

Liste d'éléments pédagogiques

Practical info

Location(s)

 Toulouse

Unit operations 1



ECTS

5 crédits



Hourly volume

56h

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):

- the basic concepts concerning intermolecular and interfacial interactions
- Different ways to perform filtration processes
- basic concepts of deep-bed filtration and membrane separation (UF/MF/NF)
- dimensionless numbers to characterise physical phenomena involved in mixing and separation operations
- design tools for unit operation of filtration and mixing

The student will be able to:

- identify interactions between compounds or interface/ compounds involved in filtration and mixing operations
- identify main membrane fouling phenomena for a given application
- operate some filtration units at lab or pilot scale
- select the required unit operation and technology for a filtration or a mixing operation
- write the mass balances
- design a deep-bed filter
- design a membrane operation (MF, UF, NF)
- design a stirred tank and a static mixer

Necessary prerequisites

Hydraulics and dispersed systems (I3BETF21)
Fluid properties (I3BEPF12)
Heat and mass transfer (I3BETF32)
Thermodynamics
Basic concepts of Chemistry and Physics

Practical info

Location(s)

 Toulouse

Unit operations 2

**ECTS**

5 crédits

**Hourly volume**

83h

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):

- Phase equilibrium diagrams
- General concept for mass transfer unit operations (Ideal stages, operating lines). Kinetic limitations and their effects on separation
- Different ways to perform separation processes (single contact, cross-current and counter-current contactors)
- design tools for separators.

The student will be able to:

- use the equilibrium diagrams
- choose the required technology for a separation
- choose the contact mode
- write the mass balance
- design a multistage separation device (extraction, distillation, adsorption, absorption)
- then propose a contactor technology.

Necessary prerequisites

Hydraulics and dispersed systems (I3BETF21)

Fluid properties (I3BEPF12)

Heat and mass transfer (I3BETF32)

Thermodynamics

Basic concepts of Chemistry and Physics

Practical info

Location(s)



Toulouse

Processes simulation and analysis



ECTS
5 crédits



Hourly volume
73h

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):

- the basics of chemical engineering process simulation tools at various scales
- the life cycle and carbon balance principles
- the basics of multidimensional analysis
- the elementary notions about process optimisation

The student will be able to:

- select the appropriate simulation tool with respect to the scale of investigation
 - synthesize their knowledge to analyze the results of a commercial simulation tool
 - simulate industrial processes in steady state
 - perform the Life Cycle Analysis of an existing process
 - use the FLUENT software to simulate single phase flows
 - use the PROSIM Plus software to simulate general steady state processes
 - use the UMBERTO software to perform a global analysis of a process within its environment.
 - gather knowledge from various fields to choose the modelling approach, perform the set-up of the simulation and analyse the results
 - perform an optimisation study with PROSIM
 - set up simulations of unsteady state processes with PROSIM Batch and FLUENT
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Necessary prerequisites

Modelling and numerical methods for transport phenomena (momentum, mass and energy) and thermodynamics

Basic concepts for Unit Operation

Technology and design of Unit Operation

Hydraulic and dispersed systems

Transport and reaction in fluid medium

Practical info

Location(s)

 Toulouse

Chemical and environmental engineer, define and build a project



ECTS
5 crédits



Hourly volume
79h

Practical info

Location(s)

 Toulouse

Heterogeneous reaction engineering



ECTS
5 crédits



Hourly volume
37h

Introducing

Thermodynamics (I2BETH11)
Fluid properties (I3BEPF12)

Objectives

Know and explain the concepts of

- chemical catalysts
- heterogeneous reaction mechanisms and associated kinetic laws
- limiting step(s) in heterogeneous reactions
- apparent (overall) reaction rate
- dimensionless numbers (Hatta, Biot, Thiele, Weiss)
- effectiveness factor and enhancement factor

Establish an intrinsic kinetic law

Determine the limiting process(es) in a heterogeneous chemical reaction

Express dimensionless numbers used in heterogeneous reactions (Hatta, Biot, Thiele, Weisz) and explain their meaning

Express the apparent global rate of a chemical reaction depending on the working conditions

Select and design the most suitable reactor to perform a given reaction

Integrate and prioritize the mechanisms in order to model heterogeneous chemical reactors (batch or continuous)

Practical info

Location(s)

 Toulouse

Necessary prerequisites

Chemical reaction Engineering I (I2BERR12)
Chemical reaction Engineering II (I3BERR12)
Heat and mass transfer (I3BETF32)

Political sciences semester 1



ECTS
3 crédits



Hourly volume

Practical info

Location(s)



Toulouse