

**1. General information****Course:** COMPONENTS AND CIRCUITS**Type:** BASIC**Degree:** 422 - UNDERGRADUATE DEGREE IN BIOMEDICAL ENGINEERING**Center:** 308 - SCHOOL POLYTECHNIC OF CUENCA**Year:** 1**Main language:** Spanish**Use of additional languages:****Web site:****Code:** 59707**ECTS credits:** 6**Academic year:** 2023-24**Group(s):** 30**Duration:** First semester**Second language:****English Friendly:** Y**Bilingual:** N**Lecturer:** RAQUEL CERVIGON ABAD - Group(s): 30

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2. Pre-Requisites

It is recommended that Fundamentals of Mathematics I and II and Fundamentals of Physics I be taken simultaneously.

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

This subject is the first to develop the subject of Electronics, one of the professional branches of biomedical engineering. It establishes the fundamentals of circuit analysis and lays the foundations for understanding how electronic and electrical circuits work, as well as the principles of operation of the passive components found in them.

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

Code	Description
INFO-2023	

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

Description

CT01 - To know and apply Information and Communication Technologies.

CT02 - To use properly oral and written communication.

CT03 - To know ethical commitment and professional deontology.

CN04 - To understand and master the basic concepts of linear systems and their associated functions and transforms, electric circuit theory, electronic circuits, physical principles of semiconductors and logic families, electronic and photonic devices, and materials technology, as well as apply them to solve engineering problems.

6. Units / Contents**Unit 1: Foundations. Elements of the circuits.****Unit 1.1** Basic and fundamental concepts of circuits.**Unit 1.2** Elements of the circuits.**Unit 1.3** Identification of Electronic Components.**Unit 2: Circuit analysis methods.****Unit 2.1** Fundamental methods of circuit analysis.**Unit 2.2** Measurements of voltages and currents in direct current.**Unit 3: Network Theorems in Electrical Engineering.****Unit 3.1** Circuits Theorems.**Unit 3.2** Practice 3: Theorems of Electrical Circuits.**Unit 4: Sinusoidal Steady & State Analysis.****Unit 4.1** Alternating Current Circuits Analysis.**Unit 4.2** Magnetic Coupling.**Unit 4.3** Practice 4: Alternating Current Analysis**Unit 5: Circuit Analysis Techniques in the Frequency Domain.**

Unit 5.1 Frequency response. Passive filters.

Unit 5.2 Resonant circuits.

Unit 5.3 Practice 5: Passive Filters & Resonant 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 (practical) [ON-SITE]	Problem solving and exercises	INFO-2023	0.49	12.25	Y	N	During the lessons, problems will be solved. In addition, students will have to carry out exercises and/or directed activities. The recovery of this activity will be carried out within the final theory test considered in the extraordinary exam.
Laboratory practice or sessions [ON-SITE]	Practical or hands-on activities	INFO-2023	0.76	19	Y	N	The students will carry on practical work according to the provided instructions. Their work will be monitored in-situ and may modulate the marks obtained in the practical part. This activity cannot be recovered.
Practicum and practical activities report writing or preparation [OFF-SITE]	Group Work	INFO-2023	0.8	20	Y	Y	The students should hand out a report of each practical activity according to the conditions provided and even including additional files of results and configurations. In some cases, an oral defense of the work could be demanded. The recovery of this activity in the extraordinary exam will be carried out by means of a test and the performance and defence of a final practice. Plagiarism or copying will be punished with a mark of 0 point to all the people involved.
Study and Exam Preparation [OFF-SITE]	Self-study	INFO-2023	2.8	70	N	-	Self-study.
Final test [ON-SITE]	Assessment tests	INFO-2023	0.12	3	Y	Y	Final exam including theory and problems. This could be recovered in the fixed session of the extraordinary call.
Individual tutoring sessions [ON-SITE]	Other Methodologies	INFO-2023	0.04	1	N	-	Personal attention to the students.
Class Attendance (theory) [ON-SITE]	Lectures	INFO-2023	0.99	24.75	N	-	Theoretical lectures and/or guided activities.
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
Laboratory sessions	35.00%	35.00%	Assessment of the reports submitted for hands-on experiments.
Test	60.00%	65.00%	A final exam assessing all theory concepts.
Self Evaluation and Co-evaluation	5.00%	0.00%	Online test and/or activities carried out autonomously by the student.
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:

All proposed laboratory practices will have to be submitted. No minimum grade will be required in any practice, but the average grade of all of them will have to be equal or higher than 4 points (out of 10). The course will be passed when the final score obtained should be equal or superior to 5 points (out of 10).

The student who passes the laboratory practices (equal or higher than 5 points) will keep the grade during the following course, unless, voluntarily, he decides to repeat it. In case of not passing the course in the next course, the student will have to do the laboratory practices again.

Non-continuous evaluation:

By default, all students take continuous assessment. If a student cannot or does not want to take the continuous assessment, he/she must inform the lecturer in order to change to non-continuous assessment. This change must be made as soon as possible and never after having taken 50% or more of the continuous assessment tests, at which point this change can no longer be made. Likewise, this change cannot be made after the end of the class period.

All proposed laboratory practices must be submitted. No minimum grade will be required for any practice, but the average grade of all of them will have to be equal or higher than 4 points (out of 10).

Specifications for the resit/retake exam:

- The theory exam will be held on the date set by the head of studies and will have a weight of 65% in the final grade.
- The laboratory practices will be recovered through the assessment of a single final practice that will take place on the date indicated by the head of studies. It will have a weight of 35% in the final note.

In order to pass the course, students will have to satisfy the following three conditions:

- They must submit the proposed practice and take the laboratory exam. In each of these two activities a minimum mark of 4 points (out of 10) will be required.
- A score equal or higher than 4 (out of 10) will be required in the theory exam.
- An average mark of more than 5 (out of 10) is required for all assessment activities.

The same requirements apply as in the ordinary exams, regarding the repetition of the laboratory practices in subsequent years.

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
Practicum and practical activities report writing or preparation [AUTÓNOMA][Group Work]	20
Study and Exam Preparation [AUTÓNOMA][Self-study]	70
Final test [PRESENCIAL][Assessment tests]	3
Individual tutoring sessions [PRESENCIAL][Other Methodologies]	1
Unit 1 (de 5): Foundations. Elements of the circuits.	
Activities	Hours
Class Attendance (practical) [PRESENCIAL][Problem solving and exercises]	2.5
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	3
Class Attendance (theory) [PRESENCIAL][Lectures]	5.5
Unit 2 (de 5): Circuit analysis methods.	
Activities	Hours
Class Attendance (practical) [PRESENCIAL][Problem solving and exercises]	2.5
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	3
Class Attendance (theory) [PRESENCIAL][Lectures]	4.5
Unit 3 (de 5): Network Theorems in Electrical Engineering.	
Activities	Hours
Class Attendance (practical) [PRESENCIAL][Problem solving and exercises]	2.75
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	3
Class Attendance (theory) [PRESENCIAL][Lectures]	4.75
Unit 4 (de 5): Sinusoidal Steady & State Analysis.	
Activities	Hours
Class Attendance (practical) [PRESENCIAL][Problem solving and exercises]	3
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	4
Class Attendance (theory) [PRESENCIAL][Lectures]	7.25
Unit 5 (de 5): Circuit Analysis Techniques in the Frequency Domain.	
Activities	Hours
Class Attendance (practical) [PRESENCIAL][Problem solving and exercises]	1.5
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	6
Class Attendance (theory) [PRESENCIAL][Lectures]	2.75
Global activity	
Activities	hours
Class Attendance (theory) [PRESENCIAL][Lectures]	24.75
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	19
Final test [PRESENCIAL][Assessment tests]	3
Study and Exam Preparation [AUTÓNOMA][Self-study]	70
Class Attendance (practical) [PRESENCIAL][Problem solving and exercises]	12.25
Practicum and practical activities report writing or preparation [AUTÓNOMA][Group Work]	20
Individual tutoring sessions [PRESENCIAL][Other Methodologies]	1
Total horas: 150	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
López Ferreras, Francisco	Análisis de circuitos lineales	Ciencia 3		84-86204-63-1 (T.II)	1994	
Nilsson, James W. & Riedel Susan A.	Circuitos electricos	Pearson/ Prentice Hall		84-205-4458-2	2012	
Sánchez Barrios, Paulino	Teoría de circuitos : problemas y pruebas objetivas orientados al aprendizaje	Pearson / Prentice Hall		978-84-8322-387-1	2007	
Dorf, Richard C.	Introduction to electric circuits	John Wiley & Sons		0-471-38689-8	2006	
Hayt, William H., Jr.	Análisis de circuitos en ingeniería	McGraw-Hill		978-970-10-6107-7	2007	
Alexander, Charles K.	Fundamentos de circuitos eléctricos	McGraw-Hill		978-970-10-5606-6	2016	

Carlson, A. Bruce	Teoría de circuitos : ingeniería, conceptos y análisis de circuitos	Thomson	978-84-9732-066-5	2004
Cervigón Raquel & Sánchez César	Electronic Components and Circuits Lab	Ediciones Universidad de Castilla-La Mancha	978-84-6957-355-6	2013