UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: ELECTRONICS II
Code: 59615
Type: CORE COURSE
ECTS credits: 6
Degree: 385 - DEGREE IN TELECOMMUNICATI TECHNOLOGY ENGINEERING
Academic year: 2020-21
Center: 308 - SCHOOL POLYTECHNIC OF CUENCA
Group(s): 30
Year: 2
Duration: C2
Main language: Spanish
Second language:
Use of additional languages:
English Friendly: Y
Web site:
Bilingual: N

Lecturer: **RAUL ALCARAZ MARTINEZ** - Group(s): **30**

Building/Office	Department	Phone number	Email	Office hours
E. Politécnica Cuenca (0.03)	INGENIERÍA ELÉCTRICA, ELECTRÓNICA, AUTOMÁTICA Y COMUNICACIONES	926054053	raul.alcaraz@uclm.es	This information will be published before the course starts

2. Pre-Requisites

According to the UCLM regulation, no prerequiste courses can be established. Nonetheless, it is recommended that students have previously followed and, if possible, passed the courses of “Fundamentals of Mathematics I”, “Fundamental of Mathematics II”, “Fundamentals of Mathematics III”, “Fundamentals of Physics I”, “Fundamentals of Physics II”, “Components and Circuits” y “Electronics Devices”. More precisely, students are required to undersand and handle basic concepts about derivation and intregration, solving systems of linear equations, spectrial analysis and Fourier Series, electromagnetism and wave propagation, analysis of electrical circuits, design of resonant circuits, physics of semiconductors, analysis of circuits with diodes, transistors and fotonic devices, and finally amplification. Students should also have some basic notions about the software Matlab.

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

Electronics plays a key role in many branchs of the Telecommunications engineering. Thus, this course exposes students for the first time to fundamental concepts of three-phase voltages and powers, transformers, single-phase and three-phase rectifiers, isolated and non-isolated dc-dc converters, single-phase and three-phase inverters, and photovoltaic installations. The knowledge gained in this course will hence be required to understand more advanced concepts in upper subjects related to high frequency electronics and medical devices.

4. Degree competences achieved in this course

Course competences

Code	Description
E06	The ability to independently acquire new knowledge and techniques suitable for the design, development or operation of telecommunication systems and services.
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.
E16	The ability to use different sources of energy, especially photovoltaic solar and thermal energy, as well as the fundamentals of electrical engineering and power electronics.
G01	Knowledge of Information and Communication Technologies (ICT).
G02	Correct, oral and written, communication skills.
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, wether 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
Realization of assemblies and measurements of circuits in the laboratory.
Correct use of oral and written expression to convey ideas, technologies, results, etc.
Use of electromagnetic induction applied to electrical engineering.
Use of ICT to achieve the specific objectives set in the subject.
Use of transformers and converters, rectifiers, amplifiers and generators.
Design of photovoltaic and thermal solar energy installations and their connection to the electricity grid.
Familiarization with the basic principles of power conversion.
Familiarization in the use of commercial circuits, interpreting the information provided by the manufacturers.
Knowledge of the legislation relating to photovoltaic and renewable energy installations.
Knowledge of photovoltaic and thermal energy generation devices.

Compression, analysis and synthesis of technical documentation and mastery of specific vocabulary.
Application of the principles of electrical engineering and power electronics to the conditioning of the signal to be distributed.
Understanding of single-phase and three-phase alternating current, and its applications

6. Units / Contents

Unit 1: Single-phase AC current
- **Unit 1.1** Basic definitions
- **Unit 1.2** Elemental circuits
- **Unit 1.3** Single-phase power
- **Unit 1.4** LAB 1. Introduction to Simulink

Unit 2: Three-phase AC current
- **Unit 2.1** Three-phase AC voltage
- **Unit 2.2** Load connections
- **Unit 2.3** Three-phase power
- **Unit 2.4** LAB 2. Simulation of three-phase circuits

Unit 3: Transformers
- **Unit 3.1** Introduction
- **Unit 3.2** Theory of operation
- **Unit 3.3** Classification
- **Unit 3.4** Tests
- **Unit 3.5** Performance and regulation
- **Unit 3.6** Measurement transformers
- **Unit 3.7** Autotransformers
- **Unit 3.8** Three-phase transformers

Unit 4: AC-DC Converters. Rectifiers
- **Unit 4.1** Introduction
- **Unit 4.2** Non-controlled rectifiers
- **Unit 4.3** Controlled rectifiers
- **Unit 4.4** LAB 3. Analysis of rectifiers

Unit 5: DC-DC Converters.
- **Unit 5.1** Introduction
- **Unit 5.2** Non-isolated buck converters
- **Unit 5.3** Non-isolated boost converters
- **Unit 5.4** Isolated and non-isolated buck-boost converters
- **Unit 5.5** LAB 4. Analysis of DC-DC converters

Unit 6: DC-AC Converters. Inverters
- **Unit 6.1** Introduction
- **Unit 6.2** Single-phase inverters
- **Unit 6.3** Three-phase inverters
- **Unit 6.4** LAB 5. Simulation of inverters

Unit 7: Photovoltaic and solar heating Installations
- **Unit 7.1** Solar heating installations
- **Unit 7.1** Isolated photovoltaic installations
- **Unit 7.2** Grid-connected photovoltaic installations

ADDITIONAL COMMENTS, REMARKS

Hardware and software tools available at eletronics 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	E16 G01 G02 G06	0.8	20	N	-	
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	E16 G02 G06 G12	0.6	15	Y	N	
Study and Exam Preparation [OFF-SITE]	Problem solving and exercises	E16 G02 G06 G12	0.6	15	Y	N	Homework assignments
Laboratory practice or sessions [ON-SITE]	Practical or hands-on activities	E06 E07 E08 E16 G01 G02 G06 G12 G13	0.8	20	N	-	Attendance is mandatory and only one session can be lost. The workers enrolled in the course must inform the instructor before the beginning of the laboratory sessions
Practicum and practical activities report writing or preparation [OFF-SITE]	Group Work	E06 E07 E08 E16 G01 G02 G06 G12 G13	0.8	20	Y	Y	Preparation of hands-on experiments before their development, as well as final reports including measures, reflexions and conclusions
Individual tutoring sessions [ON-SITE]		E06 E07 E08 E16 G01 G02 G06 G12 G13	0.04	1	N	-	
Study and Exam Preparation [OFF-SITE]	Self-study	E06 E07 E08 E16 G01 G02 G06 G12 G13	2.2	55	N	-	

Other on-site activities [ON-SITE]	Assessment tests	E06 E07 E08 E16 G01 G02 G06 G12 G13	0.12	3	Y	Y	Theory concepts will be assessed through a written examination (final exam)
Other on-site activities [ON-SITE]	Assessment tests	E06 E07 E08 E16 G01 G02 G06 G12 G13	0.04	1	Y	Y	Hands-on experiments will be assessed through one or several written and/or oral examinations
		Total:	**6**	**150**			
		Total credits of in-class work: 2.4					**Total class time hours: 60**
		Total credits of out of class work: 3.6					**Total hours of out of class work: 90**

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
Assessment of problem solving and/or case studies	5.00%	0.00%	Homework assignments
Assessment of active participation	5.00%	0.00%	In-class activities
Test	60.00%	70.00%	A final exam assessing all theory concepts
Laboratory sessions	10.00%	10.00%	Assessment of the reports submitted for hands-on experiments
Test	20.00%	20.00%	Assessment of laboratory skills by written and/or oral examinations
Total:	**100.00%**	**100.00%**	

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:

To pass the course, students have to satisfy the next three requirements:

- All laboratory tasks will have to be submitted and the oral or written examination will have to be taken. No minimum mark will be required for any hands-on experiment and examination, but the weighted average score for all of them will have to be higher than 4 points (on a scale of 10 points).

- A degree on the final exam higher than 4 points (on a scale of 10 points) will be required.

- A final mark on the course higher than 5 points (on a scale of 10 points) will be required.

Non-continuous evaluation:

Those students unable to follow regularly the course will have to contact with the instructor within the first month. To pass the course, students have to satisfy the next three requirements:

- All laboratory tasks will have to be submitted and the oral or written examination will have to be taken. No minimum mark will be required for any hands-on experiment and examination, but the weighted average score for all of them will have to be higher than 4 points (on a scale of 10 points).

- A degree on the final exam higher than 4 points (on a scale of 10 points) will be required.

- A final mark on the course higher than 5 points (on a scale of 10 points) will be required.

Specifications for the resit/retake exam:

The second oportunity to pass the course activities will follow the next criteria:

- In continuous assessment, 'assessment of active participation' and 'assessment of problem solving and/or cases studies' will be considered within the final exam assessing all theory concepts.

- The final exam assessing all theory concepts will be awarded with 70% of the final mark on the course.

- All hands-on experiment could be submitted for their re-assessment. All these activities will be awarded with 10% of the final mark on the course.

- The laboratory examination will be awarded with 20% of the final mark on the course.

To pass the course, students have to satisfy the next three requirements:

- All laboratory tasks will have to be submitted and the oral or written examination will have to be taken. No minimum mark will be required for any hands-on experiment and examination, but the weighted average score for all of them will have to be higher than 4 points (on a scale of 10 points).

- A degree on the final exam higher than 4 points (on a scale of 10 points) will be required.

- A final mark on the course higher than 5 points (on a scale of 10 points) will be required.

In the case of failing the course, the average mark on the laboratory activities (if it is equal or higher than 4 points) will be maintained for the next offering, unless the student voluntarily decides to retake this set of activities.

Specifications for the second resit / retake exam:

If students passed the laboratory activities in the preceding course, only a exam covering all theory concepts will have to be tackled. Otherwise, students will have to take two exams, one covering theory concepts and another assessing laboratory skills. The grading scheme will award 70% of the final mark on the course for theory exam and 30% for laboratory test. For both examinations a minimum mark of 4 points (on a scale of 10 points) will be required. Moreover, the final averaged mark will have to be equal or higher than 5 points (on a scale of 10 points).

9. Assignments, course calendar and important dates

Not related to the syllabus/contents

Hours	hours
Individual tutoring sessions [PRESENCIAL][]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	55
Other on-site activities [PRESENCIAL][Assessment tests]	3
Other on-site activities [PRESENCIAL][Assessment tests]	1

General comments about the planning: This planning is purely advisory and may be subject to alteration during the course.

Unit 1 (de 7): Single-phase AC current

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1
Study and Exam Preparation [AUTÓNOMA][Problem solving and exercises]	1

Unit 2 (de 7): Three-phase AC current

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1.5
Study and Exam Preparation [AUTÓNOMA][Problem solving and exercises]	1.5
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	3.5
Practicum and practical activities report writing or preparation [AUTÓNOMA][Group Work]	3.5

Unit 3 (de 7): Transformers

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1
Study and Exam Preparation [AUTÓNOMA][Problem solving and exercises]	1

Unit 4 (de 7): AC-DC Converters. Rectifiers

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	3.5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	3
Study and Exam Preparation [AUTÓNOMA][Problem solving and exercises]	3
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	4.5
Practicum and practical activities report writing or preparation [AUTÓNOMA][Group Work]	4.5

Unit 5 (de 7): DC-DC Converters.

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2.5
Study and Exam Preparation [AUTÓNOMA][Problem solving and exercises]	2.5
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	7.5
Practicum and practical activities report writing or preparation [AUTÓNOMA][Group Work]	7.5

Unit 6 (de 7): DC-AC Converters. Inverters

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2.5
Study and Exam Preparation [AUTÓNOMA][Problem solving and exercises]	2.5
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	4.5
Practicum and practical activities report writing or preparation [AUTÓNOMA][Group Work]	4.5

Unit 7 (de 7): Photovoltaic and solar heating Installations

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	3.5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	3.5
Study and Exam Preparation [AUTÓNOMA][Problem solving and exercises]	3.5

Global activity

Activities	hours
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	20
Practicum and practical activities report writing or preparation [AUTÓNOMA][Group Work]	20
Other on-site activities [PRESENCIAL][Assessment tests]	3
Other on-site activities [PRESENCIAL][Assessment tests]	1
Class Attendance (theory) [PRESENCIAL][Lectures]	20
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	15
Study and Exam Preparation [AUTÓNOMA][Problem solving and exercises]	15
Individual tutoring sessions [PRESENCIAL][]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	55
Total horas:	150

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	City	ISBN	Year	Description
Thomas L. Floyd	Electric Circuits Fundamentals	Prentice Hall		9780132197106	2007	
Andres Barrado	Problemas de electrónica de	Pearson Prentice		978-84-205-4652-0	2007	

	potencia	Hall		
Díaz Corcobado, Tomás	Instalaciones solares fotovoltaicas	McGraw-Hill Interamericana de España	978-84-481-7169-8	2010
Hart, Daniel W.	Power Electronics	McGraw-Hill	9780073380674	2008
Miguel Pareja	Radiación solar y su aprovechamiento energético	Marcombo	978-84-26-7155-93	2010
Ned Mohan, Tore M Undeland y William P Robbins	Power Electronics: Converters, Applications, and Design	John Wiley & Sons	9780471226932	2002