

## 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
-----------------	------	--------------------

**Offered in the following programmes in 2024-2025**

	<b>crdts</b>	<b>offering</b>
<a href="#">Bridging Programme Master of Science in Electromechanical Engineering(main subject Control Engineering and Automation)</a>	6	B
<a href="#">Bridging Programme Master of Science in Electromechanical Engineering(main subject Electrical Power Engineering)</a>	6	B
<a href="#">Bridging Programme Master of Science in Electromechanical Engineering(main subject Maritime Engineering)</a>	6	B
<a href="#">Bridging Programme Master of Science in Electromechanical Engineering(main subject Mechanical Construction)</a>	6	B
<a href="#">Bridging Programme Master of Science in Electromechanical Engineering(main subject Mechanical Energy Engineering)</a>	6	B
<a href="#">Master of Science in Electromechanical Engineering(main subject Control Engineering and Automation)</a>	6	A
<a href="#">Master of Science in Electromechanical Engineering(main subject Control Engineering and Automation)</a>	6	B
<a href="#">Master of Science in Electromechanical Engineering(main subject Electrical Power Engineering)</a>	6	A
<a href="#">Master of Science in Electromechanical Engineering(main subject Electrical Power Engineering)</a>	6	B
<a href="#">Master of Science in Electromechanical Engineering(main subject Maritime Engineering)</a>	6	A
<a href="#">Master of Science in Electromechanical Engineering(main subject Maritime Engineering)</a>	6	B
<a href="#">Master of Science in Electromechanical Engineering(main subject Mechanical Construction)</a>	6	A
<a href="#">Master of Science in Electromechanical Engineering(main subject Mechanical Construction)</a>	6	B
<a href="#">Master of Science in Electromechanical Engineering(main subject Mechanical Energy Engineering)</a>	6	A
<a href="#">Master of Science in Electromechanical Engineering(main subject Mechanical Energy Engineering)</a>	6	B
<a href="#">Master of Science in Fire Safety Engineering</a>	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.