

Industrial Reaction Engineering Course

Description

In this course, reaction engineers from Dow will provide an overview of conventional and non-conventional reactors used in industry to manufacture chemical intermediates and products, with a focus on the design and scale-up of these reactors. For each reactor category, we will review typical applications and highlight relevant features of those reactors, including the reactor geometry, contacting pattern, heat management strategy, transport limitations, and rate limiting steps. With those features in mind, we will discuss the scale-up of each reactor type, focusing on conceptual design rather than mechanical details. In the final two or three lectures, we plan to address special topics, including our perspectives on some reactor categories not included in this course and an overview of current industry practices and trends with respect to major processes and chemistries.

Commitment

This course will span over 20 virtual sessions (45 min lecture, 15 min Q&A). The first three lectures will take part during the CISTAR biannual meeting on October 14-16, 2020, followed by monthly virtual lectures and concentrated sets of lectures at biannual meetings, with the series concluding in the Fall of 2021.

Instructors

Sukaran Arora, Senior Engineer; **John Barton**, Senior Engineer; **Dan Hickman**, Sr. R&D Fellow; **Chris Ho**, Senior Engineer; **Jing Liu**, Associate Research Scientist; **Lauren McCullough**, Associate Research Scientist; **Mark Sullivan**, Research Specialist; **Paul Witt**, Associate Director

Registration

Follow <https://tinyurl.com/dowregistration> to register by October 2, 2020

Lectures

I. Fundamentals

Lecture 1 Preface: A practical approach to reactor scale-up

II. Conventional reactors

Lecture 2 Fixed beds - Gas-solid

Lecture 3 Fixed beds - Gas-liquid-solid or liquid-solid

Lecture 4 Stirred tanks

Lecture 5 Fluidized beds

Lecture 6 Bubble columns

Lecture 7 Loop reactors

Lecture 8 Tubular reactors (empty tube and with static mixers)

Lecture 9 Reactive extruders

Lecture 10 Moving beds

Lecture 11 Electrochemical reactors

III. Non-conventional reactors

Lecture 12 Rotating packed beds and other centrifugal reactors

Lecture 13 Microreactors

Lecture 14 Oscillatory flow baffled reactors

Lecture 15 Reactive distillation (with and without heterogeneous catalysts)

Lecture 16 Autothermal monolithic catalyst reactors

Lecture 17 Heat exchanger reactors (catalytic and non-catalytic)

IV. Additional topics

Lecture 18 Rarely used reactors

Lecture 19 Industry trends

Lecture 20 Useful tools