

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.

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

Course offerings and teaching methods in academic year 2020-2021

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

Lecturers in academic year 2020-2021

De Paepe, Michel	TW08	lecturer-in-charge
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Offered in the following programmes in 2020-2021

	crdts	offering
Bachelor of Science in Engineering (main subject Electromechanical Engineering)	6	A
Bachelor of Science in 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, 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