Design of experiments (c) - Spring semester

Fuerbringer Jean-Marie

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<th>Cursus</th>
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<td>Énergie</td>
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<td>Génie civil &amp; environnement</td>
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Language: English
Credits: 4
Session: Exam
Exam: Project report
Workload: 120h
Hours: 56
Lecture: 20
Practical work: 36
Number of positions: 60
Frequency: Every year
Remarque: Block course Spring 2020 (including a 2 days optional pre-course on Matlab)

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