11th Polyolefin Reaction Engineering Course

An Industrial Short Course on Olefin Polymerization Processes

Houston, TX

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Course Outline

www.polyolefins.org

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Professor

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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* or by contacting us at *tflmckenna@gmail.com*

The course fee is 3500 $ for industrial participants, 1750 $ for students. Special discounts exist for two or more participants from the same institution who register at the same time (large organisations, please contact us to arrange group rates). Please contact Timothy McKenna at:

tflmckenna@gmail.com

for more information.

The course fee includes course registration, breakfast, lunch, breaks, an electronic copy of the course notes (pdf) and the educational software. Participants are encouraged to bring the notes on a tablet device or a computer.

Location

The course will be held at the Hyatt Regency-Houston Galleria, 2626 Sage Road, Houston, TX.

Registered participants will receive a link to book their hotel rooms at a preferred rate.

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 9th 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

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
Particle fragmentation – theory and reality
Morphology models and particle growth
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

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

Condensed Mode Operation and Thermodynamics
Solubility and diffusion in multicomponent systems
Impact on rates, properties and reactor 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