

Heat Engineering and Mass Transport (E045910)

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

Course size (nominal values; actual values may depend on programme)
Credits 6.0 Study time 180 h Contact hrs 60.0 h

Course offerings and teaching methods in academic year 2020-2021

A (semester 1)	Dutch	Gent	seminar: coached exercises	30.0 h
			lecture	30.0 h

Lecturers in academic year 2020-2021

Heynderickx, Geraldine	TW11	lecturer-in-charge
Lecompte, Steven	TW08	co-lecturer

Offered in the following programmes in 2020-2021

	crdts	offering
Bachelor of Science in Engineering (main subject Chemical Engineering and Materials Science)	6	A
Bachelor of Science in Chemical Engineering and Materials Science	6	A
Master of Science in Electromechanical Engineering (main subject Control Engineering and Automation)	6	A
Master of Science in Electromechanical Engineering (main subject Electrical Power Engineering)	6	A
Master of Science in Electromechanical Engineering (main subject Maritime Engineering)	6	A
Master of Science in Electromechanical Engineering (main subject Mechanical Construction)	6	A
Master of Science in Electromechanical Engineering (main subject Mechanical Energy Engineering)	6	A
Preparatory Course Master of Science in Materials Engineering and	6	A
Preparatory Course Master of Science in Sustainable Materials Engineering	6	A
Preparatory Course Master of Science in Chemical Engineering	6	A
Preparatory Course Master of Science in Textile Engineering	6	A

Teaching languages

Dutch

Keywords

Chemical potential, conduction, convection, radiation, heat exchangers, continuity equations, multicomponent diffusion, mass transfer in fluids en solids, mass transfer with reaction

Position of the course

Description and use of the basis principles that govern the transfer of heat and mass in gases, liquids and solids

Contents

- Heat transfer: Conduction, Convection, Radiation, Heat exchangers, Heat exchange in two-phase flows, Conduction, Convection, Radiation, Heat exchangers, Heat exchange in two-phase flows
- Mass transfer: Continuity equation, Mass transport in fluids, Turbulent diffusion, Mass transfer in solids, Mass transport with reaction, Continuity equation, Mass transfer in fluids, Turbulent diffusion, Mass transfer in solids, Mass transfer with reaction

Initial competences

The course 'Heat and mass transfer' (Warmtetechniek en Stofftransport) builds on a number of final competences of the course 'Momentum transfer'

(Transportverschijnselen).

Final competences

- 1 Analyse and evaluate in a critical and independent manner systems and processes, related to heat transfer.
- 2 Calculate different types of heat transfer (such as conduction, convection and radiation).
- 3 To understand mass transfer
- 4 To construct Fick's law
- 5 To combine conservation equation and Fick's law for specific applications in chemical industry
- 6 To construct mass conservation equations
- 7 To determine mass fluxes and molar fluxes
- 8 To determine concentration profiles

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

Lecture, seminar: coached exercises

Extra information on the teaching methods

Lessons using projector

Learning materials and price

- Syllabus (Dutch) - Heat Engineering: sold by VTK -
- Mass Transfer: download for free on the electronic learning platform Ufora
- Slides projected during lectures available on Ufora

References

Transport Phenomena (Bird, Stewart and Lightfoot)
John H. Lienhard V, A Heat Transfer Textbook, Phlogiston press (2019)

Course content-related study coaching

The project tutorials are followed up by an assistant (Mass Transfer) and an other assistant (Heat Engineering).
The students can go to the lecturer and the co-lecturer, and to those that follow up the project work, for additional information.

Evaluation methods

end-of-term evaluation and continuous assessment

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

Open book examination, oral examination

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

Written examination, oral examination

Examination methods in case of permanent evaluation

Participation, simulation, report

Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible

Extra information on the examination methods

During examination period: oral closed-book exam, written preparation; written open-book exercises exam
During semester: Frequency: 12 weeks of project tutorials.

Calculation of the examination mark

Special conditions:

Final Result = 0.5 * Result Heat Engineering + 0.5 * Result Mass Transport;

Result HE = 0.5 * Result oral exam + 0.5 * Result written open book exam

Result MT = 0.85 * result exam + 0.15 * result reports

Exam result MT = 0.60 * result oral exam + 0.40 result written open book exam