GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2024-2025

Fluid machines (E741050)

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

Credits 3.0 **Study time 90 h**

Course offerings and teaching methods in academic year 2025-2026

A (semester 2)	Dutch	Gent	lecture

Lecturers in academic year 2025-2026

Degroote, Joris	TW08	lecturer-in-charge

Offered in the following programmes in 2025-2026	crdts	offering
Bachelor of Science in Engineering Technology(main subject Electromechanical Engineering Technology)	3	A
Preparatory Course Master of Science in Electrical Engineering Technology(main subject Automation)	3	A
Preparatory Course Master of Science in Electrical Engineering Technology(main subject Electrical Engineering)	3	A
Preparatory Course Master of Science in Electromechanical Engineering Technology	3	A

Teaching languages

Dutch

Keywords

pumps, compressors, fans, turbines

Position of the course

This course deals with technologies for mechanical energy conversion. Sufficient knowledge and insight is passed on to understand the operation of these technologies, to be able to select the right technology for the right application, and to be able to integrate the technologies in relevant processes. The course deals specifically with pumps, compressors, fans and (gas)turbines.

Contents

Pumps

- Pump performance: power, efficiency, suction head, cavitation and NPSH, characteristics (curves) and operating point
- Volumetric pumps: operation and types, indicator diagram, accumulators
- Impeller pumps: operation and types, velocity triangles, Euler head pressure, pump characteristic, operating point, flow control, serial and parallel connection, pump diagrams, efficiency, NPSH, specific speed

Compressors

- Performance of compressors: compression work, cooling, power, efficiency
- Volumetric compressors: overview, positive displacement compressors, volumetric efficiency and filling factor, screw compressors, scroll compressors, applications
- Impeller compressors: advantages and disadvantages compared to volumetric compressors, radial compressors, compressor characteristics, surge and stonewall, axial compressors, flow control

Fans

- Application, power, noise
- Radial fans: forward curved and backward curved blades, characteristics, flow control
- Axial fans: characteristics, bypass, flow control, noise

Turbines

- Law of momentum and angular momentum (Euler)

- Steam turbines: impulse turbines, reaction turbines
- Hydraulic turbines: Pelton, Kaplan, Francis

Gas turbines

- Applications, pros and cons related to other options for mechanical energy generation
- Control and security
- Classification: heavy duty and aero derivatives
- Short description of turbines for planes
- Parts: compressor, combustion chamber and turbine
- Losses in relationship to the theoretical cycle
- Calculation of power, efficiency, specific air need

Initial competences

Uses end extends some final competences of Thermodynamics and Fluid Mechanics.

Final competences

1 Select an appropriate energy converter for a particular industrial application.
2 Know the operating principles of the energy converters addressed in the course.
3 Assess, interpret, and process characteristics and performance factors of energy converters.
4 Apply principles and laws relevant to energy converters to solve specific problems.

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

Lecture

Extra information on the teaching methods

Lectures, guest lecture(s), plenary and guided exercises during lectures.

Study material

Type: Handbook

Name: Duurzame Energietechniek
Indicative price: € 70
Optional: yes
Language : Dutch
Available in the Library : Yes

Type: Handbook

Name: Toegepaste Energietechniek
Indicative price: € 70
Optional: yes
Language : Dutch
Available in the Library : Yes

Type: Slides

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

References

- Pump Handbook, I. Karassik, J. Messina, P. Cooper, C. Heald.
- Compressors: Selection and Sizing, R.N. Brown.

Course content-related study coaching

Counseling after appointment, communication via email or the electronic learning environment.

Assessment moments

end-of-term assessment

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

Written assessment

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

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

Written examination closed book.

Calculation of the examination mark