

Training in process engineering with GUNT training systems

Core areas of process engineering

Process engineering deals with processes in which substances are changed in terms of their composition or properties. Such processes are used, for example, in the following industries:

- chemical industry
- food industry
- textile industry
- petrochemical industry
- environmental engineering

Systematic training of prospective engineers and skilled workers is essential in order to understand the complex interrelationships in process engineering. Historically, the basic processes of process engineering have been divided into the four core areas below. This classification is based on the type of action involved in the respective basic process.

Mechanical process engineering	Mechanical process engineering involves the changes in material properties (e.g. particle size), and composition (concentration), due to mechanical effects.
Thermal process engineering	Thermal process engineering focuses on thermal separation processes. In mixtures made up of at least two components, heat and material transfer processes are used to selectively change the composition (concentration) of the mixture.
Chemical process engineering	The focus of chemical process engineering is not to change substance properties or the composition of a substance. The central subject of chemical process engineering is the creation of a new substance type through chemical reaction.
Biological process engineering	In biological process engineering, substances are converted by means of biologically active organisms, such as bacteria, fungi, algae, cells and enzymes. The aim of biological process engineering is to provide optimum conditions for these organisms.

Part of the Energy & Environment product area GUNT software, digital data acquisition, experiment evaluation



Structure of the catalogue

The structure of this catalogue follows the classical division of process engineering into the four core areas. The individual basic processes are based on mechanical, thermal, chemical and biological laws or empirical knowledge. In addition, you will find various pilot-scale process engineering systems in chapter 5.

A basic process is the smallest theoretically defined unit of an overall process. The restriction to these small units makes sense from a research perspective and also a didactic perspective as complex tasks already have to be solved at the unit operations level due to the several phases (solid, liquid, gaseous) and substances involved.

	Mechanical process engineering	Separation methods
		▶ Classifying
		▶ Sorting
		▶ Separation in a gravity field
		▶ Separation in a centrifugal force field
		▶ Filtration
		Comminution
		Mixing
		Agglomeration
		Storage and flow of bulk solids
	Thermal process engineering	Fluidised beds and pneumatic transport
		Drying
		Evaporation
		Distillation and rectification
		Absorption
		Adsorption
		Crystallisation
		Membrane separation processes
		Extraction
		Mass transfer
	Chemical process engineering	Thermal activation
		Catalytic activation
		Photochemical activation
	Biological process engineering	Aerobic processes
		Anaerobic processes
	Pilot plants	Pilot-scale process plants