Universidad Carlos III de Madrid
www.uc3m.es

COURSE: ELECTRONIC AND OPTOELECTRONIC INSTRUMENTATION		
MASTER: TELECOMUNICATION ENGINEERING	**YEAR: 1st**	**TERM: 2nd**

WEEKLY PLANNING

SEMANA	SESIÓN	DESCRIPTION	Special room for session (computer classroom, audio-visual classroom…)	Subgroups or 2 professors	WEEKLY PROGRAMMING FOR STUDENT		
					DESCRIPTION	CLASS HOURS	HOMEWORK HOURS (Max. 7h week)
2	1	Introduction to Instrumentation Systems: static and dynamic sensors and measuring systems characterization. Definitions			Study of basic theory.	1,66	
2	2	Errors in Instrumentation and Measurement. Examples.			Basic theory and simple exercises.	1,66	7
3	3	Analog Signal Conditioning (I): Concept. Sensors conditioning Liabilities: Bridges and alternating. Instrumentation amplifiers.			Study of basic theory.	1,66	
3	4	Analog Signal Conditioning (II): Linear and nonlinear fitting. Conditioning of optoelectronic sensors. Specific circuits. Isolation amplifiers and auto-zero. Exercise.			Basic theory and simple exercises.	1,66	7
4	5	Noise and Interference in Instrumentation Systems (I). Types, properties and characterization of noise in instrumentation. Evaluation of Resolution.			Basic theory and simple exercises.	1,66	
4	6	Noise and Interference in Instrumentation Systems (II): Interference and EMC: Techniques Shielding and Grounding. Exercise.			Basic theory and problems based learning.	1,66	7
5	7	Electronic Sensors and Measurement of Physical Magnitudes (I): Position and Displacement Measurement and associated magnitudes. Extensometry.			Applied theory.	1,66	
5	8	Electronic Sensors and Measurement of Physical Magnitudes (II):			Applied theory.	1,66	7

		Temperature measurement and other mechanical quantities.					
6	9	Exercises .			Problems based learning .	1,66	
6	10	Optical and optoelectronic sensors. Examples.			Basic theory and simple exercises.	1,66	7
7	11	Introduction to Systems Electronic Instrumentation and Optoelectronics in Medicine and Bioengineering. Examples.			Basic theory and simple exercises.	1,66	
7	12	Exercises.			Problems based learning .	1,66	7
8	13	**PARTIAL ASSESMENT**	Special Room		Control of the first thematic block.	1,66	
8	14	Data Acquisition Systems. Integration of analog and digital signals Instrumentation systems. Examples.			Applied theory.	1,66	7
9	15	Virtual Instrumentation (I) - Introduction LabVIEW.	Computer classroom		LabVIEW programming.	1,66	
9	16	Practice 1. Characterization of sensors.	Laboratory	2 professors	Preparation of practice, assembly and measurements in the laboratory work and report. Sensor calibration.	2,5	7
10	17	Systems Integration Electronic Instrumentation and Optoelectronics. Example: Aerospace Engineering.			Applied theory.	1,66	
10	18	Practice 2. Virtual Instrumentation (II) - Hardware and Software. Strain measurement - extensometer.	Laboratory	2 professors	Preparation of practice, assembly and measurements in the laboratory work and report. Calibrating a strain measurement system based on gages. LabVIEW programming.	2,5	7
11	19	Exercises.			Problems based learning .	1,66	
11	20	Practice 3. Virtual Instrumentation (III) - Hardware and Software. Optoelectronic sensor	Laboratory	2 professors	Preparation of practice, assembly and measurements in the laboratory work and report. Study of an optoelectronic sensor for the measurement of opacity in a medium. LabVIEW programming.	2,5	7
12	21	**PARTIAL ASSESMENT**	Special Room		Control of the second thematic block.	1,66	
12	22	Practice 4. Virtual Instrumentation (IV) - Hardware and Software. Pulsioximeter.	Laboratory	2 professors	Preparation of practice, assembly and measurements in the laboratory work and report. Study and calibration of an optical pulse oximeter as a biomedical example. LabVIEW programming.	2,5	7
13	23	Examples of Instrumentation System Design (I).			Teamwork.	1,66	7
14	24	Examples of Instrumentation System Design (II).			Teamwork.	1,66	7
15	25	Examples of Instrumentation System Design (III).			Teamwork.	1,66	7

15	26	Examples of Instrumentation System Design (IV).			Teamwork.	1,66	
16	27	**PARTIAL ASSESMENT**			Presentación y defensa del trabajo en equipo.	1,66	3
					Subtotal 1	**48,33**	**101**
		Total 1 *(Hours of class plus student homework hours between weeks 2-16)*					**149**
17		Tutorials, handing in, etc.					9
18		Assessment				3	9
					Subtotal 2	**3**	**18**
		Total 2 *(Hours of tutorials, handing in, assessment,etc., plus student homework at week 16-18)*					**21**
TOTAL *(Total 1 + Total 2. Maximum 180 hours)*							**170**