

Basics of Process Engineering (I002406)

Course size *(nominal values; actual values may depend on programme)*

Credits 3.0

Study time 75 h

Course offerings and teaching methods in academic year 2025-2026

A (semester 2)

English

Gent

independent work

lecture

seminar

Lecturers in academic year 2025-2026

Ronsse, Frederik

LA24

lecturer-in-charge

Offered in the following programmes in 2025-2026

crdts

offering

[International Master of Science in Environmental Technology and Engineering](#)

3

A

[International Master of Science in Sustainable and Innovative Natural Resource Management](#)

3

A

Teaching languages

English

Keywords

Fluid, gas and bulk solids transport, cooling and heating technology, and engines

Position of the course

The aim of this course is to provide the student a basic education in terms of process engineering. The basics regarding the technical aspects of relevant unit operations in mass and energy transfer are detailed. The unit operations include: heating and cooling, transport of liquids, gases and bulk solids, mechanical drive systems.

Contents

Process engineering

1. Heating and cooling

1.1 Basics of thermodynamic cycles

1.2 Heating technology (steam cycle, heat pumps)

1.3 Cooling technology (reverse Carnot cycle, vapor compression and absorption cooling systems)

2. Transport systems

2.1 Liquid transport (hydraulic systems, pumps and valves)

2.2 Gas transport (fans, blowers and compressors)

2.3. Bulk solids transport (pneumatic transport, fluidisation)

3. Introduction to heat engines

3.1 External combustion engines: Brayton, Sterling and Rankine cycle based

3.2 Internal combustion engines: Diesel & Otto cycle based

Initial competences

Basic knowledge of physical transport phenomena (mass and heat balances)

Final competences

- 1 Having insight into the inner workings of cooling machines, heat pumps, steam generation, fluid transport systems and heat engines.
- 2 Design cooling/heating cycles and calculate their resulting energy efficiencies.
- 3 Evaluate a technical description of an (industrial) installation with respect to the unit operations of heating/cooling, pumping of fluids and driving processes using thermal energy.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Seminar, Lecture, Independent work

Extra information on the teaching methods

The theory is being taught by means of on-line plenary lectures which exist both out of prerecorded lectures as well as live interactive moments. The exercises are being taught by on-line coached sessions, which again consist of a mix of prerecorded and live, interactive sessions. Additional exercises are made available through Ufora by means of which students can train themselves individually.

Study material

Type: Slides

Name: Slides (theory + exercises) basics of process engineering

Indicative price: Free or paid by faculty

Optional: no

Language : English

Number of Slides : 200

Oldest Usable Edition : 2013

Available on Ufora : Yes

Online Available : Yes

Available in the Library : No

Available through Student Association : No

References**Course content-related study coaching**

The lecturer can provide coaching to students during and after the lectures (both plenary theory lectures as well exercise sessions). Individual coaching and guidance can be offered upon making an (online) appointment.

Assessment moments

end-of-term assessment

Examination methods in case of periodic assessment during the first examination period

Written assessment

Examination methods in case of periodic assessment during the second examination period

Written assessment

Examination methods in case of permanent assessment**Possibilities of retake in case of permanent assessment**

not applicable

Calculation of the examination mark

The final mark is distributed according to 50% on the theory part (open questions, closed book, oral examination with written preparation) and another 50% on the exercise part (exercises, written examination, closed book but a formularium is available to the student).

Students who eschew period aligned and/or non-period aligned evaluations for this course unit may be failed by the examiner.