

Turbomachines (E037321)

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

Credits 6.0

Study time 180 h

Course offerings and teaching methods in academic year 2024-2025

A (semester 1)	Dutch	Gent	
B (semester 1)	English	Gent	seminar practical lecture

Lecturers in academic year 2024-2025

Degroote, Joris	TW08	lecturer-in-charge
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Offered in the following programmes in 2024-2025

	crdts	offering
Bridging Programme Master of Science in Electromechanical Engineering(main subject Control Engineering and Automation)	6	B
Bridging Programme Master of Science in Electromechanical Engineering(main subject Electrical Power Engineering)	6	B
Bridging Programme Master of Science in Electromechanical Engineering(main subject Maritime Engineering)	6	B
Bridging Programme Master of Science in Electromechanical Engineering(main subject Mechanical Construction)	6	B
Bridging Programme Master of Science in Electromechanical Engineering(main subject Mechanical Energy Engineering)	6	B
Master of Science in Electromechanical Engineering(main subject Control Engineering and Automation)	6	A
Master of Science in Electromechanical Engineering(main subject Control Engineering and Automation)	6	B
Master of Science in Electromechanical Engineering(main subject Electrical Power Engineering)	6	A
Master of Science in Electromechanical Engineering(main subject Electrical Power Engineering)	6	B
Master of Science in Electromechanical Engineering(main subject Maritime Engineering)	6	A
Master of Science in Electromechanical Engineering(main subject Maritime Engineering)	6	B
Master of Science in Electromechanical Engineering(main subject Mechanical Construction)	6	A
Master of Science in Electromechanical Engineering(main subject Mechanical Construction)	6	B
Master of Science in Electromechanical Engineering(main subject Mechanical Energy Engineering)	6	A
Master of Science in Electromechanical Engineering(main subject Mechanical Energy Engineering)	6	B
Master of Science in Fire Safety Engineering	6	B

Teaching languages

English, Dutch

Keywords

Turbomachines, fans, pumps, steam turbines, hydraulic turbines, wind turbines

Position of the course

Principles of turbomachines in general and elementary analysis of different types of machines

Contents

- Principles: axial machines (examples), flow analysis, work transfer, energy analysis, degree of reaction, radial machines, characteristics
- Components: foils, cascades, channels, diffusers
- Fans: types, flow analysis, characteristics
- Compressible fluid: flow in nozzles
- Measurement: measurement of pressure, flow rate, rotational speed, torque
- Steam turbines: application, basic principles, impulse turbines, reaction turbines, design
- Dynamic similitude: nondimensional groups, characteristic numbers, design diagrams
- Pumps: cavitation, design, constructive aspects, self priming, unstable operation, special pumps
- Hydraulic turbines: application, types
- Wind turbines: application, types, performance, matching to a wind regime

Initial competences

Transport Phenomena, Technical Thermodynamics

Final competences

- 1 Derive basic functioning of turbomachines and the flow in their components
- 2 Derive parameter choice and layout of fans, steam turbines, pumps, hydraulic turbines and wind turbines
- 3 Calculate the flow in a turbomachine using one-dimensional analysis

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, Lecture, Practical, Independent work

Extra information on the teaching methods

Practical on pump, fan and Pelton turbine

Study material

Type: Handbook

Name: Turbomachines
 Indicative price: Free or paid by faculty
 Optional: no
 Language : English
 Online Available : Yes

Type: Slides

Name: Slides
 Indicative price: Free or paid by faculty
 Optional: no
 Language : English
 Available on Ufora : Yes

References

[1] Erik Dick, Fundamentals of Turbomachines: Fluid Mechanics and Its Applications, Springer, 2015.

Course content-related study coaching

Assessment moments

end-of-term 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

Oral assessment, Written assessment

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 on theory, written preparation; written open-book exam on exercises.

Calculation of the examination mark

- Exam on theory 50% and exam on exercises 50%.
- Special condition: If the student scores less than 8/20 for at least one component of the assessment, a pass mark for the course unit in question is not possible. If the final mark does turn out to be a 10/20 or more, this will be reduced to the highest non-deliberative mark, i.e. 7/20.