

Processes simulation and analysis



ECTS
5 credits



Component
INSTITUT
NATIONAL
DES SCIENCES
APPLIQUEES
TOULOUSE



Number of
hours
69h

Presentation

Description

Programme (detailed contents):

- local scale: Computational fluid dynamics, principles, applications, solving the equations, turbulence modelling. Software FLUENT
- unit operation or process scale: simulation (material and energy balances, elements of design of apparatus) on different processes operating in continuous operation and simulation of batch chemical reactors or distillation columns. Software PROSIM
- process scale: methodology for environmental impacts assessment. Life cycle analysis. Carbon footprint. Data utilization. Software Umberto

Organisation:

Introduction lectures, tutorials on computer, individually or in pairs. Project: performing a Life cycle analysis on a process.

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

Pre-requisites

Modelling and numerical solution for fluid mechanics

Thermodynamics

Basic concepts for OPU

Technology and design of OPU

Hydraulic and dispersed systems

Transport and reaction in fluid medium

Useful info

Place

➤ Toulouse