Universidad Carlos III de Madrid
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COURSE: Industrial Automation		
DEGREE: Energy Engineering	YEAR: 2º	TERM: 1

WEEKLY PROGRAMMING

WEEK	SESSION	DESCRIPTION	GROUPS (marK X)		SPECIAL ROOM FOR SESSION (Computer class room, audio-visual class room)	Indicate YES/NO If the session needs 2 teachers	WEEKLY PROGRAMMING FOR STUDENT		
			LECTURES	SEMINARS			DESCRIPTION	CLASS HOURS	HOMEWORK HOURS (Max. 7h week)
1	1	**Presentation**: The detailed content of the subject, the detailed chronogram, and the evaluation system will be explained.		X		NO		1,66	
1	2	**Introduction and Logic systems**: Logic systems. Basic concepts of the Boole algebra. Combinational and sequential logic systems.	X			NO	Previous reading of the lesson. Studying the concepts related to logic systems. Solving the proposed exercises of Boole algebra.	1,66	3
2									
2	3	**System modelling:** Logic system representation. State diagrams. System representation using functional diagrams.	X			NO	Previous reading of the lesson. To study the solved exercises about State Diagram. To study the concepts related to	1,66	3

							the system representation using functional diagrams. To study the solved exercises of functional diagrams.		
3	4	State Diagram exercises.		X		NO	Preparing the proposed exercises of State Diagrams before their resolution at the classroom.	1,66	6
3	5	**Technologies:** Wiring and programmable systems. PLC hardware.	X			NO	Previous reading of the lesson. Studying the concepts related to the automation technologies. To study the concepts related to the PLC hardware.	1,66	
4	6	SFC exercises.		X		NO	To prepare the proposed exercises of Functional Diagrams before their resolution at the classroom.	1,66	6
4	7	**Programming I:** Execution modes. Programming languages according to the norm IEC 61131-3. Common elements.	X			NO	Previous reading of the lesson. To study of the concepts related to the Programming languages according to the norm IEC 61131-3.	1,66	
5	8	System modelling exercises		X		NO	Preparing the proposed exercises of State Diagrams before their resolution at the classroom.	1,66	6
5	9	**Ladder (contact language) programming:** Examples of ladder (LD) programming. Unity Pro elements.	X			NO	Previous reading of the lesson. To study of the concepts related to ladder (LD) programming.	1,66	
6	10	State diagrams and LD exercises		X		NO	To prepare the proposed exercises of Ladder programming before their resolution at the classroom.	1,66	7
6	11	**Midterm Exam 1:** Contents: State and functional diagrams.	X			NO	To prepare the evaluation test.	1,66	
7	12	Simulation Software UnityPro:		X	PC Lab	NO	Previous reading of the proposed guiding notes.	1,66	6

		PLC programming introduction: hardware configuration, variables, execution modes, programming) PLC programming introduction: LD programming.					The student will program a simple script using LD so he will learn to use the simulation software in a practical way.		
7	13	**SFC Programming:** SFC program execution.	X			NO	Previous reading of the lesson. To study of the concepts related to SFC program execution.	1,66	
8	14	SFC – LD exercises		X		NO	Preparing the proposed exercises of SFC and LD programming before their resolution at the classroom.	1,66	
8	15	**Programming III:** PLC programming concepts extension. Examples: doubts about modelling and programming will be solved.	X			NO	Previous reading of the lesson. To study of the concepts related to programming examples.	1,66	7
8		**Lab Session 1:** Ladder programming	X		1.1L01/02	YES	Previous reading of the proposed guiding notes. The student will program a simple script using SFC and LD.	2	
9	16	Simulation Software UnityPro: SFC Programming.		X	PC Lab	NO	Previous reading of the proposed guiding notes. The student will program a simple script using SFC and LD. The UniPro tools for SFC programming will be introduced in a practical way.	1,66	6
9	17	**Exercises Solutions**: Questions related to proposed exercises will be answered. Moreover, the exercises from the Exam1 will be also solved.	X			NO		1,66	
10	18	SFC and LD Programming exercises		X		NO	Students will solve the proposed exercises. The solutions will be presented and discussed in class.	1,66	7

10	19	**Sensors I:** Classification. Features, presence/proximity sensors.	X			NO	Previous reading of the lesson. To study of the concepts related to sensors.	1,66	
10		Laboratory session 2: SFC Programming.		X	1.1L01/02	YES	Previous reading of the proposed guiding notes. The student will program a simple script using SFC and LD.	2	
11	20	SFC Programming exercises using Multi-token tools and Macro Steps		X		NO	Students will solve the proposed exercises. The solutions will be presented and discussed in class.	1,66	
11	21	**Sensors II:** Position, strength, acceleration, pressure, flow, and temperature sensors.	X			NO	Previous reading of the lesson. To study of the concepts related to sensors.	1,66	6
12	22	SFC Programming exercises using Multi-token tools and Macro Steps		X		NO	Students will solve the proposed exercises. The solutions will be presented and discussed in class.	1,66	
12	23	**Actuators:** Electric engines. Hydraulic actuators. Pneumatic (actuators, valves, symbology)	X			NO	Previous reading of the lesson. To study of the concepts related to actuators.	1,66	7
12		Laboratory session 3: PLC programming		X	1.1L01/02	NO	PLC programming to solve proposed exercises.	2	
13	24	**Midterm Exam 2:** A practical programming exercise will be done individually. This exercise is the second valuable test of the continuous evaluation.		X	1.1L01/02	YES	In this test each student will solve a problem using the PLC. The teacher in charge of the small group will evaluate the solution.	1,66	7
13	25	**Industrial Communications:** Introduction to Fieldbuses	X			NO	Previous reading of the lesson. To study of the concepts related to actuators.	1,66	

14	26	**Midterm Exam 2:** A practical programming exercise will be done individually. This exercise is the second valuable test of the continuous evaluation.		X	1.1L01/02	YES	In this test each student will solve a problem using the PLC. The teacher in charge of the small group will evaluate the solution.	1,66	4
							Subtotal 1	**49,16**	**81**
			Total 1 *(Hours of class plus student homework hours between weeks 1-14)*					130,16	
15		Tutorials, handing in, etc							
16		Assessment						3	
17									
18									15
							Subtotal 2	**3**	**15**
			Total 2 *(Hours of class plus student homework hours between weeks 15-18)*					18	
TOTAL *(Total 1 + Total 2. Maximum 180 hours)*								**148,16**	