GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2025-2026

Thermal Cycles: Sustainable Energy Conversion, Heating and Cooling (E032720)

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

Credits 3.0 **Study time 90 h**

Course offerings in academic year 2026-2027

A (semester 1)	English	Gent

Lecturers in academic year 2026-2027

Lecompte, Steven	TW08	lecturer-in-charge

Offered in the following programmes in 2026-2027	crdts	offering
Master of Science in Electromechanical Engineering	3	A
Master of Science in Mechanical and Electrical Systems Engineering	3	A

Teaching languages

English

Keywords

Heat pumps, organic Rankine cycles (ORC), refrigeration technology, refrigerants, renewable residential heating, renewable industrial process heating

Position of the course

This is an advanced academic elective course in the learning line thermo-fluids

Contents

- Heat pumps for industrial and residential heating and cooling
- Chillers: compression, absorption, part load behaviour, shut down
- Organic Rankine cycle technology
- Principles of comfort and indoor air quality in buildings
- Energy balance of a building, introduction to building physics
- Overview of thermal energy use in industry
- Introduction to performing dynamic simulations of thermal cycles in Dymola

Initial competences

- Transport Phenomena
- Technical Thermodynamics
- Heat and Flow Engineering

Final competences

1 Understanding and describing components of a thermal system (heat pump, chillers, ORC)
2 Describing part load and off-design behaviour of thermal systems (heat pump, chillers, ORC)
3 Understanding Energy performance of building, building systems and components
4 Having a grasp of the overall thermal energy needs in industry
5 Being able to perform dynamic simulations and energy performance calculations in Dymola
6 Reporting on design and energy performance

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

Extra information on the teaching methods

- The theory is taught in lectures.
- In the seminar the software package Dymola is introduced.
- The students will individual report on an assignment following on the seminar.

Study material

None

References

- The Thermoeconomics of Energy Conversions, Yehia, M. El-Sayed
- Industrial Refrigeration Handbook, W. Stoecker

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 and continuous assessment

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

Oral assessment

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

Oral assessment

Examination methods in case of permanent assessment

Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible in modified form

Extra information on the examination methods

- Theory: oral exam (closed book

Calculation of the examination mark

* The end score (S) is determined as: S = 0.9*T + 0.1*E, with T the score for the theory exam and E the score for the assignment during the year.