SUBJECT TEACHING GUIDE

M1596 - Electronic Instrumentation

Master's Degree in Telecommunication Engineering

Academic year 2016-2017

1. IDENTIFYING DATA					
Degree	Master's Degree in Telecommunication Engineering			Type and Year	Compulsory. Year 1
Faculty	School of Industrial Engineering and Telecommunications				
Discipline					
Course unit title and code	M1596 - Electronic Instrumentation				
Number of ECTS credits allocated	5	Term	Semester based (1)		
Web	http://moodle.unican.es/moodle27/				
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. INGENIERÍA INFORMÁTICA Y ELECTRÓNICA
Name of lecturer	M. MERCEDES GRANDA MIGUEL
E-mail	mercedes.granda@unican.es
Office	Facultad de Ciencias. Planta: + 3. DESPACHO DE PROFESORES (3060)
Other lecturers	MARIA ELENA MEDIAVILLA BOLADO

3.1 LEARNING OUTCOMES
- Know how to design, build and validate an instrumentation system for measuring physical magnitudes based on a computerized environment.
- Know how to generate and interpret the qualification documentation of an instrumentation system in order to make measurements with it and define its validity range.

4. OBJECTIVES
The student will know the procedures for specifying, designing, characterizing and using instrumentation systems with transducers, actuators and sensors to perform measurements of physical magnitudes.
The student will know and be able to use the techniques for signal acquisition and processing and for presentation of results.
The student will know how to use the computer as a central element of the measurement system and build with it automated environments.
The student will know to assess the influences of the real measurement environment to consider the limitations of the components and the interference issues.
Students will learn the process of calibration and validation of instruments and know how to interpret the information provided.

6. COURSE ORGANIZATION	
CONTENTS	
1	Introduction to instrumentation systems and measurement processes: Instrumentation systems. Computerized instrumentation. Characteristics of an instrument. Statistical analysis of experimental data. Uncertainty calculation.
2	Electronic instrumentation systems with transducers, actuators and sensors and signal conditioning circuits. Real model of the operational amplifier. Instrumentation amplifiers. Integrated instrumentation amplifiers.
3	Programmable electronic instrumentation. Data acquisition systems. Instrumentation buses. High-level software for electronic instrumentation. Development of virtual instrumentation.
4	Noise and interferences: Noise concept. Characterization of noise levels. Noise sources. Noise in operational amplifiers. Nature and cause of the interferences. Grounding and shielding techniques. Isolation amplifiers.
5	Individual project to design and characterize an instrumentation environment.

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
Description THEORY EXAM	Written exam	Yes	Yes	50,00
Description LABORATORY PRACTICES EVALUATION	Laboratory evaluation	No	Yes	50,00
TOTAL				100,00
Observations				
The student must have a mark equal to or greater than 4.0 in each evaluation. Under these conditions, the final grade is the average of both.				
Observations for part-time students				

8. BIBLIOGRAPHY AND TEACHING MATERIALS
BASIC
GRANDA M. y MEDIAVILLA E., Instrumentación Electrónica: Transductores y Acondicionadores de señal. PUbliCan, Ediciones de la Universidad de Cantabria, Santander, 2010.
FRANCO S., Design with Operational Amplifier and Analog Integrated Circuits. Mc Graw Hill, 1988.
PEREZ M.A., ALVAREZ J.C. y otros, Instrumentación Electrónica. Thomson-Paraninfo, 2004.
AENOR, Metrología. Práctica de la Medida en la Industria. AENOR, 1999.
CENTRO ESPAÑOL DE METROLOGÍA, Metrología. Guía para la Expresión de la Incertidumbre de Medida. Ministerio de Fomento. Centro Español de Metrología, 2ª Edición, 2000.