

ELECTRONIC INSTRUMENTATION

COURSE PROGRAM

2016

Antonio Boscolo

The latest activities of the Degree and Doctorate tend to form research and development professionals able to lead, not only from the technical and scientific point of view, large-scale projects such as the development of new products based on the measurement of complex quantities as the quality of the environment, the development of new sensor systems based on organic semiconductors, the innovative use of micro and nano technologies and the development of innovative methods of extracting useful information from the raw provided by the sensors.

This type of professionalism is dominated by the interdisciplinarity of knowledge and techniques, and allows a great professional integration in numerous contexts of both R & D and manufacturing.

The course provides the basic knowledge in the field of measurement of non-electrical quantities such as pressure, temperature, chemical species .. etc., needed for the identification of methods and measurement techniques, devices and tools appropriate to the realization of automated measurement systems. Particular emphasis is given to the interaction with the real world or to the sensors, to their conditioning and extracting information of interest from the raw they supplied.

PROGRAM

Purpose, methods and aims of the course.

The measurement of non-electrical quantities and sensorial systems.

Structure of a measuring system.

Techniques of direct and indirect measures in the field of non-electrical quantities.

Description of the measurement methods, the sensory systems, the first conditioning and the technological aspects involved in practical interest variables such as temperature, position, strain, force, pressure, velocity, acceleration, level and flow of liquid, moisture, PH, chemical species, etc ..

Measurement models.

Modeling and Metrological study of a measurement chain.
Methods and conditioning of raw information extraction techniques.
Methods and data fusion techniques.
Electromagnetic compatibility, and other noise sources in a sensory system.
Methods and techniques of noise compression.
Data acquisition systems
Automated instrumentation
Remote measurement and distributed systems
Sensors and intelligent instrumentation, knowledge-based.
Methods and techniques for optimal identification of the measuring method in the development of sensors and instrumentation.
The technologies involved in the realization of the actual sensors and instrumentation.
The synthesis of a measurement system: different approaches
The compliance and the adequacy of measurement systems.
Characterization and validation of sensory systems and instrumentation.
The quality of the measurement and measures for the quality.
Research in the instrumentation field.

LAB EXERCISES

Conditioning of conventional sensors. Examples of specific instrumentation. Development of an example of a sensor. Implementation of simple measuring devices, etc.

TEACHING METHODS

Lectures and individual development of a shared theme in the laboratory

LEARNING VERIFICATION

Oral examination in the following way: the individual term paper presentation. Discussion on a topic chosen by the candidate. Discussion on a topic concerning the matter of the course.