Universidad Zaragoza
1542

Year : 2018/19

60819 - Power and Digital Electronics

Syllabus Information

Academic Year:	2018/19
Subject:	60819 - Power and Digital Electronics
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 is based on teaching sessions and laboratory session. In the teaching sessions, the challenging-method is used, which consists on the introduction of a new concept and the consequent learning of a paradigm or tool. The next steps are followed:

- First, a Challenging Problem (CP) is introduced. This CP is related to a real scenario in such a way that a new

concept, paradigm or tool should be required for its solving.
- Discussion groups of 4 or 5 students are organized (a group per table-array, for example)
- These groups must prepare the CP during a time (from 5 to 60 minutes, depending on the CP). They must propose and evaluate several possible solutions using exclusively their own knowledge and capacities.
- After this group discussion, a brain-storming session is organized. For doing so each group selects a speaker. The teacher writes or draws on the blackboard all the proposed solutions.
- Once all the proposed solutions are listed, they are analyzed in a classroom discussion. Students must evaluate the suitability of each proposed solution, retaining the right ideas and rejecting the deficient ones. During this phase the teacher acts as a simple guide, stimulating and leading the students towards the right way.
- At the end, the teacher explains the new device or concept, including the related theory and training problems. This is the final phase of the CPM. It is important to explain "why" the solution is carried out instead of the "how".

Learning tasks

The course includes the following learning tasks:

Classroom activities (2.4 ECTS: 60 hours)

- **T1 T2 Teaching sessions** (T1 15 hours, T2 30 hours). The challenging-method.
- **T3 Laboratory sessions** (15 hours). Laboratory sessions are organized in small groups and students will implement and test the experimental validity of the solutions and problems carried out in class.

Autonomous work (3.6 ECTS: 90 hours)

- **T6 Assignments** (25 hours). Students must complete, analyse and organize all the data and knowledge required for a successful achievement of the laboratory session.
- **T7 Autonomous work and study** (60 hours). Individual work of each student in order to achieve a comprehensive knowledge of the concepts and methods required for passing the course.
- **T8 Assessment** (5 hours). The assessment activities evaluate the degree of achievement of the students and also give them feedback of their skills and knowledge in the field of the course.

Syllabus

The course will address the following topics:

Lectures

1. Fundamentals of microcontrollers
2. Design of microcontroller-based electronic systems
3. Fundamentals of power electronics
4. Power conversion: DC-DC, DC-AC, AC-AC and AC-DC
5. Fundamentals of power electronics technology

Laboratory sessions

- Introduction to microcontroller-based design
- Speed variation of a motor using a PWM generated by a microcontroller
- Simulation and experimental implementation of a DC-DC converter
- Simulation and experimental show of an inverter
- Thyristor-based control of the luminosity of an incandescent lamp

Course planning and calendar

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

Bibliography and recommended resources