

**1. General information****Course:** ELECTRONIC TECHNOLOGY**Type:** ELECTIVE**Degree:** 385 - DEGREE IN TELECOMMUNICATIONS TECHNOLOGY ENGINEERING**Center:** 308 - SCHOOL POLYTECHNIC OF CUENCA**Year:** 4**Main language:** Spanish**Use of additional languages:****Web site:****Code:** 59668**ECTS credits:** 6**Academic year:** 2020-21**Group(s):** 30**Duration:** First semester**Second language:****English Friendly:** Y**Bilingual:** N**Lecturer:** ROBERTO ZANGRONIZ CANTABRANA - Group(s): 30

Building/Office	Department	Phone number	Email	Office hours
E. Politécnica Cuenca (0.03)	INGENIERÍA ELÉCTRICA, ELECTRÓNICA, AUTOMÁTICA Y COMUNICACIONES	926054061	roberto.zangroniz@uclm.es	It will be established at the beginning of the course.

**2. Pre-Requisites**

It is recommended that students have previously followed and passed the courses "Components and Circuits", "Electronics Devices", "Electronics I", "Electronics II", and "Digital Electronics Systems".

More precisely, students are required to understand and handle basic concepts about electronics components, analysis and design of electronics circuits, power conversion, and digital electronics systems.

**3. Justification in the curriculum, relation to other subjects and to the profession**

This elective course, taught in the penultimate semester of the degree program, aims to integrate the knowledge acquired in the areas of electronics and projects. For this purpose, those knowledge will be applied to a guided design project of a Printed Circuit Board.

Throughout the course, basic knowledge acquired in the subjects "Electronic Devices", "Electronics I", and "Digital Electronics Systems" will be applied more directly.

Customized design of printed circuit boards and their manufacturing process, as well as a basic knowledge of electronic technology, open a wide range of professional opportunities in the field of engineering.

**4. Degree competences achieved in this course****Course competences**

Code	Description
E07	The ability to use communication and computer applications (office automation, databases, advanced calculation, project management, visualisation, etc.) to support the development and operation of telecommunication and electronic networks, services and applications.
E08	The ability to use computer tools to search for bibliographic resources or for information related to telecommunications and electronics.
E28	The ability to analyse components and its specifications for guided and non-guided communications systems.
G01	Knowledge of Information and Communication Technologies (ICT).
G03	Ethical commitment and professional ethics.
G06	Knowledge of basic subjects and technologies, enabling students to learn new methods and technologies, as well as providing great versatility to adapt to new situations
G12	The ability to work in a multidisciplinary group and in a multilingual environment and to communicate, both in writing and orally, knowledge, procedures, results and ideas related to telecommunications and electronics
G13	The ability to look for and understand information, whether technical or commercial in different sources, to relate and structure it to integrate ideas and knowledge. Analysis, synthesis and implementation of ideas and knowledge.

**5. Objectives or Learning Outcomes****Course learning outcomes****Description**

Acquisition of knowledge and skills in the use of computer tools that provide the student a greater operational capacity of the acquired knowledge.

Application of current and emerging technologies in real situations within the telecommunication field.

Identification and understanding of emerging technologies within the ICT field, such as electronic technology, biometrics, etc.

Correct use of oral and written expression to convey ideas, technologies, results, etc.

Use of ICT to achieve the specific objectives set in the subject.

Analysis, synthesis and compression of technical documentation and mastery of specific vocabulary.

**6. Units / Contents****Unit 1: Printed circuit technology and design overview****Unit 1.1** Printed Circuit Boards (PCB)

- Unit 1.2 PCB Manufacture
- Unit 1.3 Non-ideal components
- Unit 2: Computer aided printed circuit design
  - Unit 2.1 Design tools
  - Unit 2.2 Circuit schematic
- Unit 3: Design rules and techniques
  - Unit 3.1 Layers and rules
  - Unit 3.2 Placement and layout
- Unit 4: Post-processing and industrial standards
  - Unit 4.1 Design for manufacturing
  - Unit 4.2 Circuit verification
- Unit 5: [LAB]
  - Unit 5.1 Components
  - Unit 5.2 Schematic
  - Unit 5.3 Layout
- Unit 6: [PROJECT]
  - Unit 6.1 Design and manufacture

#### ADDITIONAL COMMENTS, REMARKS

Hardware and software tools, available at electronics laboratory, will be used to develop the proposed hands-on experiments.

#### 7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	E28 G01	0.95	23.75	N	-	
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	E07 E08 E28 G13	0.45	11.25	N	-	
Laboratory practice or sessions [ON-SITE]	Practical or hands-on activities	E07 E08 E28 G01 G03 G06 G12 G13	0.8	20	N	-	
Writing of reports or projects [OFF-SITE]	Problem solving and exercises	E07 E08 E28 G01 G03 G06 G12 G13	1.6	40	N	-	
Study and Exam Preparation [OFF-SITE]	Practical or hands-on activities	E07 E08 E28 G01 G03 G06 G12 G13	1	25	N	-	
Other on-site activities [ON-SITE]	Assessment tests	E07 E08 E28 G01 G03 G06 G12 G13	0.07	1.75	Y	Y	Lab
Study and Exam Preparation [OFF-SITE]	project-based learning	E07 E08 E28 G01 G03 G06 G12 G13	1	25	N	-	
Other on-site activities [ON-SITE]	Assessment tests	E07 E08 E28 G01 G03 G06 G12 G13	0.04	1	Y	Y	Project and homework
Individual tutoring sessions [ON-SITE]		E07 E08 E28 G01 G03 G06 G12 G13	0.09	2.25	N	-	
<b>Total:</b>			<b>6</b>	<b>150</b>			
<b>Total credits of in-class work: 2.4</b>			<b>Total class time hours: 60</b>				
<b>Total credits of out of class work: 3.6</b>			<b>Total hours of out of class work: 90</b>				

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

#### 8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Test	60.00%	60.00%	Lab
Test	40.00%	40.00%	Project and homework
<b>Total:</b>	<b>100.00%</b>	<b>100.00%</b>	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

#### Evaluation criteria for the final exam:

##### Continuous assessment:

In order to pass the course, it is mandatory to submit all lab tasks and obtain a grade higher than 4 points (out of 10) in each compulsory activity. In any case, the final grade must be equal or higher than 5 points (out of 10).

In the case of failing the course, the average mark on the laboratory activities (if it is equal or higher than 5 points) will be maintained for the next offering, unless the student voluntarily decides to retake this set of activities.

##### Non-continuous evaluation:

In order to pass the course, it is mandatory to submit all lab tasks and obtain a grade higher than 4 points (out of 10) in each compulsory activity. In any case, the final grade must be equal or higher than 5 points (out of 10).

In the case of failing the course, the average mark on the laboratory activities (if it is equal or higher than 5 points) will be maintained for the next offering, unless the student voluntarily decides to retake this set of activities.

#### Specifications for the resit/retake exam:

Students will be able to recover the compulsory activities by means of an exam on the date set by the management of the centre.

**Specifications for the second resit / retake exam:**

Students will be able to recover the compulsory activities by means of an exam on the date set by the management of the centre.

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
Writing of reports or projects [AUTÓNOMA][Problem solving and exercises]	40
Study and Exam Preparation [AUTÓNOMA][Practical or hands-on activities]	25
Other on-site activities [PRESENCIAL][Assessment tests]	1.75
Study and Exam Preparation [AUTÓNOMA][project-based learning]	25
Other on-site activities [PRESENCIAL][Assessment tests]	1
Individual tutoring sessions [PRESENCIAL][ ]	2.25
<b>General comments about the planning:</b> The topics will be taught consecutively adapting to the actual calendar that is held in the semester in which the course is located. Planning can be adapted depending on the development of the course.	
Unit 1 (de 6): Printed circuit technology and design overview	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	7.75
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2.5
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	4.5
Unit 2 (de 6): Computer aided printed circuit design	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	7
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2.5
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	4.5
Unit 3 (de 6): Design rules and techniques	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	4.5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	3.75
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	5
Unit 4 (de 6): Post-processing and industrial standards	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	4.5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2.5
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	6
Global activity	
Activities	hours
Class Attendance (theory) [PRESENCIAL][Lectures]	23.75
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	11.25
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	20
Writing of reports or projects [AUTÓNOMA][Problem solving and exercises]	40
Other on-site activities [PRESENCIAL][Assessment tests]	1.75
Individual tutoring sessions [PRESENCIAL][ ]	2.25
Other on-site activities [PRESENCIAL][Assessment tests]	1
Study and Exam Preparation [AUTÓNOMA][project-based learning]	25
Study and Exam Preparation [AUTÓNOMA][Practical or hands-on activities]	25
<b>Total horas: 150</b>	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Chris Robertson	Printed circuit board designer's referente	Prentice Hall		978-0130674814	2003	
Clyde F. Coombs	Printed circuits handbook	McGraw-Hill		978-0071467346	2007	