

**1. General information****Course:** ELECTRICAL TECHNOLOGY AND ELECTRONIC**Type:** CORE COURSE**Degree:** 384 - MINING AND ENERGY ENGINEERING DEGREE**Center:** 106 - SCHOOL OF MINING AND INDUSTRIAL ENGINEERING**Year:** 2**Main language:** Spanish**Use of additional languages:****Web site:****Code:** 19553**ECTS credits:** 6**Academic year:** 2023-24**Group(s):** 51**Duration:** First semester**Second language:** English**English Friendly:** Y**Bilingual:** N**Lecturer:** RAQUEL JURADO MERCHAN - Group(s): 51

Building/Office	Department	Phone number	Email	Office hours
Edificio Störr, 3ª planta, Dpto. IEEAC	INGENIERÍA ELÉCTRICA, ELECTRÓNICA, AUTOMÁTICA Y COMUNICACIONES	926052772	raquel.jurado@uclm.es	

2. Pre-Requisites

In order for students to achieve the learning objectives described above, they must possess knowledge and skills that are supposed to be guaranteed in their previous training, especially those related to physics and mathematics.

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

The contents that make up the subject matter of Electrical Engineering will lay the foundations for successfully tackling subjects that are taught later on, such as Electrical Energy Systems and Renewable Energy Engineering, which form part of the specific training in Energy Resources, Fuels and Explosives.

In addition, they are the only training in electrical energy systems within the Mining curriculum, and these graduates must also have training in the electrical field.

With the subjects that make up the subject, students will acquire knowledge of electrical and electronic circuits, as well as the electrical system and the regulations to be applied in this field.

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

Code	Description
C12	To know the fundamentals of the electrical system and power: energy generation, transport grid, delivery, distribution as well as different types of conductors and lines. To know regulations about high and low voltage. To know the basic fundamentals of electronics and control systems.
CB02	Apply their knowledge to their job or vocation in a professional manner and show that they have the competences to construct and justify arguments and solve problems within their subject area.
CB05	Have developed the necessary learning abilities to carry on studying autonomously
CT00	To promote respect and promotion of Human Rights as well as global access principles and design for everybody according to the 10th final order of the Law 51/2003 of December 2nd, about equal opportunities, non-discrimination and universal accessibility for people with disabilities.
CT02	To be acquainted with Information and Communication Technology ICT
CT03	Capacity for written and oral communication skills.

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

Description

Knowledge of basic electronics and control systems

6. Units / Contents**Unit 1: ELECTRICAL CIRCUIT COMPONENTS. GENERAL PRINCIPLES OF ELECTRICAL CIRCUIT THEORY.****Unit 2: ELECTRIC CIRCUITS IN DIRECT CURRENT AND ALTERNATING CURRENT.****Unit 3: ANALOGIC ELECTRONIC CIRCUITS.****Unit 4: DIGITAL ELECTRONIC CIRCUITS.****Unit 5: INTRODUCTION TO CONTROL SYSTEMS.****ADDITIONAL COMMENTS, REMARKS**

PRACTICES PROGRAM:

Practice 1: Direct current circuits.

Practice 2: Alternating current circuits.

Practice 3: Characteristic curves of electronic devices.

Practice 4: Study of logic gates. Combinational circuits.

Practice 5: Sequential circuits.

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	C12 CB02 CB05 CT00 CT02 CT03	1	25	N	-	Presentation and development of fundamental theoretical concepts.
Problem solving and/or case studies [ON-SITE]	Project/Problem Based Learning (PBL)	C12 CB02 CB05 CT00 CT02 CT03	0.72	18	N	-	Resolution of exercises by the teacher that illustrate the theoretical contents discussed above.
Class Attendance (practical) [ON-SITE]	Practical or hands-on activities	C12 CB02 CB05 CT00 CT02 CT03	0.4	10	Y	Y	Practical work in the laboratory in which the student's attitude during the work will be assessed, as well as the quality of the practice reports submitted. It is a compulsory activity and a prerequisite for passing the course. In the section on evaluation criteria, the rules for the evaluation and recovery of the same are set out.
Mid-term test [ON-SITE]	Assessment tests	C12 CB02 CB05 CT03	0.16	4	Y	Y	It will consist of tests related to both theoretical aspects and practical applications. Two partial tests will be scheduled. They can be made up in the final exam.
Final test [ON-SITE]	Assessment tests	C12 CB02 CB05 CT03	0.08	2	Y	Y	It will cover the whole course, evaluating both theoretical and practical aspects of the subject. It is compulsory for students who have not passed the partial exams.
Individual tutoring sessions [ON-SITE]		C12 CB02 CB05 CT00 CT02 CT03	0.04	1	N	-	
Practicum and practical activities report writing or preparation [OFF-SITE]	Self-study	C12 CB02 CB05 CT02 CT03	0.8	20	Y	Y	They will consist of writing a brief report explaining the activity carried out during the internship and presenting the results obtained. In the event of not passing the practical, a practical exam may be taken.
Study and Exam Preparation [OFF-SITE]	Self-study	C12 CB02 CB05 CT02 CT03	2.4	60	N	-	
Writing of reports or projects [OFF-SITE]	Self-study	C12 CB02 CB05 CT02 CT03	0.4	10	Y	Y	They will consist of solving problems or cases proposed by the teacher or answering a series of tests. This activity is not recoverable.
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
Projects	10.00%	10.00%	This activity will consist of solving problems or cases proposed by the teacher or answering multiple-choice questions. It is not recoverable. The grade will not be retained for subsequent academic years.
Practicum and practical activities reports assessment	20.00%	20.00%	<p>The work carried out by the student will be assessed both during the internship and the quality of the report presented. As this is a compulsory activity, it is a necessary condition to complete and pass the laboratory practicals in order to pass the course. As in all compulsory and evaluable activities, at least 40% of the maximum grade must be obtained.</p> <p>If, for justified reasons, a student has not attended any of the practical sessions, there is the possibility of a make-up, justifying the non-attendance within the deadlines that will be indicated at the beginning of the course.</p> <p>Finally, students who, having passed the rest of the assessment tests, have not passed the practicals, may sit a practicals exam. The internship grade will be retained for two academic years. If,</p>

			<p>after this time, the student has not passed the course, he/she will have to retake the laboratory practicals and be re-evaluated again.</p> <p>Translated with www.DeepL.com/Translator (free version)</p>
Test	35.00%	0.00%	<p>It will consist of tests related to both theoretical aspects and practical applications dealt with in subjects 1 and 2.</p> <p>Only those who obtain a mark equal to or higher than 40% of the maximum mark will be able to add the marks of the other partial tests, requiring a minimum mark of 4 points to compute the marks of the rest of the sections.</p> <p>As this is a recoverable activity, if the partial test is not passed, it may be recovered in the final test.</p> <p>Translated with www.DeepL.com/Translator (free version)</p>
Test	35.00%	0.00%	<p>It will consist of tests related to both theoretical aspects and practical applications dealt with in subjects 3, 4 and 5.</p> <p>Only those who obtain a mark equal to or higher than 40% of the maximum mark will be able to add the marks of the other partial tests, requiring a minimum mark of 4 points to compute the marks of the rest of the sections.</p> <p>As this is a recoverable activity, if the partial test is not passed, it may be recovered in the final test.</p> <p>Translated with www.DeepL.com/Translator (free version)</p>
Final test	0.00%	70.00%	<p>It will cover the whole course, evaluating both theoretical and practical aspects of the subject.</p> <p>This exam will be compulsory for students who have not passed the mid-term exams and, therefore, the percentage of the grade will be the one corresponding to each of the mid-term exams, structuring the exam as mid-term exams and following the same criteria that have been set out for the rest of the exams.</p> <p>Students who do not pass the course in the final exam.</p>
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:

In the ordinary exams, students will have two mid-term exams which will be eliminatory, i.e. if they pass a mid-term exam, they will not have to take the final exam.

In order to pass the course in the ordinary exams, students must obtain a minimum of 40% of the maximum grade in each of the mid-term exams and in the practicals, all of which are compulsory activities.

If this requirement is not met, even if the overall grade of the subject after the weighted average of all the evaluable parts is higher than 5 out of 10, the grade in the minutes will be Fail (4). In the event that the weighted average does not reach 4, the grade will be that obtained from the weighted average of all the activities.

The recovery of the partial tests will be possible in the final exam, while the recovery of the practicals will be possible by means of a practice exam that will only be taken when at least 40% of the maximum grade of each of the partial tests has been previously obtained.

The use of any type of electronic device (mobile phones, tablets, smartwatches, etc.) is strictly forbidden, and it is not even allowed to use them during the exam, even if they are switched off.

In case of non-compliance with this rule, the grade will be Fail (0), even if the terminal is switched off. This rule is applicable for all exam sessions and also for the mid-term exams.

Non-continuous evaluation:

In the case of students who do not take part in continuous assessment, the criteria will be the same as for continuous assessment, except that the part of the assessment corresponding to the partial tests will be examined in a single final exam which will be structured as two partial tests and which will be subject to the same criteria as those established for the partial tests of continuous assessment.

The assignments will also be assessed, although they are neither compulsory nor recoverable (if they are not done, the student will forfeit 10% of the grade).

Practicals are compulsory, assessable and recoverable, and students who do not take part in continuous assessment will be able to do them on dates agreed between students and teacher.

Specifications for the resit/retake exam:

In the extraordinary exam session, the same criteria will be followed as in the ordinary exam session.

Specifications for the second resit / retake exam:

In the special final exam session, the same criteria will be followed as in the ordinary exam session.

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
Mid-term test [PRESENCIAL][Assessment tests]	4
Final test [PRESENCIAL][Assessment tests]	2
Individual tutoring sessions [PRESENCIAL][]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	60

Writing of reports or projects [AUTÓNOMA][Self-study]	10
Unit 1 (de 5): ELECTRICAL CIRCUIT COMPONENTS. GENERAL PRINCIPLES OF ELECTRICAL CIRCUIT THEORY.	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Problem solving and/or case studies [PRESENCIAL][Project/Problem Based Learning (PBL)]	2
Unit 2 (de 5): ELECTRIC CIRCUITS IN DIRECT CURRENT AND ALTERNATING CURRENT.	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	7
Problem solving and/or case studies [PRESENCIAL][Project/Problem Based Learning (PBL)]	6
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	4
Practicum and practical activities report writing or preparation [AUTÓNOMA][Self-study]	8
Unit 3 (de 5): ANALOGIC ELECTRONIC CIRCUITS.	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	5
Problem solving and/or case studies [PRESENCIAL][Project/Problem Based Learning (PBL)]	4
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	2
Practicum and practical activities report writing or preparation [AUTÓNOMA][Self-study]	4
Unit 4 (de 5): DIGITAL ELECTRONIC CIRCUITS.	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	5
Problem solving and/or case studies [PRESENCIAL][Project/Problem Based Learning (PBL)]	4
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	4
Practicum and practical activities report writing or preparation [AUTÓNOMA][Self-study]	8
Unit 5 (de 5): INTRODUCTION TO CONTROL SYSTEMS.	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Problem solving and/or case studies [PRESENCIAL][Project/Problem Based Learning (PBL)]	2
Global activity	
Activities	hours
Problem solving and/or case studies [PRESENCIAL][Project/Problem Based Learning (PBL)]	18
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	10
Mid-term test [PRESENCIAL][Assessment tests]	4
Individual tutoring sessions [PRESENCIAL][]	1
Practicum and practical activities report writing or preparation [AUTÓNOMA][Self-study]	20
Class Attendance (theory) [PRESENCIAL][Lectures]	25
Writing of reports or projects [AUTÓNOMA][Self-study]	10
Final test [PRESENCIAL][Assessment tests]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	60
Total horas: 150	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
A. J. Conejo, A. Clamagirand, J. L. Polo, N. Alguacil.	Circuitos Eléctricos para la Ingeniería	McGraw-Hill			2004	Texto recomendado para los temas 1 y 2.
CARLSON, A.B	Teoría de Circuitos	Thomson			2004	Texto recomendado para los temas 1 y 2.
Malik, N.R	Circuitos electrónicos. Análisis, simulación y diseño	Prentice Hall			2003	
NILSSON, J.W. & Riedel, S.A.	Circuitos Eléctricos.	Pearson.			2005	Texto recomendado para los temas 1 y 2.
Ricardo Hernández Gaviño	Introducción a los sistemas de control	Prentice-Hall		9786074427424	2010	
Robert L. Boylestad y Louis Nashelsky	Electrónica: teoría de circuitos y dispositivos electrónicos	Pearson-Prentice Hall		978-60-744-2292-4	2009	Texto recomendado para los temas 3 y 4