GHENT UNIVERSITY

# Course Specifications

Valid as from the academic year 2026-2027

## Fluid Machines (E048100)

**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 2026-2027**

| | | | |
|---|---|---|---|
| A (semester 1) | English | Gent | |
| B (semester 1) | Dutch | Gent | independent work |

**Lecturers in academic year 2026-2027**

| | | |
|---|---|---|
| Degroote, Joris | TW08 | lecturer-in-charge |
| Lecompte, Steven | TW08 | co-lecturer |

| **Offered in the following programmes in 2026-2027** | **crdts** | **offering** |
|---|---|---|
| Bridging Programme Master of Science in Engineering: Ships and Marine Technology | 6 | A |
| Bridging Programme Master of Science in Mechanical and Electrical Systems Engineering | 6 | A |
| Master of Science in Electromechanical Engineering(main subject Maritime Engineering) | 6 | B |
| Master of Science in Electromechanical Engineering | 6 | B |
| Master of Science in Engineering: Ships and Marine Technology | 6 | B |
| Master of Science in Engineering: Ships and Marine Technology | 6 | A |
| Master of Science in Fire Safety Engineering | 6 | A |
| Master of Science in Mechanical and Electrical Systems Engineering | 6 | A |

**Teaching languages**

English, Dutch

**Keywords**

Volumetric machines, turbomachines

**Position of the course**

This is the fourth course in the learning line thermo-fluids

**Contents**

- Working principle and terminology of volumetric machines.
- Volumetric pumps: operation and design, properties and applications, volumetric and energetic study, fluid stroke, valve design, construction, construction, discussion of various types of pumps, flow control, energy efficiency at full load and part load
- Volumetric compressors: applications and versions, operation, single-stage and multi-stage compression, volumetric and energetic study, components, implementation, discussion of various types of compressors, flow control, energy efficiency at full load and part load
- Introduction to volumetric expanders
- Principles of turbomachines: axial machines, radial machines, flow analysis, work transfer, energy analysis, degree of reaction, characteristics
- Fans: types, flow analysis, characteristics
- Turbopumps: cavitation, design, constructive aspects, self-priming, unstable operation, special pumps, dynamic similitude, nondimensional groups, characteristic numbers, design diagrams
- Steam turbines: application, basic principles, impulse turbines, reaction turbines, design
- Hydraulic turbines: application, types
- Wind turbines: application, types, performance, matching to a wind regime

- Introduction to turbocompressors: characteristics, limits

**Initial competences**

This course builds on certain course competences/learning outcomes of the courses Transport Phenomena, Technical Thermodynamics and Heat and Flow Engineering.

**Final competences**

1 Derive basic functioning of fluid machines.
2 Derive parameter choice, layout and performance of fluid machines.
3 Calculate the performance of a fluid machine by hand.

**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**

- The theory is taught in lectures.
- Exercises are made by the students, guided by a teaching assistant.
- Practical with different types of fluid machine

**Study material**

Type: Syllabus

Name: Syllabus
Indicative price: Free or paid by faculty
Optional: no
Available in the Library : Yes

Type: Slides

Name: Slides (Enligsh)
Indicative price: Free or paid by faculty
Optional: no
Available on Ufora : Yes

**References**

- Pump handbook, McGraw-Hill
- Compressor Handbook, McGraw-Hill
- Fundamentals of Turbomachines, Springer

**Course content-related study coaching**

- Interactive support through the electronic learning platform (forums, e-mail), in person: after agreement on date, fixed contact hour: immediately before and after lectures.
- Additional guidance by assistant for exercise classes

**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 with written preparation (theory); written open-book exam (exercises).

**Calculation of the examination mark**

Weighting to determine final score: theory exam 45%, exercises exam 45% and

practical 10%.
The part on turbomachines counts for 2/3 of the theory and exercises, the part on volumetric machines for 1/3, proportional to the number of lecture weeks spent on these topics. In the practical both parts count for 1/2 of the score.