

Experimental physics and stochastic modelling

Introducing

Description

Programme (detailed contents):

Experimental section :

- 5 lab sessions (7h30) chosen from the following: Temperature sensors, Vacuum technologies, Lasers, Extensometers, Thin films, Optical Measurement.
- Each practical deals with different sensors, how do they work, how to use them, how to analyse the results ?

- Statistics section:

Random modeling of measurements: systematic error, random error, confidence intervals.

Linear model: least squares adjustment, prediction intervals, model validation, model choice.

Introduction to experimental planning: optimality criteria, estimation of main effects and interaction effects of different factors.

Organization (progress):

The documents (course handout, tutorial statements, exam subjects) are available on Moodle and distributed to students.

The practical work will be carried out using a data processing tool (Excel, Python, etc.)

intervals, statistical hypothesis tests, linear models.

The student will be able to build a data acquisition system starting from different sensors, to analyse the result and quantify the various components in measurement errors, to build a statistical model from observations.

Necessary prerequisites

Probabilities and Statistics (Second year - IMACS - I2MADOPOMS20)

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

Objectives

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

- Operation of the different sensors used during the lab sessions. They will know how to use them in order to solve a problem and view the results critically.
- Stochastic modelling of measurements, confidence