

**Course title:** Numerical Simulation – selectable / ~~regular course~~

**Number of contact hours:** 40 hours (30h Comp lab/10 Project)

**ETCS credits:** 3

**Course description:** The objective of this course (laboratory classes) is to provide the practice needed by the chemical engineers to carry out computer-aided analyses of large-scale chemical processes using Aspen Plus.

The course aims to provide a basic using of Aspen Plus tools and to enable students to acquire a specialised knowledge and understanding of selected aspects of process simulation.

Computers have become an indispensable tool in the profession of chemical engineering. Computers simulations are often used to perform complex calculations encountered in industrial installations. The process performances could be predicted using computer-aided process simulation tools. The ASPEN Plus is one of the most powerful and widely used software.

Practical applications in process simulation and flowsheeting will be performed. In laboratory classes students will learn how to use the ASPEN Plus program to model and solve real-life processes. Selected tools of package ASPEN Plus will also be introduced.

The course uses a combination of some computer assignments.

The “step by step” examples are performed. In the first part the students are modelling distillation and extraction columns, heat exchangers, and others unit operations in steady state process. Then students will perform and analyse the complex industrial installations like distillation column network with heat recover or reactive distillation columns. In the next step the students accomplish dynamic simulation of distillation column.

In the second part of course students will perform a project of industrial chemical installation.

#### **Education effects:**

##### **EK1 Knowledge**

Students will gain a good understanding of numerical simulation and should be able to use their knowledge to perform the simulations of industrial installation using Aspen Plus.

##### **EK2 Skills**

Students could be able to create a flowsheet of industrial installation. The skills acquired by students will help choosing accurate models of unit operation and thermodynamic models of physical properties. Students will be able to perform all input data, run the simulation and analyse the results.

Gain the skills and knowledge to model complex distillation processes

#### **Literature:**

##### **Basic literature**

1. Manual, ASPEN Plus V8.8: Getting Started Building and Running a Process Model by Aspen Technology, Inc
2. [www.aspentech.com](http://www.aspentech.com), on line sources
3. Examples “Aspen Plus - Step by step” (pdf file), Marek Czernicki
4. Examples “First Steps with Aspen Plus” (pdf file), Marek Czernicki

##### **Additional literature**

Video of examples Step by Step with Aspen Plus

**Assessment method:** practical exercises, final grade

**Prerequisites:** Basic knowledge in numerical programming /codes.

Basic knowledge in applied thermodynamics, thermodynamics of real solutions and phase equilibrium.

Basic knowledge in unit operation in chemical engineering, like heat and mass transfer and hydrodynamics.

Base of design of absorbers, distillation column, heat exchangers

**Primary target group:**

**Lecturer:** Marek CZERNICKI - Ecole Nationale Supérieure de Chimie de Lille