

# Process control & optimization

 **ECTS**  
5 credits

 **Component**  
INSTITUT  
NATIONAL  
DES SCIENCES  
APPLIQUEES  
TOULOUSE

 **Number of  
hours**  
75h

## Presentation

- \* A serious game on process control
- \* Optimization of coupled WWTP-cogeneration (renewable energy production)

## Description

Programme (detailed contents):

- \* Process control and regulation (classical control, advanced control)
- \* Modelling and simulation of dynamic systems
- \* Single-objective optimization
- \* Applied optimization (multi-objective, evolutionary algorithms, advanced optimization)

Organisation:

- \* Big pictures + Jigsaw
- \* Lectures
- \* Tutorials
- \* Project

During the project, the following tasks will be pursued:

- \* WWTP Modelling via Matlab
- \* WWTP single-objective optimization via Golden number method
- \* Regulation of WWTP in the dynamic regime via Simulink

All above-mentioned items are provided in English. I5PECS11 is an English training unit (EMINSA project 2016).

## Objectives

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

1. how to proceed for the simulation and regulation of dynamic systems via:
  - a) An open programming platform (Matlab)
  - b) A multi-domain dynamic system analyzer (Simulink)
2. how to formulate and solve an optimization problem (single-objective or multi-objective) through suited methods (derivative-based or evolutionary)

The student will be able to:

3. compare different methods for the regulation and optimization of a dynamic industrial case study (Waste Water Treatment Plant – WWTP)

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## Pre-requisites

Analysis and computing

Modelling and numerical solution for fluid mechanics

Heterogeneous reactor engineering

The whole chemical engineering course

## Useful info

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### Place

› Toulouse