

Course size

Course Specifications

Valid as from the academic year 2024-2025

Technical Thermodynamics (E039110)

	Credits 6.0	Study time 180 h				
C οι	irse offerings in academi	c year 2025-2026				
	A (semester 1)	Dutch	Gent			
	B (semester 1)	Dutch	Gent			
Lec	turers in academic year 2	2025-2026				
	De Paepe, Michel Verhelst, Sebastian		TW08 TW08		lecturer-in-charge co-lecturer	
0ff	ered in the following pro	ogrammes in 2025-2026	5		crdts	offering
	Bachelor of Science in I	Bachelor of Science in Engineering(main subject Electromechanical Engineering)				А
	Bridging Programme M Control Engineering an	Bridging Programme Master of Science in Electromechanical Engineering(main subject Control Engineering and Automation)				В
	Bridging Programme Master of Science in Electromechanical Engineering(main subjec			g(main subject	3	В
	Bridging Programme M	laster of Science in Electi	omechanical Engineering	g(main subject	3	В
	Bridging Programme M	laster of Science in Electi	omechanical Engineering	g(main subject	3	В
	Bridging Programme M	laster of Science in Electi ineering)	omechanical Engineering	g(main subject	3	В
	Master of Science in Ch	emical Engineering			6	А
	Master of Science in Ch	emical Engineering			6	А
	Preparatory Course Ma Control Engineering an	ster of Science in Electro d Automation)	mechanical Engineering(main subject	6	Α
	Preparatory Course Ma Electrical Power Engine	ster of Science in Electro eering)	mechanical Engineering(main subject	6	Α
	Preparatory Course Ma	ster of Science in Electro	mechanical Engineering(main subject	6	А
	Preparatory Course Ma	ster of Science in Electro	mechanical Engineering(main subject	6	А
	Preparatory Course Ma	ster of Science in Electro	mechanical Engineering(main subject	6	А
	Preparatory Course Ma	ster of Science in Engine	ering: Ships and Marine T	echnology	6	А
	Preparatory Course Ma	ster of Science in Fire Sat	fety Engineering		6	А
	Preparatory Course Ma and Master of Science i	ster of Science in Mechar n Electromechanical Eng	nical and Electrical Syster ineering	ns Engineering	6	А

(nominal values; actual values may depend on programme)

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
- 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 anergy 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 Enegy 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 email 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