

Transport Phenomena (E045120)

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 2018-2019

A (semester 1)	Dutch	seminar	32.5 h
		seminar: practical PC room classes	2.5 h
		lecture	27.5 h

Lecturers in academic year 2018-2019

De Mulder, Tom	TW15	lecturer-in-charge
De Paepe, Michel	TW03	co-lecturer
Merci, Bart	TW03	co-lecturer

Offered in the following programmes in 2018-2019

	crdts	offering
Bachelor of Science in Civil Engineering	6	A
Bachelor of Science in Chemical Engineering and Materials Science	6	A
Bachelor of Science in Engineering Physics	6	A
Bachelor of Science in Electromechanical Engineering	6	A
Bridging Programme Master of Science in Biomedical Engineering	6	A
Bridging Programme Master of Science in Biomedical Engineering	6	A
Bridging Programme Master of Science in Engineering Physics	6	A
Preparatory Course Master of Science in Biomedical Engineering	6	A
Preparatory Course Master of Science in Industrial Engineering and Operations Research	6	A
Preparatory Course Master of Science in Fire Safety Engineering	6	A
Preparatory Course European Master of Science in Nuclear Fusion and Engineering Physics	6	A
Preparatory Course Master of Science in Chemical Engineering	6	A

Teaching languages

Dutch

Keywords

fluid mechanics, heat transport, mass transport

Position of the course

This course is introductory and aims at gaining insight in and basic knowledge of the equations and the similarities between transport of heat, mass and impulse. This course is a prerequisite for a number of technical courses from various engineering disciplines.

Contents

- Properties of fluids and flows.
- Statics.
- Fluids in motion.
- Conservation of mass.
- Newton 's Second Law.
- Conservation of energy.
- Conservation of mass, impulse and energy combined.
- Differential form of the equations of flow; Navier-Stokes equation.
- Laminar and turbulent flow.

- Dimensional analysis.
- Introduction to heat transport.
- Stationary heat transport by conduction.
- Virtual practical session with Flowlab.
- Stationary heat transport by convection.
- Heat transport by flow through a pipe; correlations for heat transport by convection.
- Introduction to heat transport by radiation.
- Introduction to mass transport.
- Flow through pressured pipes.

Initial competences

Basic knowledge mechanics and mathematics.

Final competences

- 1 To understand the properties of fluids.
- 2 To master the laws of statics and dynamics and to be able to apply them.
- 3 To understand the law of energy in open and closed systems and to be able to apply it.
- 4 To know the basic laws of stationary heat transport and to be able to apply them.
- 5 To solve problems of stationary heat transport.
- 6 To understand the similarities between transport of impulse, heat and mass.

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, seminar: practical PC room classes

Learning materials and price

Text book: "Fundamentals of momentum, heat and mass transfer", 5th edition, J.R. Welty, C. E. Wicks, R. E. Wilson, G. Rorrer (ISBN-13 979-0470128688)

References

Course content-related study coaching

The lecturer is available before and after the lectures. Additional individual coaching on request.

Evaluation methods

end-of-term evaluation

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

Open book examination

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

Open book examination

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation

not applicable

Extra information on the examination methods

During examination period: written open-book examination - problems; written open-book examination.

Calculation of the examination mark

Weights: theory 4/20, exercises 16/20.