EPFL

ENG-606(c)   **Design of experiments (c) - Spring semester**
Fuerbringer Jean-Marie

Cursus	Sem.	Type
Advanced Manufacturing		Obl.
Civil & Environmental Engineering		Obl.
Energy		Obl.
Mechanics		Obl.
Robotics, Control and Intelligent Systems		Obl.

Language of teaching	English
Credits	4
Session	
Exam	Project report
Workload	120h
Hours	**56**
Courses	20
TP	36
Number of positions	**60**

Frequency

Every year

Remark

Block course Spring 2019

Summary

The course teaches the acquisition of a methodology of designing experiments for optimal quality of the results and of the number of experiments.

Content

Experiment analysis and planning

Treatment of qualitative factors
- Inference of constant and random coefficient models
- Graeco-latin squares design
- Balanced bloc design
- Analysis of variance (Anova)

Treatment of quantitative factors
- Empirical models
- Matricial treatment of the multilinear regression
- Analysis of non-orthogonal estimators
- Analysis of variance

Standard designs for first and second degree models
- Hadamard, factorial, fractional factorial designs
- Normal and half normal
- Composite, Doehlert and Box Behnken design
- Canonical analysis

Note

Specifically the objectives are:

• To transfer to the student the conceptual basis for designing, performing and analyzing statistical design of experiments

• To let the student understand the methodology of response surface, with the mathematical concepts that allow the evaluation and the optimization of a matrix of experiments

• To develop a principle of know-how to evaluate, optimize and analyze design of experiments

• To develop conceptual understanding of the design of experiments that allows the PhD student to collaborate with statisticians

Given during spring semester; block course (2x3 days)
The course requires to be familiar with Excel or Matlab

Keywords

Experimental methodology, optimization of experimental plan, applied statistics, empirical models, sensitivity analysis

Learning Prerequisites

Recommended courses

Basic statistics, Matrix algebra, Matlab and/or Excel