

## 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 2024-2025**

A (semester 2)	English	Gent	independent work lecture seminar
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**Lecturers in academic year 2024-2025**

Ronsse, Frederik	LA24	lecturer-in-charge
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**Offered in the following programmes in 2024-2025**

	<b>crdts</b>	<b>offering</b>
<a href="#">International Master of Science in Environmental Technology and Engineering</a>	3	A
<a href="#">International Master of Science in Sustainable and Innovative Natural Resource Management</a>	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 plenary lectures. The exercises are being taught by a combination by coached 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 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.