Introduction à la planification d'expériences

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 ex-periments resulting if the best possible compromise between quality of the requested information (precision, independence, ...) and the experimental effort deployed, consi-dering 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 - Introduction à la planification d'expériences	Cours magistral	11h
TP - Introduction à la planification d'expériences	Travaux pratique	4h

Pré-requis obligatoires

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