Universidad Carlos III de Madrid
www.uc3m.es

COURSE: Industrial Automation		
• **DEGREE:** Electrical Power Engineering	**YEAR: 2014/2015**	**TERM: 2**

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**: Logic systems. Basic concepts of the Boole algebra. Combinational and sequential logic systems.	X			NO	Previous reading of the lesson. To study of the concepts related to logic systems. To solve the proposed exercises of Boole algebra.	1,66	3
2									
2	3	**System modelling:**	X			NO	Previous reading of the lesson.	1,66	3

		Logic system representation. State diagrams. System representation using functional diagrams.					To study the solved exercises about State Diagram. To study the concepts related to the system representation using functional diagrams. To study the solved exercises of functional diagrams.		
3	4	State Diagram exercises.		X		NO	To prepare 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. To study of 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	Laboratory session 1: PLC programming introduction: hardware configuration, variables, execution modes, programming)		X	1.1L01/02	YES	Previous reading of the proposed guiding notes. The student will configure the PLC, will program a simple script and he will test the different execution modes.	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	**Exam 1:** Contents: State and functional diagrams.	X			NO	To prepare the evaluation test.	1,66	

7	12	Laboratory session 2: PLC programming introduction: LD programming.		X	1.1L01/02	YES	Previous reading of the proposed guiding notes. The student will program a simple script using LD.	1,66	6
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	To prepare the proposed exercises of SFC and LD programming before their resolution at the classroom.	1,66	6
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	
9	16	Laboratory session 3: 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.	1,66	7
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	
9	18	**PROPOSED LABORATORY EXERCISE**		X	1.1L01/02	YES	Students will solve a proposed laboratory exercise. The State Diagram, LD programming and project documentation will be requested at the end of the session.	1,66	
10	19	Laboratory session 4: PLC programming		X	1.1L01/02	NO	PLC programming to solve proposed exercises.	1,66	7
10	20	**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	21	**PROPOSED LABORATORY EXERCISE**		X	1.1L01/02	YES	Students will solve a proposed laboratory	1,66	

							exercise. The SFC programming and project documentation will be requested at the end of the session.		
11	22	Laboratory session 5: PLC programming		X	1.1L01/02	NO	PLC programming to solve proposed exercises.	1,66	6
11	23	**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	
12	24	Laboratory session 6: PLC programming		X	1.1L01/02	NO	PLC programming to solve proposed exercises.	1,66	6
12	25	**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	
13	26	**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	27	**PIDs:** Introduction to control of continuous system. PID Controller.	X			NO	Previous reading of the lesson. To study of the concepts related to PID controllers.	1,66	
14	28	**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
							Subtotal 1	**46,48**	**83**
							Total 1 *(Hours of class plus student homework hours between weeks 1-14)*	129,48	
15		Tutorials, handing in, etc							
16		Assessment						3	
17									
18									

		Subtotal 2	**3**
	Total 2 *(Hours of class plus student homework hours between weeks 15-18)*		3
TOTAL *(Total 1 + Total 2. Maximum 180 hours)*			**132,48**