

Metrology and Quality Control



SCHOOL

Polytech Graduate School of Engineering



CAMPUS

Belle-Beille



LEVEL

Engineering 3rd year



OPEN TO EXCHANGE STUDENTS

Yes



SEMESTER

Spring (S2)

> **Degree course:** Quality, Innovation and Reliability Engineering

> **Teaching unit:** Industrial production

> **Course language:** English

> **Duration (hours):** 40

> **ECTS:** 1

> **Teacher(s):** Teodor Tiplica

> Assessment:

Continuous assessment

Final exam

> Teaching methods:

Lecture course 9.33 hours

Tutorial course 18.67 hours

Practical work 12 hours

Case study

Project

COURSE DESCRIPTION

Part 1: Metrology

- Organization of industrial metrology, legal and scientific
- Management System of Measurement (ISO 10012) and traceability of measurement
- Different sources of uncertainty of a measurement chain or a measurement process and methods of propagation of uncertainties
- Applications (1) of the conventional method for estimating uncertainty from physical models.
- Applications (1) of the measurement uncertainty estimation method of the GUM (methods of types A and B standard uncertainty, expanded uncertainty) (2) for the measurement of electrical quantities, metrology temperatures, volumes and masses.

Part 2: Quality Control

- Accuracy of results and measurement methods (definitions, statistical model to estimate the accuracy, planning experience of estimating accuracy, estimation of the precision of a measurement method, estimation of the correctness of a measurement method).
- Evaluation of the capability of a measurement system

Part 3: Reception sampling

- Statistical control, sampling, efficiency curve. Multiple normalized sampling plans

OBJECTIVES

Students will:

- know the basic concepts of metrology (all disciplines).
- understand that a measure is still affected by uncertainty and learn to express it.
- know how to evaluate the accuracy of a standard measurement method by inter-laboratory comparisons.
- know how to evaluate the capability of a measurement system according to the standard Ford.

PREREQUISITES

Statistics and probability, Estimation and Tests, Linear algebra

SELECTIVE BIBLIOGRAPHY

ISO 10012, GUM, VIM

- Incertitudes de mesure - Tome 2, Applications concrètes pour les essais, EDP Sciences, A. Charki
- Incertitudes de mesure - Tome 1, Applications concrètes pour les étalonnages, EDP Sciences, A. Charki
- BARRENTINE Larry B., Concepts for RandR studies ? 2nd ed., ASQ Quality Press, 2003
- QUEVAUVILLER Philippe, Métrologie en chimie de l'environnement, Editions Technique et Documentation, 2001
- Measurement Systems Analysis - Reference Manual - Chrysler Corporation, Ford Motor Company, General Motors Corporation, 1995
- Méthodes statistiques, tome 5 : Traitement des résultats de mesure, 7ème édition, Qualité et Efficacité des Organisations, AFNOR, 1996
- NF ISO 5725-1 : Exactitude (justesse et fidélité) des résultats et méthodes de mesure , partie 1 : principes généraux et définitions, AFNOR, 1994
- NF ISO 5725-2 : Exactitude (justesse et fidélité) des résultats et méthodes de mesure , partie 2 : méthode de base pour la détermination de la répétabilité et de la reproductibilité d'une méthode de mesure normalisée, AFNOR, 1994
- NF ISO 5725-4 : Exactitude (justesse et fidélité) des résultats et méthodes de mesure , partie 4 ? méthodes de base pour la détermination de la justesse d'une méthode de mesure - normalisée, AFNOR, 1994