VNIVERSITAT DE VALÈNCIA

Course Guide
34951 Ancillary techniques in industrial electronics

COURSE DATA

Data Subject	
Code	34951
Name	Ancillary techniques in industrial electronics
Cycle	Grade
ECTS Credits	6.0
Academic year	2016 - 2017

Study (s)

Degree	Center	Acad. year	Period
1402 - Degree in Telecommunications Electronic Engineering	School of Engineering	4	Second term
1404 - Degree in Industrial Electronic Engineering	School of Engineering	4	Second term

Subject-matter

Degree	Subject-matter	Character
1402 - Degree in Telecommunications Electronic Engineering	22 - Optional subjects	Optional
1404 - Degree in Industrial Electronic Engineering	21 - Optional subjects	Optional

Coordination

Name	Department
SANCHIS KILDERS, ESTEBAN	242 - Electronic Engineering

SUMMARY

This subject is optional and is lectured in the fourth year of the Degree of Industrial Electronics Engineering. It has a load of 6 ECTS, which translates into a total workload for the student of 150 hours. 60 hours are in the classroom and 90 hours are individual work of the student. The 6 ECTS are all of lab work.

In this subject, students will learn special skills to design a complete Printed Circuit Board, starting with a correct schematics design and continuing with the proper design of the printed circuit board itself. A available software tool will be used, but the skills obtained can be applied to any software tool available in the market

Once the student passes this subject he will be able to design a complete Printed Circuit Board (PCB) following the whole process and complying with the specifications granted. Design criteria to improve electromagnetic compatibility will also be learned.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

It is highly recommendable that the student has passed the subjects related to electronics belonging to the matter of Principles of Electronics and Electric Technology of the first and second year of the degree.

OUTCOMES

1404 - Degree in Industrial Electronic Engineering

- CO1 - More comprehensive skills than those acquired in compulsory subjects must be acquired in elective subjects.

LEARNING OUTCOMES

1. Ability to design printed circuit boards.

   a) design of the electronic schematics,

   b) design of the PCB

   c) generation of the manufacturing files (gebers and excellons).

2. Ability to know the design criteria of practical circuits

   a) use of decoupling capacitors,

   b) correct placement of components in industrial applications,

   c) routing technics to reduce electromagnetic noise

3.Ability to use the software to design PCBs

DESCRIPTION OF CONTENTS

1. Introduction

1. Goals.
2. General procedure.
3. Software
4. Index of terms

2. Schematics

1. Introduction to the schematic
2. Building symbols and libraries
3. Interconnections, properties and details
4. Errors (DRCs)
5. Netlist
6. Reports

3. Printed Circuit Board (PCB)

1. Introduction to the PCB
2. Component package
3. Making footprints and libraries.
4. Creating the new PCB and assigning the new properties
5. Creating the board outline

4. Placement

1. Introduction to placement
2. Basic rules
3. Minimum distances (clearance)
4. Non electric components
5. Decoupling capacitors
6. Footprint verification
7. Applying changes (AutoECO)

5. Routing

1. Introduction to routing
2. Basic rules and parameters of the router
3. Layers
4. Tracks clearance
5. Tracks width
6. Vias

7. Thermal relief
8. Manual routing or autorouting
9. Copper pours.

6. Errors and clean-ups

1. Introduction
2. Errors (DRCs)
3. Component renaming
4. Layout on silk screen
5. PCB identifier
6. Layers identifier
7. Fiducials
8. Dimensions and notes
9. Test points
10. Back annotate

7. Gerbers and reports

1. Introducción a los gerbers.
2. Formato gerber y tabla de aperturas.
3. Ficheros de taladros.
4. Listados necesarios.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	40,00	100
Laboratory practices	20,00	100
Study and independent work	10,00	0
Readings supplementary material	5,00	0
Preparation of evaluation activities	15,00	0
Preparing lectures	15,00	0
Preparation of practical classes and problem	45,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

Teaching methodology will be based on practical learning. The student will have to design three complete PCB.

EVALUATION

Evaluation has two options.

The first option is a continuous evaluation through the whole quarter. The student will have to make three practical works (complete PCB designs) with a weight of 20% for P1, 35% for P2 and 45% for P3 on the 50% of the final mark of the subject. At the end of the quarter he will have a compulsory final exam (related to theory) with a weight of 50% of the mark.

The minimum mark for both parts is 5 over 10. Otherwise the student will fail the subject.

The student may use notes and books in the exam.

If the student fails the practical part he will have to do also a practical exam that will then weight the other 50%.

Attendance is compulsory and only 2 fails will be acceptable. Otherwise the student will have to make both exams to pass the subject.

REFERENCES

Basic

- IPC (2005): IPC-7351 Generic Requirements for Surface Mount Design and Land Pattern Standard.
- Printed Circuits Handbook, 7th Edition, Clyde Coombs, Happy Holden, McGraw-Hill Education

Additional

- Kicad Like a Pro: Learn the World's Favourite Open Source PCB Electronic Design Automation tool and make your own professional PCBs!, Peter Dalmaris,
  Tech Explorations.