

Introduction à la planification d'expériences



Niveau
d'étude
BAC +5 /
master



ECTS
1 crédits



Composante
Faculté des
sciences

En bref

- > Langue(s) d'enseignement: Français
- > Ouvert aux étudiants en échange: Oui

Présentation

Description

The following courses will be dedicated to the presentation and use of several types of designs, developed to answer different types of problems.

> Introduction

Objectives, technical and economical interest, investigation methodology.

> Constitutive elements

The factors : discrete, continuous, ... ; main factors, noise factors,...

Treatments, experimental units, ...

Observations, special case : quality (reduction of the signal to noise ratio).

The expected model, additivity hypotheses of the contributions, state vector, free or constrained effects.

> Searching for an optimal design of experiments

The sampling variance/co-variance matrix of the effects.

The a priori analysis of an experimentation, optimality criteria.

Execution of a designed experimental set (randomisation, error estimation, ...).

Reminder on the significance of statistical tests, risks, comparison of variance estimations (Fisher-Snedecor test), of mean estimations (Student test, Tuckey test) ...

> Presentation/use of some types of designs

Discrete factor designs : complete blocking, incomplete, latin squares, ...

Full factorial designs, 2p designs with interactions.

Fractional designs, Taguchi designs, Box designs ..., notion of aliases, resolution ...

Response surface designs, quadratic designs : Doehlert, composite, Box-Behnken.

- # Mixture designs.
- # Simplex design for optimum search.

Objectifs

The goal of the design of experiments is to conceive, execute and analyze a set of experiments resulting in the best possible compromise between quality of the requested information (precision, independence, ...) and the experimental effort deployed, considering the formulated hypotheses on the studied system's behavior. Frequently used by the industrial sector for R&D and quality control, the method appears also more and more for research purposes.

Heures d'enseignement

CM	Cours magistral	11h
TP	Travaux pratique	4h

Compétences visées

- # Isolate / detect the influencing factors of a system or process;
- # Build an optimized experience plan;
- # Conduct an experience plan during the experiments;
- # Use the results of an experiment plan;
- # Interpret the results of an experiment plan;
- # Optimize a system or process from an experience plan.

Other concepts discussed and not deepened (not required): Evaluate the validity and the precision of the experiment plan used; Use Taguchi plans to optimize a system or process.

Infos pratiques

Lieu(x)

- Angers

Campus

- Campus Belle-beille