

## Smart Devices



ECTS  
5 crédits



Hourly volume

# Introducing

## Description

## Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):

SMART SENSORS AND ACQUISITION CHAIN:

- The criteria for the design and use of a "smart device" and an acquisition chain

It will be capable of handling:

- The physical principles of sensors operation
- The concepts used in metrology
- Procedures implemented,
- electrical "conditioners"
- The design of an acquisition chain and a "smart device".

MICROCONTROLLERS AND OPEN SOURCE HARDWARE: the elements necessary for the design and implementation of concrete applications in Open Source Hardware,

DESIGN OF A CIRCUIT IN ANALOG ELECTRONICS:

It will be able to design and simulate an amplification stage dedicated to the measurement of the sensor realized

DESIGN OF AN ELECTRONIC BOARD OF THE SENSOR:

He will be able to design and build an electronic board

containing the sensor, its conditioning electronics and the communication elements necessary to send the data on a low speed network such as LoRa.

NANO-SENSOR:

- The approach of making nano devices and micro-electronic methods by integrating low-cost nano-objects prepared in solution;
- The operation of a nano-sensor.

The student will have understood and be able to explain:

- Experimental concepts and practices to synthesis nano-objects in liquid phase; Stabilization of colloidal solutions;
- Experimental concepts and practices of deposits of these nano-objects as 2D and 3D networks;
- The physical principles of sensors based on nanoparticles (gas sensors, stress ...)

The student will be able to:

- Experimentally produce a nanoparticle-based sensor that will be synthesized and assembled between two electrodes;
- Measure the properties of the sensor and describe its operation;
- Discuss experimental results and suggest improvements

## Necessary prerequisites

General physic and electronic lectures. C et C++ programming

## Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

## Practical info

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### Location(s)

 Toulouse