

# Course Package

## Process design – Q4

Name module	Process design – Q4 (second-year BSc module)
Course Code	202000744
Educational programme	BSc Chemical Science and Engineering
Period	Second quartile of the second semester – Q4
Study load	15 ECTS
Coordinator	Jéré van Lente

Process design			
Quartile 1	Quartile 2	Quartile 3	Quartile 4
			<b>Intr. Chem. Reactor Engineering</b> (incl. process control) <b>202000745</b> (4 EC)
			<b>Intro. Separation Methods</b> <b>202000746</b> (4 EC)
			<b>Project Process Design*</b> <b>202000747</b> (7 EC)

Required preliminary knowledge: Calculus; Thermodynamics; Process Engineering; Physical Transport Phenomena; Numerical Methods; Organic Chemistry; basic knowledge of Chemical Reactions; Kinetics and Catalysis; 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 Intro to Chem. Reaction Eng.; and 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.

### **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.

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

## 202000747 - Project Process Design

The project focusses on the design of an industrial process (f.e., in 2022 this was the steam cracker and the ethylene oxide (EO) process at Shell Moerdijk). The processes are selected in accordance with the company to be able to visit the process and present our results to the staff. 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
- Distillation
- 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.