

Turbomachines (E037321)

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

Course offerings and teaching methods in academic year 2018-2019

Offering	Language	Teaching Methods	Hours
A (semester 1)	Dutch	seminar: coached	25.0 h
		exercises	
		practicum	5.0 h
		guided self-study	30.0 h
B (semester 1)	English	seminar: coached	25.0 h
		exercises	
		practicum	5.0 h
		lecture	30.0 h

Lecturers in academic year 2018-2019

Degroote, Joris TW03 lecturer-in-charge

Offered in the following programmes in 2018-2019

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

Teaching languages

Dutch, English

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

Guided self-study, lecture, practicum, seminar: coached exercises

Extra information on the teaching methods

Practical on pump, fan and Pelton turbine

Learning materials and price

English course material for sale at VTK

References

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

Course content-related study coaching

Evaluation methods

end-of-term evaluation

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

Written examination, oral examination

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

Written examination, oral examination

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation

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: the student needs a pass for the theory as well as for the exercises to get a pass for the course. If the student fails either the theory or the exercises, the total mark is the lowest of the two.