	SUBJECT: ELECTRONICS ENGINEERING FUNDAMENTALS		
	BACHELOR IN MECHANICAL ENGINEERING	**ACADEMIC YEAR: 2º (2023-2024)**	**TERM: 2º**

The course has 29 sessions distributed during 15 weeks. The duration of each session is 100 minutes (50 + 50) with (10+10) minutes break between each session. The laboratory sessions are set in six of these sessions, specifically those addressed as SEMINARS.

WEEKLY PLANNING OF THE COURSE

WEEK (Groups)	SESSION	DESCRIPTION OF THE SESSION CONTENTS	GROUP		Indicate if it is a different location from the classroom	Indicate YES/NO if it is a session with >1 teaching staff	STUDENT WEEKLY HOMEWORK LOAD		
			LECTURE	SEMINAR			DESCRIPCIÓN	HORAS PRESENCIALES	HORAS TRABAJO (Max. 7h semana)
1	0	Preparatory session of the subject. Topic 0. Electrical signals: Types and Parameters. Basic laws of circuit analysis		X			Review of basic concepts of electrical engineering fundamentals required in the course. Familiarisation with the types of electrical signals and their parameters and analysis of electrical circuits.	1.66	

1	1	**Presentation of the subject and laboratory .** Topic 1. Introduction to electronic systems. Introduction to the basic concepts of amplifiers . transducers and power sources. Examples of electronic systems	X				Work with examples of where electronics are today. Study of top -down design . getting to know the general blocks of an electronic system. Familiarisation with the concept of amplification in an electronic system with sensing and actuation.	1.66	2.86
2	2	**Topic 2. Electronic instrumentation.** Sensors and transducers Sensors and transducers. Fundamentals of operation Linearity and superposition		X			Review of the use of sensors and transducers of different types: light . temperature . force and pressure . position . speed and sound. Work on the concepts of linearity and superposition with sensors and transducers. Familiarisation with analogue amplifier models and their characteristic parameters.	1.66	6
2	3	Circuit exercises with sensors and transducers to apply previous concepts. **Topic 3. Analogue amplifiers and subsystems.** Polarisation. Gain . linearity . frequency response.	X					1.66	
3	4	Electronic Instrumentation		X	LAB		Laboratory assembly of simple circuits and handling of instrumentation. Concept of "negative" feedback and its consequences	1.66	7
3	5	Continuation of amplifier parameters. Models and Feedback Basic examples with amplifiers	X					1.66	
4	6	Practical circuit exercises with amplifiers (I)		X				1.66	7

4	7	Practical circuit exercises with amplifiers (II)	X				Use of the amplification models learnt with load effects in real circuits. Working with operational amplifier circuits in different practical applications. Preparation of Lab session 1	1.66	
5	8	**LAB SESSION 1: Electronic sensors and transducers**		X	LAB	YES	Laboratory exercise on sensor/transducer assemblies. Learning how MOSFET type transistors work. Preparation of Lab session 2	1.66	6
5	9	**Topic 4. Electronic components** The MOSFET transistor. How it works. Practical examples of use in amplifiers	X					1.66	
6	10	**LAB SESSION 2: AMPLIFIER CIRCUIT WITH OP-AMPS**		X	LAB	YES	Carrying out practice 2 Laboratory exercise on amplifier assemblies. Learning how the diode works.	1.66	6
6	11	**Topic 4. Electronic components** The diode. How it works. Basic examples	X					1.66	
7	12	Exercises of diodes and MOSFET (I)		X			Learning how to use the diode and MOSFET in practical circuits.	1.66	7

7	13	Application of diode circuits to a power supply. Concept of efficiency Application examples	X				Preparation of Lab session 3	1.66	
8	14	**LAB SESSION 3: TRANSISTOR CIRCUIT**		X	LAB	YES	Carrying out practice 3 Laboratory exercise on transistor assemblies.	1.66	6
8	15	**Topic 5. Digital Subsystems** Introduction to digital subsystems. Basics of digital electronics. Numbering systems. Boolean algebra Basic logic gates Logic functions and representation	X				Discuss the need for digital systems approach to an electronic system. e.g. with microcontroller. Study of the basic concepts of digital electronics and numbering systems. Work with logic functions and their mode of representation. Support with basic logic gates.	1.66	
9	16	Exercises of diodes and MOSFET (II)		X			Learning how to use the diode in practical circuits.	1.66	
9	17	Fundamental concepts of combinational circuits and sequential circuits. Basic examples	X				Know the functionality and uses of simple combinational circuits. Distinguish them from sequential circuits. Preparation for the Partial Evaluation	1.66	6

10	18	Problems in digital electronics (I)		X			Implementation of logic functions with multiplexers and decoders.	1.66	6
10	19	MIDTERM ASSESMENT	X					1.66	
11	20	Digital circuit applications (II). Registers and Counters.		X			Know the fundamental applications of digital circuits	1.66	6
11	21	Digital circuit applications (III). Memories	X					1.66	
12	22	Problems in digital electronics (II)		X			Digital problems specially on memories	1.66	6
12	23	**Link between digital and analogue subsystems: Data conversion.** A/D and D/A converters Characteristic parameters. Basic Examples of signal conversion.	X				To know the fundamental applications of digital circuits Study the need for data conversion and the characteristics of D/A and A/D converters. Preparation of Lab session 4	1.66	
13	24	LAB SESSION 4: DIGITAL SUBSYSTEMS		X	LAB	YES	Carrying out practice 4	1.66	6
13	25	Implementation of A/D and D/A converters. Exsercises of A/D and D/A converters	X				Work out possible implementations of circuits with data conversion in practical cases.	1.66	

14	26	Problems in digital electronics (III)		X			Digital problems specially on D/A and A/D converters	1.66	
14	27	**Introduction to electronic integrated circuits**. Fabrication. Moore's law. Examination problems in digital electronics	X				To understand the conventional process of integrated circuit manufacturing and future technological trends. preparation for the ordinary exam.	1.66	6
15	28	Exam problem solving		X			Supplementary preparation for the ordinary exam.	1.66	3
							Subtotal 1	**48.14**	**86.86**
							Total 1 *(*Hours of classroom and student work between weeks 1-14*)*	135	
	15		Recovery sessions. tutorials. handing in work. ect.						
	16		Preparation for evaluation and assessment					3	12
	17								
	18								
							Subtotal 2	**3**	**12**
							Total 2 *(*Hours of classroom and student work between weeks 15-18*)*	15	
							TOTAL *(Total 1 + Total 2.* Maximum 180 hours*)*	**150**	