CESPE ACADEMY

DESIGN OF EXPERIMENTS

Course Programme

Module 1: Basics of DoE

- **Drawbacks of non-DoE experimentation methods**
- **DoE "Active Learning" approach & goal**
- **Define-Model-Design-Analyze workflow**
- **Full Factorial "screening" DOE case study**
- **Regression Modelling and Analysis**
- **Response Surface "Central Composite Design" optimization case study**

Module 2: Advanced case studies
(specific experimental conditions, criteria & goals)

- **Some factors (effects) are categorical**
- **Number of experiment runs is limited because of the available budget**
- **Process optimization with several Y responses**
- **"Quality by Design" case study: specifying the "Control Space"**
- **"Mixture DOE": Factors are components of a mixture**
- **There are uncontrollable "random block" effects**

Target Audience

Professionals, researchers, and PhD students in chemical, pharmaceutical, and healthcare sciences and engineering who wish to enhance their understanding and application of optimized experimental design.

Information

Time and Date: 9:00 - 17:00 **9th and 10th of September 2025**

Place: **Faculty of Pharmaceutical Sciences** Ottergemsesteenweg 460, Ghent, Belgium

Contact: Mark.Gontsarik@UGent.be

Course Description

The DOE training is hands-on and designed for individuals who want to actively engage in Experimental Design and gain a better understanding of the statistical analysis of experimental data.

The course emphasizes the **Optimal Design of Experiments**, matching the experimental design to the problem while considering all experimental boundary conditions and constraints. Optimal DOE is computer-aided, meaning experiment runs and regression models are generated by computer algorithms; **the software package used is JMP**. The topics are illustrated through case studies and examples from industrial R&D, making the training particularly relevant for professionals in that field.

The course is divided into two modules, each lasting one full day. The basic module begins by covering the necessary theory, including basic training in linear multiple regression analysis for analyzing experimental data and establishing statistical process models needed for parameter screening and optimization. Additionally, the JMP software package will be introduced, and simple cases will be reviewed to describe the basic DOE approach. The advanced module covers more complex examples with specific experimental conditions. In each of the case studies, the goal is to improve the performance of a process or product through efficient exploration and optimization.

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