

## Technical Thermodynamics (E039110)

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.

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

### Course offerings and teaching methods in academic year 2022-2023

A (semester 2)	Dutch	Gent	practicum	2.5 h
			seminar: coached exercises	30.0 h
			seminar: practical PC room classes	2.5 h
			lecture	30.0 h
			excursion	3.75 h
B (semester 2)			seminar: coached exercises	25.0 h
			lecture	30.0 h

### Lecturers in academic year 2022-2023

De Paepe, Michel	TW08	lecturer-in-charge
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### Offered in the following programmes in 2022-2023

	crdts	offering
<a href="#">Bachelor of Science in Engineering (main subject Electromechanical Engineering)</a>	6	A
<a href="#">Bridging Programme Master of Science in Electromechanical Engineering (main subject Control Engineering and Automation)</a>	3	B
<a href="#">Bridging Programme Master of Science in Electromechanical Engineering (main subject Electrical Power Engineering)</a>	3	B
<a href="#">Bridging Programme Master of Science in Electromechanical Engineering (main subject Maritime Engineering)</a>	3	B
<a href="#">Bridging Programme Master of Science in Electromechanical Engineering (main subject Mechanical Construction)</a>	3	B
<a href="#">Bridging Programme Master of Science in Electromechanical Engineering (main subject Mechanical Energy Engineering)</a>	3	B
<a href="#">Master of Science in Chemical Engineering</a>	6	A
<a href="#">Master of Science in Chemical Engineering</a>	6	A
<a href="#">Preparatory Course Master of Science in Electromechanical Engineering (main subject Control Engineering and Automation )</a>	6	A
<a href="#">Preparatory Course Master of Science in Electromechanical Engineering (main subject Electrical Power Engineering)</a>	6	A
<a href="#">Preparatory Course Master of Science in Electromechanical Engineering (main subject Maritime Engineering)</a>	6	A
<a href="#">Preparatory Course Master of Science in Electromechanical Engineering (main subject Mechanical Construction)</a>	6	A
<a href="#">Preparatory Course Master of Science in Electromechanical Engineering (main subject Mechanical Energy Engineering)</a>	6	A
<a href="#">Preparatory Course Master of Science in Fire Safety Engineering</a>	6	A

### Teaching languages

Dutch

### Keywords

ENGINEERING THERMODYNAMICS,  
first law, second law, internal energy, enthalpy, entropy, polytropic process, exergy, anergy, mixtures, humid air, thermodynamic cycles, piston machinery, turbo machinery

## Position of the course

### Contents

- First Law: Introduction, Transformations and polytropic processes, Stationary cycle process
- Second Law: The second law, Exergy and anergy
- Processes: Isentropic flows, Work processes, Mixing processes
- Properties of technical gases: Properties of pure substances, Mixtures of ideal gases, Humid air
- Cycles: Cooling, Heating, ventilation and air conditioning, Steam cycles, Gas cycles
- Piston machinery
- Turbo machinery

### Initial competences

Physics I, Transport phenomena

### Final competences

- 1 Understanding the importance and application of exergy and anergy for processes.
- 2 Basic understanding of working principles and technology of piston machinery and turbomachinery.
- 3 Calculate thermodynamic processes and cycles and using polytropic processes
- 4 Calculation of properties for pure substances and mixtures.
- 5 Understanding and application of the first and second law of thermodynamics.
- 6 Explaining the important thermodynamic cycles.

### 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

Excursion, lecture, practicum, seminar: coached exercises, seminar: practical PC room classes

### Extra information on the teaching methods

Lectures  
Exercises based on the handbook, guided during colleges  
Introduction to cycle simulation software  
Project on cycle simulation, report  
Practical training lab on heat pump, report  
Visit to Fluxys LNG terminal

### Learning materials and price

Engineering Thermodynamics, Moran & Shapiro, Wiley

### References

- H. Baehr, 'Thermodynamik', Springer-Verlag, 1999
- Int Journal of Applied Thermal Engineering
- Int Journal of Energy Conversion and Management

### Course content-related study coaching

#### 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

Open book examination

#### Examination methods in case of permanent evaluation

Assignment, skills test

#### Possibilities of retake in case of permanent evaluation

examination during the second examination period is not possible

#### Extra information on the examination methods

During examination period: oral closed-book exam, written preparation; written open-book exam

Project report on cycle simulation using software  
Practical training lab on heat pump

**Calculation of the examination mark**

PE1 : Oral exam theory 7/20 Exercises exam 12/20 Rapports projects en practical training 1/20  
PE2 : exercises exam 20/20