

Course Package

Process design – 2B

Name module	Process design - 2B
Course Code	202000744
Educational programme	BSc Chemical Science and Engineering
Period	Second block of the second semester (block 2B)
Study load	15 ECTS
Coordinator	Jéré van Lente

Process design			
block 1A	block 1B	block 2A	block 2B
			Intr. Chem. Reactor Engineering (incl. process control) 202000745 (4 EC)
			Intro. Separation Methods 202000746 (4 EC)
			Project Process Design* 202000747 (7 EC)

Required preliminary knowledge: Calculus; Thermodynamics; Process Engineering; Physical Transport Phenomena; Numerical Methods; Organic Chemistry; basic knowledge of Chemical Reactions, Kinetics and Catalysis, and Programming skills (preferably Matlab).

[Only for students with a prior technical education, who have knowledge of the basic principles of physical transport phenomena and have taken an introductory course in process technology.]

*This study unit can only be done in combination with CSE M8A: Intro to Chem. Reaction Eng., and CSE M8A: Intro Separation Methods.

Please note, you need to register for the courses in Osiris 2 weeks before the start of the block!

202000745 - Intr. Chem. Reactor Engineering

The course Introduction to Chemical Reaction Engineering focuses on model reactors (PFR, CSTR, BR), micromixing, multiple reactions in parallel and/or series, reaction kinetics, isothermal and non-isothermal operation, and mixtures with constant and changing densities.

The modules are tentative and subject to change. Please check [the website](#) regularly.

202000746 - Intro. Separation Methods

Industrial separation processes focus on distillation, absorption/desorption, extraction, adsorption, drying, crystallization, sedimentation, filtration, and membranes. This course also includes a practicum with either the distillation column, absorption column, or extraction column. Each team (3-4 students) will get 2½ days each for this assignment.

202000747 - Project Process Design

The project focusses on the design of an industrial process (f.e., in 2021 this was the Methyl-Tert-Butyl (MTBE) process and the Propylene Oxide-t-butyl alcohol (PO-TBA) process at LyondellBasell Rotterdam). The processes are selected in accordance with the company to be able to visit the process and present our results to the staff. In 2021 this was due to Corona an online visit via Teams. A project team consists of 3-4 students. The project is finalized with a report and an individual oral exam.

The project combines knowledge obtained in previous modules e.g.:

- Information collection
- Chemistry (reaction equations, reaction mechanism)
- Thermodynamics
- Mass & energy balances
- Kinetics and catalysis
- Reactor design
- Distillation column design
- Matlab modelling

Within the project this knowledge is extended on:

Estimation of properties, additional information collection, design of two or three selected unit operations, process control, industrial safety (two guest lectures) and process economics.

The calculations will be done in Excel (mass & energy balances) and Matlab (reactor design).

Two excursions are scheduled:

One-day excursion to the Safety lab of Nouryon, Deventer with lectures and demonstrations

One or two day excursion to the company involved to visit the investigated process.

In 2021 both were online visits.