Program	09AQ-Master in Telecommunication Engineering

Course number and name	
Number	93000796
Name	Instrumentation Systems Engineering Ingeniería de Sistemas de Instrumentación
Semester	Y1-S2

Credits and contact hours	
ECTS Credits	6
Contact hours	66

Coordinator's name	Enrique Iborra Grau

Specific course information

Description of course content

The course has as main objective to form the students in the analysis and design of electronic instrumental systems. The concept of instrumental system will be described and developed as a window to the actual status of a physical system, which could be observed (measured) or controlled. The different parts of an instrumentation systems will be described: sensors, electronic conditioning, data transmission control units and actuators. Basis of control theory will also be introduced.

List of topics to be covered

Theory- Introduction to instrumentation systems. Magnitudes, transducers, and electronic signals. Signal conditioning. Noise, calibration and certification. Control in instrumentation systems The use of computer in instrumentation systems. Examples and particular cases.

Laboratory- LabView® programming. Use of instruments (oscilloscope, multimeter, function generator and power supply). Resistive sensors: thermistor and strain gauge. Generating sensors: thermocouple and photodiode. Noise and filtering: an electrocardiograph. Control: PID control implementation.

Prerequisites or co-requisites

The needed for this Master (BsC in telecommunication engineering)

Course category in the program

_X_ R (required)	__ E (elective)	__ SE (selective elective)

Specific goals for the course

Specific outcomes of instruction
RA36: To know the basis of electronic instrumentation engineering RA38: To design, at block diagram level, a particular instrumental system RA39: To analyze and evaluate the specifications and design constrains of each part of an instrumentation system. RA40: To develop applications for the control of individual instruments to form an instrumentation system by using a PC and LabView® as platform
Student outcomes addressed by the course
CG1, CG2, CG4, CG5, CT3, CT4, CT5, CE14 and CE15.

Bibliography and supplemental materials

Bibliography

- Patrick H. Garrett, “Advanced Instrumentation and Computer I/O Design” John Wiley & Sons, Inc. (2013)
- Walt Boyes, “Instrumentation Reference Book”, Butterworth-Heinemann (Elsevier), (2010)
- Patrick H. Garrett, “Multisensor Instrumentation 6σ_ Design”, John Wiley & Sons, Inc. (2002)
- Gerard C.M. Meijer, “Smart Sensor Systems”, John Wiley and Sons, Ltd, (2008)
- Waldemar Nawrocki, “Measurement Systems and Sensors”, Artech House, Inc. (2005)
- Curtis D. Johnson, “Process Control Instrumentation Technology”, Prentice Hall, (2000)

Laboratory benchtop.

Digital oscilloscope. Digital multimeter. Function generator. Programmable power supply. Personal computer with IEEE 488 bus controlling the instruments and LabView® for programming. Sensors and specific circuitry.

Teaching methodology

_X_ lectures	__ problem solving sessions	_X_ collaborative actions	_X_ laboratory sessions
Other:	33.3% lectures 66.6% laboratory sessions.		