3. COMPETENCE: DEVELOPMENT

The Bachelor of Science develops or improves a process, instrument, product or material or scales a process up or down in the Applied Science domain.

	Level I	Level II	Level III	Level IV
	The student *develops or improves in accordance with a supplied approach.* He demonstrates this by:	The student *develops or improves by selecting or adapting an approach.* He demonstrates this by:	The student *develops or improves by independently creating an approach.* He demonstrates this by:	The experienced professional *develops or improves independently, where the situation is complicated or transfer from a different discipline is involved.* He demonstrates this by:
a. Criteria in specification of requirements (SoR)	Applying the criteria that the product, process, instrument or material must meet (SoR).	Adapting where necessary the criteria that the product, process, instrument or material must meet (SoR).	Setting the criteria that the product, process, instrument or material must meet, based on the client's requirements or wishes (SoR).	Setting the criteria with which the product, process, instrument or material must comply in a complex situation, based on the client's requirements or wishes (SoR).
b. Concepts	Identifying discipline-specific concepts supplied (assessing whether and where they can be identified), in the specification of requirements.	Choosing from a supplied set of discipline-specific concepts while identifying these concepts in the specification of requirements.	Identifying without assistance discipline-specific concepts in the specification of requirements.	Identifying without assistance, in a complex situation, discipline-specific concepts in the specification of requirements.
c. Parameters	Selecting the discipline-specific design parameters supplied that can affect the process, product, instrument or material.	Selecting the most suitable discipline-specific design parameters supplied that can affect the process, product, instrument or material.	Selecting the most suitable discipline-specific design parameters that can affect the process, product, instrument or material.	Selecting, in a complex situation, the most suitable discipline-specific design parameters that can affect the process, product, instrument or material
d. Models	Verifying whether discipline-specific models supplied are in accordance with the SoR, adjusting them and validating them.	Selecting suitable discipline-specific models supplied, verifying whether they are in accordance with the SoR, adjusting them and validating them.	Selecting, without assistance, suitable discipline-specific models, verifying whether they are in accordance with the SoR, adjusting them and validating them.	Selecting, in a complex situation, suitable discipline-specific models, verifying whether they are in accordance with the specification of requirements, applying and validating them.
e. Feasibility, sustainability	Using a supplied method to investigate the discipline-specific feasibility of the result.	Investigating the discipline-specific feasibility and sustainability of the result.	Investigating the discipline-specific and economic feasibility and sustainability of the result.	Investigating, in a complex situation, the discipline-specific and economic feasibility and sustainability of the result.
f. Feedstocks and unit operations	Determining the quantity of the feedstocks supplied and – if necessary – the dimensions of the unit operations.	Selecting the most suitable of the supplied feedstocks and unit operations in both qualitative (which) and quantitative (quantity, dimensions) terms.	Selecting, without assistance, the most suitable feedstocks and unit operations in both qualitative (which) and quantitative (quantity, dimensions) terms.	Selecting, in a complex situation, the most suitable feedstocks and unit operations in both qualitative (which) and quantitative (quantity, dimensions) terms.
g. Documentation	Preparing the documentation for the development and the result in a supplied format.	Preparing the documentation for the development and the result in accordance with detailed guidelines.	Preparing the documentation for the development and the result in accordance with the standard applicable in the professional field.	Preparing the documentation for the development and the result in accordance with the standard applicable in the professional field for a complex situation.

Definitions Competence Experimentation (page 81)

- Where **documentation** is mentioned, this can also be read as: 'lab journal, logbook, technical manual or any other type of documentation used in the professional field'.
- Where **experiment** is mentioned, this can also be read as 'analysis'.
- Here, **replicability** means that the experiment produces the same results if it is carried out again by the same person under as equal conditions as possible.
- Here, **reproducibility** means that the experiment produces the same results if it is carried out again by another person under as equal conditions as possible.
- The **reliability** of the results can be derived from statistical calculations, but also from other calculations, literature or additional experiments.

Definitions Competence Development (page 83)

- **Developing** can also be 'designing', 'improving', 'optimising' or 'up- or downscaling' a process.
- We call it a **process** when a 'component' undergoes a treatment in a 'device' or other item of equipment, e.g. a distillation column, a reactor or a heat exchanger.
- An **instrument** is a 'device' or other item of equipment that has a physical, chemical or biological function, e.g. a magnet, an analytical instrument or a booster.
- A **component** is a material or intermediate product that undergoes a process.
- A situation is **complex** as a result of a large number of concepts, a significant correlation between concepts or a correlation with another discipline.
- **Or** is the 'inclusive or', that is 'and/or'.
- **Discipline-specific** is an adjective used within the context of Applied Science, e.g. relating to chemistry, physics, biology, engineering.
- A **discipline-specific concept** is a subject from the discipline for which a theory or models have been described, e.g. reaction kinetics (chemistry), distillation (physics), increase of biomass (biology) or electromagnetism (engineering).
- A **discipline-specific model** is a model of a discipline-specific concept or a combination thereof.
- **Discipline-specific feasibility** is feasibility in terms of chemistry, physics, biology or engineering, but not economic feasibility. Economic feasibility is defined separately.
- The **result** is the developed product, process, instrument or material or the scaled process.
- The **development** is the entire process undergone to achieve the result.