

## Transport Phenomena (E045120)

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

**Credits 6.0**

**Study time 180 h**

**Course offerings and teaching methods in academic year 2024-2025**

A (semester 1)	Dutch	Gent	seminar lecture
B (semester 2)	Dutch	Gent	

**Lecturers in academic year 2024-2025**

De Mulder, Tom	TW15	lecturer-in-charge
De Paepe, Michel	TW08	co-lecturer

**Offered in the following programmes in 2024-2025**

	crdts	offering
<a href="#">Bachelor of Science in Engineering(main subject Biomedical Engineering)</a>	6	B
<a href="#">Bachelor of Science in Engineering(main subject Chemical Engineering and Materials Science)</a>	6	B
<a href="#">Bachelor of Science in Engineering(main subject Civil Engineering)</a>	6	B
<a href="#">Bachelor of Science in Engineering(main subject Electromechanical Engineering)</a>	6	A, B
<a href="#">Bachelor of Science in Engineering(main subject Engineering Physics)</a>	6	B
<a href="#">Bridging Programme Master of Science in Engineering Physics</a>	6	B
<a href="#">Preparatory Course European Master of Science in Nuclear Fusion and Engineering Physics</a>	6	B
<a href="#">Preparatory Course Master of Science in Biomedical Engineering</a>	6	B
<a href="#">Preparatory Course Master of Science in Chemical Engineering</a>	6	B
<a href="#">Preparatory Course Master of Science in Fire Safety Engineering</a>	6	B
<a href="#">Preparatory Course Master of Science in Industrial Engineering and Operations Research</a>	6	B

**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

Having followed basic courses on physics ("Natuurkunde I") and mathematics ("Basiswiskunde").

### 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

Seminar, Lecture

### Study material

Type: Handbook

Name: Fundamentals of Momentum, Heat, and Mass transfer  
 Indicative price: € 55  
 Optional: no  
 Language : English  
 Author : J. Welty, G.L. Rorrer & D.G. Foster  
 ISBN : 978-1-11963-512-3  
 Oldest Usable Edition : 5  
 Online Available : No  
 Available in the Library : Yes  
 Available through Student Association : Yes  
 Usability and Lifetime within the Course Unit : intensive  
 Usability and Lifetime within the Study Programme : regularly  
 Usability and Lifetime after the Study Programme : regularly

Type: Slides

Name: Inland waterways and locks  
 Indicative price: € 10  
 Optional: yes  
 Language : Dutch  
 Available on Ufora : Yes  
 Online Available : No  
 Available in the Library : No  
 Available through Student Association : No

### References

### Course content-related study coaching

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

### Assessment moments

end-of-term assessment

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

Written assessment open-book

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

Written assessment open-book

**Examination methods in case of permanent assessment**

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

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.