INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES TOULOUSE

# 4th YEAR GP INSA_SEMESTER 8

# Introducing

## Description

## 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

## Location(s)

Toulouse

# Laboratory Works Multiphysics Measurements 1

ECTS
3 crédits

Hourly volume
232h

# Introducing

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# Practical info

## Location(s)

Toulouse

# Physical properties of Condensed Matter 2

ECTS
4 crédits

Hourly volume
85h

# Introducing

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# Practical info

## Location(s)

Toulouse

# Multidisciplinary project

ECTS
3 crédits

Hourly volume
40h

# Introducing

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# Practical info

## Location(s)

Toulouse

# Micro-nano technologies

ECTS
3 crédits

Hourly volume
23h

# Introducing

## Description

## Objectives

The goal of the course is to introduce the techniques used in the micro-electronics industry for the fabrication of integrated circuits (photolithography, growth and deposition of thin films, doping, etching techniques), as well as various optical and electrical characterization techniques.
The physical and the chemical processes involved in these techniques are studied.

The complete fabrication process of NMOS and CMOS circuits is presented.

The students are also initiated to the design and the simulation of integrated circuits.

## Necessary prerequisites

Semiconductor physics (electrons, holes, doping, band structure).
Design and working principle of basics electronics components (PN junction, MOS transistor).

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# Practical info

## Location(s)

Toulouse

# From the sensor to the test bench in open source hardware

ECTS
3 crédits

Hourly volume
92h

# Introducing

## Description

## Objectives

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

THE MANUFACTURING OF ¿low tech¿ SENSORS based on graphite: with elements of physics (electronic transport) allowing the understanding of the electrical characteristics of a sensor based on a granular system (graphite nanoparticles).

SENSORS AND ACQUISITION CHAIN:
- The criteria for the design and use of this sensor and an adapted 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.

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

MICROCONTROLERS AND OPEN SOURCE HARDWARE:
Elements to master the microcontrollers allowing the design and implementation of concrete applications in Open Source Hardware,
- The architecture and operation of ATMEL AVR microcontrollers,
- Programming in the C and C++ language of the Arduino and IDE development environment,
- Creating his own libraries and programs,
- Creating its own human/machine interfaces: in Arduino / Processing, Android and python,
- The achievement of its own circuit boards (PCB + Eagle...)
- Board interfacing with various devices (displays, motors, sensors, Nunchuk, touch screens, I2C bus, wifi, Bluetooth LE ...)
- Intellectual property in open source hardware

REALIZATION OF AN ANDROID APPLICATION:
He will be able to create an ANDROID application to retrieve data from the graphite sensor.

REALIZATION OF A TEST BENCH ADAPTED TO THE SENSOR
He will be able to build a bench allowing characterizing in a optimal and reproducible way the electrical characteristics of the sensor.

REALIZATION OF THE SENSOR DATASHEET
Finally, he will realize the data sheet of the sensor realized.

## Necessary prerequisites

Knowledge of Fortran, C and even C++
Knowledge of algorithmic

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# Practical info

## Location(s)

Toulouse

# Safety, quality and applications to measurement

ECTS
4 crédits

Hourly volume
186h

# Introducing

## Description

## Objectives

This module provides a theoretical and experimental approach of the main concepts involved in the field of quality, safety, environment and measurement. The following topics are covered:
¿ design of experiments,
¿ Statistical process control.
¿ component failure
¿ Metrology and testing
¿ decision making and risk analysis

This entire course is motivating for the student by putting it in concrete situation with report to the problems they might encounter in his life as a future engineer.
In this framework, the guiding principle of the training is to focus on the one hand on the work group around applications and unifying themes and secondly, strengthening the link between academic courses of their curriculum and the concepts they will required during practical training in laboratory and/or company.

At the end of this UF, the student will:
1 - Be able to define, build and analyze an experimental design of a complex physics problem and have a critical look on the obtained results.
2 - Master the requirements of the space industry in terms of reliability as well as its normative aspects with the consequences that this can sometimes have (limitation of performances, etc...).
3 - Be aware of safety, quality, decision, environmental risks and risk analysis

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# Practical info

## Location(s)

Toulouse


Non-contractual information

# [FRANCAIS] Physique pour la transistion énergétique

ECTS
3 crédits

Hourly volume
32h

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# Practical info

## Location(s)

Toulouse

# Communication in organisations with LV2

ECTS
6 crédits

Hourly volume

# Introducing

## Description

## Objectives

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

-How to answer the demand of the civil society for technical and scientific information
-How to carry out critical analysis in order to give appropriate answers when questioned about such issues
-How to consider the circulation and content of information within the organizations in which they will be hired

The classes given in English will focus on the specific linguistic characteristics of the English used in scientific contexts in order for the students to understand and master them.
The students will also be made aware of the specificities of scientific English as relates to publications in his specific field of research.

Module L 2
The objectives, defined in reference to the CEFRL for the 5 language activities, are specific for the language studied ¿ Chinese, German, Spanish ¿ and the level of the student.
They can be consulted on :
https://moodle.insa-toulouse.fr/course/view.php?id=44

In certain cases, students may be authorised to follow an English module instead of another language

## Necessary prerequisites

Necessary knowledge:
For classes in English : understanding of scientific English

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# Improving one's autonomy and building one's own professional project level 2 S

ECTS
4 crédits

Hourly volume
40h

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# Political sciences semestre 2

ECTS
3 crédits

Hourly volume

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Non-contractual information