



**SCIENTIFIC  
UPDATE**

*We've got chemistry*

**2** day  
Course

# DESIGNING ROBUST CHROMATOGRAPHIC PROCESSES WITH A PROVEN PREDICTIVE APPROACH

Principles and Practice

**17-18 MARCH 2020,  
FRANKFURT, GERMANY**

"Very insightful and informative course. Thoroughly enjoyed all aspects, especially background equations and troubleshooting/case studies. Also enjoyed simulations using software as they are more visual."

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# DESIGNING ROBUST CHROMATOGRAPHIC PROCESSES WITH A PROVEN PREDICTIVE APPROACH

A 2 day course

17-18 March 2020, Frankfurt, Germany



## INTRODUCTION

This course will present an overview of the state of the art in process chromatography. The attendees will learn how to develop preparative chromatographic processes. They will gain knowledge on the scale-up and optimization of these processes.

The course will cover the fundamentals of process chromatography and the tutors will present a rational and proven methodology for the design of efficient and robust chromatographic processes. They will show how this approach serves both the design of new processes and the resolution of issues encountered in the daily life of chromatographers.

The methodology rests upon the rigorous description of the physical phenomena at stake, which includes thermodynamics, kinetics of mass transfer and hydrodynamics of the separation. Predictive models are derived from the understanding of these phenomena and are then used to assess the impact of operating parameters on the process performances.

Major applications will also be presented, spanning across the tone-scale glucose/fructose separation or the purification of therapeutic protein with stringent purity constraints. Various case studies inspired from real industrial examples or taken from the most recent literature will illustrate that the general approach presented during these two days applies as a roadmap, irrespective of the application, and ultimately leads to the development of reliable and robust processes.

## COURSE OUTLINE

### Day 1

#### I. Basics

1. Introduction
  - > Generalities and definition
  - > A bit of history
  - > Introduction to modeling
2. Operating modes
  - > Single-column
  - > Multi-column applications

#### II. Concepts

1. Fluid partitioning
  - > Phases
  - > Volumes
  - > Porosities
  - > Inert tracers
2. Phase equilibria and adsorption isotherms (thermodynamics)
  - > The linear case
  - > Non-linear adsorption isotherms
  - > Consequence on the shape of the chromatograms
3. Hydrodynamics
  - > Band broadening
  - > The MC/PD models
4. Mass transfer (kinetics)
  - > Basic considerations
  - > Some notions about diffusion
  - > The Fick's law at a glance
  - > The LDF approximation
  - > Van Deemter equation, comparison of equilibrium and LDF models
5. The autopsy of a model
  - > List of model parameters
  - > Impact of the parameters on the chromatograms
  - > Orders of magnitude and rigorous estimation

### Day 2

#### III. Design

1. Generalities on scale-up and economics
  - > Objectives
  - > Constraints
  - > Cost function
2. Single-column Chromatography
  - > Case study
3. Counter-current multi-column processes
  - > Fundamentals of counter-current chromatography
  - > Basic design and shortcut approach
  - > From the true moving bed to the simulated moving bed
  - > Case study

#### IV. Daily Life

1. Issues identification
2. Troubleshooting

#### V. Take home message and conclusions

1. Summary
2. Q&A discussion

## IN-HOUSE COURSE

For 8+ people contact us to discuss holding this event In-House - [sciup@scientificupdate.com](mailto:sciup@scientificupdate.com)



# SCIENTIFIC UPDATE

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Registration 8.30  
Start 8.45am on Day 1  
Finish 4.30pm on Day 2  
Course fees include a comprehensive course manual, refreshments throughout each day, lunches and one course dinner on the first evening  
Course Fees: €1699.00

17-18 March 2020, Frankfurt, Germany



IT'S EASY TO REGISTER ONLINE

## COURSE TUTORS



Dr Lucrèce Nicoud



Dr. Hector Osuna

Lucrèce is a (bio)chemical engineer with expertise in process modeling and separation science. She graduated from ENSIC (Nancy, France) with major in chemical engineering and obtained her PhD from the ETH Zurich (Switzerland) in 2015. Her doctoral work focused on the stability of therapeutic proteins. As a post-doctoral fellow at ETH Zurich, she worked on the modeling of chromatographic systems, both single and multicolumn. She also contributed to the book *Continuous Biopharmaceutical Processes: Chromatography, Bioconjugation and Protein Stability*.<sup>1</sup> Then, she carried out a research project at MIT (Cambridge, MA, USA) in the field of pharmaceuticals crystallization. She joined Ypso-Facto in 2018, where she is currently involved both in scientific consulting and software development.

<sup>1</sup> *Continuous Biopharmaceutical Processes: Chromatography, Bioconjugation and Protein Stability*. D. Pfister, L. Nicoud, M. Morbidelli. Cambridge University Press. Cambridge Series in Chemical Engineering. ISSN: 9781108420228

Hector is a chemical engineer with expertise in process modeling, reaction engineering and separation science. He graduated from CPE Lyon Engineering School (Lyon, France) with major in chemical engineering and obtained his Ph.D. from the University of Lyon (UCB Lyon1) (France). He worked at Novasep as an expert on the modeling and simulation of chromatographic processes for pharma and biopharma. He also contributed at lab-scale on proof-of-concept of multicolumn processes. As Innovation Manager at Processium, he then developed processes by combining chemical engineering and numerical tools. He joined Ypso-Facto in 2018 as Head of Biotech Modeling and is currently working on the development of simulation software solutions for the development and optimization of chemical and bio processes.



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

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These will be sent via email.

### Late Applications

For late applications, please register online or fax 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, Scientific Update will refund your registration less £300.00 (or equivalent in €/€) processing fee. Unfortunately refunds are not possible after that date. Substitutions can be made at any time.

**DON'T MISS OUT - REGISTER TODAY**

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17-18 MARCH 2020, FRANKFURT, GERMANY

No. of attendees

Price



## NEW FAST ONLINE REGISTRATION

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Complete the details for either two or three delegates and your discount will automatically be applied. This offer only applies where all delegates are booked simultaneously and at the same billing address.

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