

## **9<sup>th</sup> Polyolefin Reaction Engineering Course**

An Industrial Short Course on Olefin Polymerization Processes

Houston, TX

20-22 September 2017

### **Course Outline**

[www.polyolefins.org](http://www.polyolefins.org)



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**Professor**

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**Villeurbanne, France**

## **Course Description**

This course is designed for engineers, chemists, and scientists working in olefin polymerization with coordination catalysts, polyolefin physical properties and microstructural characterization.

All sessions include case studies where the concepts covered in the lectures are applied to real situations in laboratory and industrial scales. The lectures are designed in such a way that both beginners and specialists can benefit from the course.

An electronic copy of the course notes and of the PRE educational software developed by the instructors to illustrate the subjects covered in the course is provided to each participant. We encourage the participants to bring their laptop computers, so they can follow the notes and use the PRE educational software during the lectures.

## **Instructors**

**Professor João B.P. Soares** is a specialist in the areas of olefin polymerization kinetics and catalysis, mathematical modeling of olefin polymerization processes and polyolefin microstructural characterization.

**Dr Timothy McKenna** is a specialist in the area of polyolefin particle morphology and experimental methods for the evaluation of particle morphology, single particle modeling, and the production of impact copolymers.

## **Registration**

Registration forms and relevant information are available at [www.polyolefins.org](http://www.polyolefins.org) or by contacting us at [tflmckenna@gmail.com](mailto:tflmckenna@gmail.com)

The course fee is 3250 \$ for industrial participants, 1500 \$ for students. Special discounts exist for two or more participants from the same institution.

Please contact Timothy McKenna at [tflmckenna@gmail.com](mailto:tflmckenna@gmail.com) for more information.

The course fee includes course registration, an electronic copy of the course notes (pdf), the educational software and coffee breaks.

## **Location**

The course will be held at the Hyatt Centric Woodlands Hotel, 9595 Six Pines Drive, The Woodlands, TX.

Registered participants can benefit from a reduced room rate upon request.

## **The PRE Course Series**

The PRE course was designed to fill the need in the industry and academia for graduate-level training on polyolefin reaction engineering, characterization and physical properties. This is the 9<sup>th</sup> public course of the series. Previous public courses have been run in Lyon (FR), Porto Alegre (BR), Dubai (UAE), and Houston (USA).

In addition, we run 3-day and 5-day in-house courses, with previous such events being held in Saudi Arabia, Colombia, Holland, Spain, the United States and Austria.

For more information on the PRE Course Series, please visit our website at [www.polyolefins.org](http://www.polyolefins.org)

## Course Contents

### Introduction to Polyolefins

Polyolefin types  
Polymerization reactor types

### Catalysts for Olefin Polymerization

Rapid review of catalyst and cocatalysts types  
Summary of insertion mechanism  
Catalyst supports  
Catalyst characterization

### Industrial Reactors and Processes

Slurry processes  
Gas-phase processes  
Solution processes

### Principles of Mathematical Modeling

Population balances  
Method of instantaneous distributions  
Monte Carlo simulation

### Polymerization with Single-Site Catalysts

Molecular weight distribution  
Chemical composition distribution  
Long chain branch distribution

### Single Particle Models 1

Mass and heat transfer  
Polymeric flow and multigrain models

### Polyolefin Microstructural Characterization

Gel permeation chromatography  
Fractionation Techniques

### Parameter Estimation for Kinetic Models

Homopolymerization models  
Copolymerization models  
Effect of impurities on productivity and molecular weight

### Single Particle Models II

Particle fragmentation – theory and reality  
Morphology models and particle growth

### Polymerization with Multiple-Site Catalysts

Characteristics  
MWD deconvolution  
CCD deconvolution  
Mathematical models for TREF and CRYSTAF

### Steady-State and Dynamic Simulation of Industrial Reactors in Series

Simulation of CSTRs in series  
Residence time distribution effects  
Particle size distribution effects

### Differential Commodity Polyolefins

Chain walking and late transition metal catalysts  
Production of thermoplastic elastomers via heterogeneous long chain branching  
Production of linear-block olefin copolymers

### Overview of Condensed Mode Operation

A copy of the PRE educational software developed by the instructors will also be provided to the course participants at no additional cost. The PRE education software is composed of a series of Excel spreadsheets covering the following applications:

1. Polyolefin microstructural simulation using Flory's and Stockmayer's distributions
2. Molecular weight and chemical composition distribution deconvolution for multiple-site catalysts
3. Long chain branching modeling
4. Semi-batch and continuous polymerization reactor simulation
5. Polymerization kinetics with coordination catalysts