

# Design of Experiments for Chemists and Engineers (DoE)

9<sup>th</sup> and 10<sup>th</sup> November 2016

A 2 day course given by

Dr Paul Murray

Paul Murray Catalysis Consulting Ltd

## Course Participants, who should attend?

Organic Chemists/Medicinal Chemists in R&D

Development and Production Chemists

Chemical Engineers

Managers

## Venue

The Park Hotel,

Gloucester Road,

Whitfield,

South Gloucestershire, GL12 8DR.

01454 260 550



Register for this course by using the form on page 4.

# Design of Experiments for Chemists and Engineers (DoE)

A 2 day course given by Dr Paul Murray, Paul Murray Catalysis Consulting Ltd  
9<sup>th</sup> and 10<sup>th</sup> of November 2016 at The Park Hotel, Whitfield, UK.

## Introduction

Industrial Scientists can no longer afford to experiment in a trial-and-error manner, changing one factor at a time.

A far more effective method is to apply a systematic approach to experimentation that considers all factors simultaneously.

This approach is called Design of Experiments (DoE) and many scientists use it as an efficient way to solve serious problems afflicting their projects.

DoE provides information about the interaction of factors and the way the total system works, something not obtainable through traditional testing methods. DoE also shows how interconnected factors respond over a wide range of values, without requiring the testing of all possible values directly. DoE is a fundamental aspect of Quality by Design.

The Two day course written and presented by a process chemist with extensive experience of applying DoE across a wide range of chemical reactions from reactions screening and new route development through to reaction optimisation.

The course will empower scientists to implement DoE in their work to more efficiently improve their processes.

## Course Objectives - What does the course set out to achieve?

Design of Experiments (DoE) is a statistical tool which enables the efficient exploration of potential reaction parameters and their effect on a process. DoE is a fundamental aspect of Quality by Design. The course will introduce the DoE Process and how to use it to develop and understand chemical reactions and processes.

## Day One

### Session 1

- Introduction to the principals of Design of Experiments with a comparison with traditional methods.
- Introduction to DoE language and the DoE process. How to identify potentially important factors and ranges.

### Session 2

- Designs for 2 factors.
- Taylor's expansion and an introduction to the statistics.
- Designs for 3 and more factors.
- Work Shop: Selecting factors and Ranges

### Session 3

- Fractional Factorial designs. Different design types from screening designs to optimisation and robustness designs.

### Session 4

- How and when to use the different design types. Work shop: Calculating main effects and identifying interactions

## Day Two

### Review of day one

### Session 1

- Principal component analysis (PCA) for solvent selection.

### Session 2

- Case studies.

### Session 3

- Workshop: implementing DoE.

### Session 4

- Review of the course and questions.

## Course Fee

The course begins with registration at 8.30 am on Wednesday 9<sup>th</sup> of November and finishes at approximately 4.30 pm on Thursday 10<sup>th</sup> of November 2016. The course fee is £1,000, which includes lunch, teas, coffees on each day and dinner on Wednesday 9<sup>th</sup> of November, plus comprehensive course manual.

## Course Tutor: Dr Paul Murray



Paul is a consultant with expertise in the fields of Catalysis, Design of Experiments, Principal Component Analysis and Process Development. Paul has a proven track record of the timely delivery of innovative solutions to projects resulting in significant reductions in costs and resources to customers.

Paul worked as a Process Development Chemist at AstraZeneca and collaborated with academics at the University of Bristol to develop ligand property maps to enable the use of DoE for the efficient, rational development of catalytic reactions. Paul has 18 publications and 9 patents to date.

## What will the attendees gain from the course?

- Understand the DoE process.
- Select process factors and suitable ranges.
- Understand the different types of experimental design and when to use them.
- Identify main effects, interactions and interpret DoE models in relation to chemical understanding.
- Understand where DoE will solve a problem and when to consider complementary techniques like reaction progress kinetics to probe more challenging processes.

### VENUE

The Park Hotel,

Gloucester Road, Whitfield,

South Gloucestershire, GL12 8DR.

01454 260 550

[www.theparkfalfield.co.uk](http://www.theparkfalfield.co.uk)

## Registration

You can either post to:

Paul Murray Catalysis Consulting Ltd,  
67 Hudson Close, Yate, BS37 4NP, UK.

or email the attached registration form to:

[stephen.evans@catalysisconsulting.co.uk](mailto:stephen.evans@catalysisconsulting.co.uk)

### How to Pay

Credit Card: American Express, Mastercard or Visa. For email payments, please include course title, card number, expiry date and security code. A receipted invoice will be sent by post.

Bank Transfer or Cheque - should your company wish to pay by cheque or bank transfer, in GB£, bank details will be supplied with an invoice.

### Group Discounts

Group discounts are available on multiples of 2 or more attendees – see registration form. This offer only applies if bookings are made simultaneously and from the same billing address.

Confirmation of your registration Confirmation will be sent by email and your invoice will be sent by post.

### Late Applications

For late applications, please register email the completed registration form, including credit card payment information.

### Cancellations/Refunds

Should you be unable to attend and cancel in writing no later than 1 month before the start of the course, Paul Murray Catalysis Consulting Ltd will make a refund (minus) - £150 admin fee. Unfortunately refunds are not possible after that date.

# Design of Experiments for Chemists and Engineers (DoE)

9<sup>th</sup> and 10<sup>th</sup> November 2016

Number of attendees  @ £1000

## Special Offer!

Register 2 delegates: 5% discount on final amount,  
Register 3 delegates: 10% discount on final amount,  
Register 4 delegates: 15% discount on final amount.

### First attendee

Company	<input type="text"/>
Title (Dr/Prof/Mr/Mrs/Ms)	<input type="text"/>
First Name	<input type="text"/>
Surname	<input type="text"/>
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	<input type="text"/>
Post Code/Zip	<input type="text"/>
Tel/Mobile	<input type="text"/>
Email	<input type="text"/>
Special Diet	<input type="text"/>

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First Name	<input type="text"/>
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Special Diet	<input type="text"/>

### Payment Methods

I would like to charge the fee(s) to my credit card

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First Name	<input type="text"/>
Surname	<input type="text"/>
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Email	<input type="text"/>
Special Diet	<input type="text"/>

CCV code

(last 3 or 4 digits by signature on card)

Date

Signature

#### Discounts

This offer only applies where all delegates are booked simultaneously and at the same billing address.

Please complete this form and either email to  
[stephen.evans@catalysisconsulting.co.uk](mailto:stephen.evans@catalysisconsulting.co.uk) or post to Paul Murray Catalysis  
Consulting Ltd, 67 Hudson Close, Yate, BS37 4NP, UK.