

Faculty of Applied Sciences



MAPR2330 Reactor Design

[30h+30h exercises] 5 credits

This course is taught in the 1st semester

Teacher(s): Denis Dochain
Language: French
Level: Second cycle

Aims

The objective of the course is to present and apply chemical engineering methods used for the design, the scale up and the modelling of reactors.

Main themes

- Homogeneous reactors - General balance equations and design of ideal isothermal and non-isothermal reactors with one and multiple reactions.
- Analysis of the behaviour of non-ideal reactors. Study of the residence time distribution (RTD). Models of axial dispersion reactors and of tanks in series, with or without recycle.
- Heterogeneous catalytic reactors. Influence of the catalyst on the global reaction rate (Thiele modulus). Catalyst deactivation. Design of fixed bed and fluidised bed reactors.
- Liquid-gas reactors. Hatta theory. Design of mixing reactors and absorption columns.

Content and teaching methods

This course deals with the main model used in chemical engineering that intervene in the representation of reactors and the analysis of the behaviour. It is based in particular on the notions of mass and energy balances and of unit operations, and it involves an integration by considering examples drawn from applications in the process industry.

Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

Pre-requisite : MAPR 2400 Kinetics

Written support : Levenspiel O. (1999). Chemical Reaction Engineering, 3rd edition, John Wiley, New York.

Evaluation : final exam (90%); homeworks (10%).

Other credits in programs

BIR23/1C	Troisième année du programme conduisant au grade de bio-ingénieur: chimie et bio-industries (Sciences, technologie & qualité des aliments)	(5 credits)	Mandatory
BIR23/2C	Troisième année du programme conduisant au grade de bio-ingénieur : Chimie et bio-industries (Ingénierie biomoléculaire et cellulaire)	(5 credits)	Mandatory
BIR23/3C	Troisième année du programme conduisant au grade de bio-ingénieur : chimie et bioindustries (Nanobiotechnologies, matériaux et catalyse)	(5 credits)	Mandatory
BIR23/4C	Troisième année du programme conduisant au grade de bio-ingénieur : chimie et bio-industries (Technologies environnementales: eau, sol, air)	(5 credits)	Mandatory
INCH21	Première année du programme conduisant au grade d'ingénieur civil chimiste	(5 credits)	
INCH22	Deuxième année du programme conduisant au grade d'ingénieur civil chimiste	(5 credits)	Mandatory