

Technical Thermodynamics (E039110)

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

Credits 6.0

Study time 180 h

Course offerings in academic year 2025-2026

A (semester 1)	Dutch	Gent
B (semester 1)	Dutch	Gent

Lecturers in academic year 2025-2026

De Paepe, Michel	TW08	lecturer-in-charge
Verhelst, Sebastian	TW08	co-lecturer

Offered in the following programmes in 2025-2026

	crdts	offering
Bachelor of Science in Engineering(main subject Electromechanical Engineering)	6	A
Bridging Programme Master of Science in Electromechanical Engineering(main subject Control Engineering and Automation)	3	B
Bridging Programme Master of Science in Electromechanical Engineering(main subject Electrical Power Engineering)	3	B
Bridging Programme Master of Science in Electromechanical Engineering(main subject Maritime Engineering)	3	B
Bridging Programme Master of Science in Electromechanical Engineering(main subject Mechanical Construction)	3	B
Bridging Programme Master of Science in Electromechanical Engineering(main subject Mechanical Energy Engineering)	3	B
Master of Science in Chemical Engineering	6	A
Master of Science in Chemical Engineering	6	A
Preparatory Course Master of Science in Electromechanical Engineering(main subject Control Engineering and Automation)	6	A
Preparatory Course Master of Science in Electromechanical Engineering(main subject Electrical Power Engineering)	6	A
Preparatory Course Master of Science in Electromechanical Engineering(main subject Maritime Engineering)	6	A
Preparatory Course Master of Science in Electromechanical Engineering(main subject Mechanical Construction)	6	A
Preparatory Course Master of Science in Electromechanical Engineering(main subject Mechanical Energy Engineering)	6	A
Preparatory Course Master of Science in Engineering: Ships and Marine Technology	6	A
Preparatory Course Master of Science in Fire Safety Engineering	6	A
Preparatory Course Master of Science in Mechanical and Electrical Systems Engineering and Master of Science in Electromechanical Engineering	6	A

Teaching languages

Dutch

Keywords

engineering thermodynamics, first law, second law, internal energy, enthalpy, entropy, polytropic process, exergy, anergy, mixtures, humid air, combustion, work, heat, thermodynamic cycles

Position of the course

This is the second course in the learning line thermo-fluids.

Contents

- First law: transformations and polytropic processes, stationary cycle process

- Second law: exergy and energy
- Processes: isentropic flows, work processes, mixing processes
- Cycles: cooling, heating, ventilation and air conditioning, steam cycles, gas cycles
- Properties of technical gases: properties of pure substances, mixtures of ideal gases, humid air
- Combustion: chemical and energetic aspects, properties of fuels, stoichiometry, types of flames, emissions

Initial competences

Physics I, Transport phenomena

Final competences

- 1 Understand the importance and application of exergy and energy for processes.
- 2 Calculate thermodynamic processes and cycles and using polytropic processes.
- 3 Calculate properties for pure substances and mixtures.
- 4 Calculate combustion processes and emissions.
- 5 Understand and apply the first and second law of thermodynamics.
- 6 Explain 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

Seminar, Excursion, Lecture

Extra information on the teaching methods

- Interactive lectures for the theory lessons, following the textbook
- Seminars with guided exercises based on the textbook
- Company visit
- Presentation and discussion on EnergyDay

Study material

Type: Handbook

Name: Engineering Thermodynamics

Indicative price: € 50

Optional: no

Language : English

Author : Moran & Shapiro,

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 : intensive

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

- The lecturer or his assistants are available for questions during or after the lectures.
- There is coaching during the seminars; individual explanations are possible by e-mail or on appointment.

Assessment moments

end-of-term assessment

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

Oral assessment, Written assessment with open-ended questions, Written assessment open-book

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

Written assessment with open-ended questions, 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: oral closed book exam, written preparation; written open book exam (open questions)

Calculation of the examination mark

PE1: Oral theory exam 7/20, Written exercises exam 13/20

Special condition: If a student scores less than 8/20 in at least one part of the evaluation, they cannot pass the entire course. If the final mark would still be 10 or more out of 20, it will be reduced to the failing mark, i.e. 7/20.

PE2: Written exercises exam 20/20