

**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:** 2020-21**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]	Combination of methods	C12 CB02 CB05 CT00 CT02 CT03	1	25	N	-	Presentation and development of fundamental theoretical concepts.
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	C12 CB02 CB05 CT00 CT02 CT03	0.72	18	N	-	Resolution of exercises by the teacher that illustrate the theoretical contents discussed above.
Laboratory practice or sessions [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.
Progress test [ON-SITE]	Assessment tests	C12 CB02 CB05 CT03	0.16	4	Y	N	It will consist of carrying out tests related to both theoretical and practical application aspects. Two partial tests will be scheduled. Recoverable in the final test.
Final test [ON-SITE]	Assessment tests	C12 CB02 CB05 CT03	0.08	2	Y	Y	It will cover the whole of the subject evaluating theoretical and practical aspects of it. Recoverable in the extraordinary exam.
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]	Group Work	C12 CB02 CB05 CT02 CT03	0.8	20	Y	Y	They will consist of the preparation by groups of students of a brief report in which the activity carried out in practice is presented and the results obtained are presented. The recovery will consist of a practice test.
Study and Exam Preparation [OFF-SITE]	Self-study	C12 CB02 CB05 CT02 CT03	2.4	60	N	-	
Other off-site activity [OFF-SITE]	Self-study	C12 CB02 CB05 CT02 CT03	0.4	10	Y	Y	They will consist of the resolution of problems proposed by the teacher that must be solved individually or in groups of students. It is an activity that is evaluable but not mandatory and therefore 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
Practicum and practical activities reports assessment	20.00%	20.00%	<p>The work done by the student during the practices and the quality of the report presented will be evaluated.</p> <p>As it is a compulsory activity, it is a necessary condition to carry out and pass the laboratory practices in order to pass the course.</p> <p>If, for justified reasons, a student has not attended a laboratory session, there is a possibility of making up the course, justifying non-attendance within the time limits that will be indicated at the beginning of the course.</p> <p>Finally, students who have passed the evaluation tests but have not passed the practices may take a practice test.</p> <p>The practices qualification will be retained for two academic years. If, after this time, the student has not passed the course, he or she must return to the laboratory practices and evaluate them again.</p>

Projects	10.00%	10.00%	This activity will consist of the resolution of problems or cases proposed by the teacher. The quality of the work carried out will be valued, as well as the attitude when developing the work.
Test	35.00%	0.00%	It will consist of tests related to both theoretical and practical application aspects of topics 1 and 2. All students will be able to take this test, with theoretical/practical questions. Only those who obtain a mark higher than 4 (out of 10) may add up the scores of the other partial tests, requiring an average score of 5 points to consider the examinations passed and, only in this case, the remaining scores will be counted. As it is a recoverable activity, if the partial test is not passed, it can be recovered in the final test.
Test	35.00%	0.00%	It will consist of tests related to both theoretical and practical application aspects of topics 3, 4 and 5. All students will be able to take this test, with theoretical/practical questions. Only those who obtain a mark higher than 4 (out of 10) may add up the scores of the other partial tests, requiring an average score of 5 points to consider the examinations passed and, only in this case, the remaining scores will be counted. As it is a recoverable activity, if the partial test is not passed, it can be recovered in the final test.
Final test	0.00%	70.00%	It will cover the whole of the subject evaluating theoretical and practical aspects of it. This exam will be compulsory for students who have not passed one or more mid-term exams and, therefore, the percentage of the grade will be the one corresponding to each of the mid-term exams, and the exam will be structured as a mid-term exam and therefore a minimum grade will be required in each of the parts according to what is stated in the mid-term exams in order to consider the exam passed. Only if you have a minimum score of 5 points in the exam, the scores of the other sections will be taken into account. Students who do not pass the course in the final exam will be given an extraordinary summons, for which the grades of the partial exams will not be saved, but all students who need this exam will be evaluated on the whole subject.
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 call, the students will have the two partial tests that will be eliminatory, that is to say, if the students obtain a grade equal to or higher than 5 points out of 10, the corresponding subject will be considered passed and they will not have to take the final test, which will be structured as two partial tests, requiring a minimum in each one of the parts according to what is exposed in the evaluation of the partial tests.

Likewise, if the score obtained in either of the two partial tests is equal to or greater than 4 out of 10 points, this score may be offset against the score obtained in the other partial test, provided that you obtain an average score of at least 5 points.

In any case, in order to pass the course, it is essential to pass the laboratory practices. If the theoretical and practical tests have been passed, but the laboratory practices have not been approved, by default the grade for the minutes will be Suspense (4). The grade for internships and assignments will only be computed from the moment the student has obtained at least a 5-point grade in the partial or final exams. If this is not the case, these grades will not be assessed and only the grade of the final test will be recorded in the records.

It is strictly forbidden to keep your mobile phone switched off during the test. If the telephone is taken to the examination, it must be left at the place indicated by the teacher during the examination. In the event of non-compliance with this rule, the rating will be Suspense (0), even if the terminal is switched off. This rule applies to all calls for applications and also to partial tests.

Non-continuous evaluation:

Evaluation criteria not defined

Specifications for the resit/retake exam:

In the extraordinary convocation, the students must take the exam of the whole subject of study, that is to say, the grades obtained in the partial exams will not be kept, but it is structured equally as two different parts, with a minimum score in each one of them being obtained according to what is stated in the evaluation of the partial exams. Only from a minimum grade of 5 points will be counted the grades of the rest of the sections.

In order to pass the course, it is a prerequisite to pass the laboratory practices following exactly the same criteria as in the ordinary course.

Specifications for the second resit / retake exam:

It will follow the same criteria as the extraordinary call.

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
Progress test [PRESENCIAL][Assessment tests]	4

Final test [PRESENCIAL][Assessment tests]	2
Individual tutoring sessions [PRESENCIAL][]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	60
Other off-site activity [AUTÓNOMA][Self-study]	10
Unit 1 (de 5): ELECTRICAL CIRCUIT COMPONENTS. GENERAL PRINCIPLES OF ELECTRICAL CIRCUIT THEORY.	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Combination of methods]	4
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Unit 2 (de 5): ELECTRIC CIRCUITS IN DIRECT CURRENT AND ALTERNATING CURRENT.	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Combination of methods]	7
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	6
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	4
Practicum and practical activities report writing or preparation [AUTÓNOMA][Group Work]	8
Unit 3 (de 5): ANALOGIC ELECTRONIC CIRCUITS.	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Combination of methods]	5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	4
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	2
Practicum and practical activities report writing or preparation [AUTÓNOMA][Group Work]	4
Unit 4 (de 5): DIGITAL ELECTRONIC CIRCUITS.	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Combination of methods]	5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	4
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	4
Practicum and practical activities report writing or preparation [AUTÓNOMA][Group Work]	8
Unit 5 (de 5): INTRODUCTION TO CONTROL SYSTEMS.	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Combination of methods]	4
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Global activity	
Activities	hours
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	18
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	10
Progress test [PRESENCIAL][Assessment tests]	4
Final test [PRESENCIAL][Assessment tests]	2
Practicum and practical activities report writing or preparation [AUTÓNOMA][Group Work]	20
Class Attendance (theory) [PRESENCIAL][Combination of methods]	25
Other off-site activity [AUTÓNOMA][Self-study]	10
Individual tutoring sessions [PRESENCIAL][]	1
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