

Instrumentation

Number of ECTS credits: 3
Coefficient: 3

Description:

Study of the various elements of the instrumentation chain from the analog measurand to its transformation into a digital signal:

- Instrumentation systems
- Sensors and signal conditioning: advanced resistance measurement, load measurement
- Noise and interference: noise protection, electronic noise, noise equivalent scheme, noise factor, synchronous detection ...
- Conversion of analog data <-> digital: quantization noise, structure of CAN
- Acquisition chain: precision, oversampling, multiplexed acquisition
- Instrumentation buses: communication with measuring devices

Pedagogical objectives:

Design conditioning circuits for all types of electrical quantities
Identify and know how to protect against interference in electronic circuits
Modeling the effects of noise in an electronic circuit
Implement detection techniques in the presence of noise
Design a complete measuring chain to ensure a level of accuracy and speed
Ability to control measuring instruments automatically (Python, VISA, SCPI)

Bibliography: Prerequisite:

Analog electronics, probability

Lectures Hours: 10.5

Tutorials Hours: 6.5

Labs Hours: 12

Knowledge monitoring modalities: 100% continuous assessment

Assessment: 1 project of measurement chain design, 1 exam, reports of labs

Leader: Franck CHOLLET

Participants: