

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 2024-2025

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

Lecturers in academic year 2024-2025

De Paepe, Michel TW08 lecturer-in-charge

Offered in the following programmes in 2024-2025

	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 Fire Safety 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 anergy
- Processes: isentropic flows, work processes, mixing processes
- 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
- Cycles: cooling, heating, ventilation and air conditioning, steam cycles, gas cycles

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, Practical

Extra information on the teaching methods

- 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

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 and continuous assessment

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

Oral assessment, Written assessment

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

Written assessment with open-ended questions, Written assessment

Examination methods in case of permanent assessment

Skills test, Assignment

Possibilities of retake in case of permanent assessment

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 (open questions)
- Project report on cycle simulation using software
- Practical training lab report on heat pump

Calculation of the examination mark

- PE1: Oral exam theory 7/20, Written exercise exam 12/20, Project report and practical training 1/20
- PE2: Exercise exam 20/20