar.es/).

Bibliography and recommended resources