Course Package

Industrial Processes – 1A

Name module	Industrial Processes - 1A
Course Code	202000733
Educational programme	BSc Chemical Science and Engineering
Period	First block of the first semester (block 1A)
Study load	15 ECTS
Coordinator	Jéré van Lente

Industrial Processes			
block 1A	**block 1B**	**block 2A**	**block 2B**
Vector Calculus for CSE **202001227** (2 EC)			
Kinetics & Catalysis **202000734** (4,5 EC)			
Industrial Chemical Process & Project Sustainable Industrial Chemistry **202000735** (8,5 EC)			

Required preliminary knowledge: Thermodynamics; Process Engineering; Equilibria; Calculus.

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

202001227 - Vector Calculus for CSE

The course covers integral calculus over curves and surfaces and, as such, extends Calculus 2 where double and triple integrals for multivariate functions have been treated. In this course we will define several new types of integrals meant to deal with various situations arising in applications. The first new type will be the line integral, which generalizes the ordinary integral introduced in Calculus 1, and which, for example, allows to calculate the length of bent curves. Accordingly, we will be able to find the total mass or charge held by such regions in applied settings. The vector variant of the line integral will lead us to the concept of work done by a force, which is a handy way of calculating the energy exchange between two systems. Next, we will introduce surface integrals, which generalize the double integrals introduced in Calculus 2. Surface integration allows us to calculate the area of curved surfaces, and also the total mass or charge held by such surfaces in applications. The vector variant of surface integrals will allow us to introduce the notion of flux, a quantity which measures flow through a given surface and thus quantifies material exchange between two regions in space. The concepts of flow and flux are related to the divergence and curl of a vector field and will lead us

to the theorems of Gauss and Green/Stokes connecting surface and line integrals to the multiple integrals of Calculus 2.

202000734 - Kinetics & Catalysis

In this course, we will initially study the intrinsic kinetics of chemical reactions and subsequently the changes in these kinetics in the presence of a catalyst. We will look at homogeneous, heterogeneous and biocatalysis, with a focus on heterogeneous catalysis. This part of the module will be concluded with a written test and a case-study, where we will ask you to apply your acquired knowledge in a simulated realistic situation. For more information, please, check the detailed information and assessment plan in the appendix.

202000735 - Industrial Chemical Process & Project Sustainable Industrial Chemistry

In Industrial Chemistry & Processes we will study the most important industrial processes and products, while paying attention to the scale, feed-streams and process flow diagrams, catalysis, separations and selectivity.

In the project Sustainable Industrial Chemistry, we will work in groups to study a process in detail in order to answer the question if the process can be made (even) more sustainable.