

Heating, Ventilation, Air-conditioning and Refrigeration (E039211)

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 1)	English	Gent	lecture
			independent work
			seminar
			excursion

Lecturers in academic year 2025-2026

Lecompte, Steven	TW08	lecturer-in-charge
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Offered in the following programmes in 2025-2026

	crdts	offering
Bridging Programme Master of Science in Electromechanical Engineering(main subject Mechanical Energy Engineering)	3	A
Master of Science in Electromechanical Engineering(main subject Mechanical Energy Engineering)	3	A

Teaching languages

English

Keywords

Heating, ventilation, air conditioning, refrigeration
Heat pump, compression chiller, absorption chiller
Boiler, CHP

Position of the course

This course aims at teaching the students the basics of HVAC&R. It is an advanced course for students energy engineering. It requires knowledge of Engineering Thermodynamics, Heat and Mass transfer, Combustion Technology, fan and compressor technology and Heat Exchangers.

Contents

Principles of comfort and indoor air quality in buildings
Energy balance of a building, introduction to building physics
Heat load, cooling load, moisture load : transmission, in/exfiltration, solar gains, internal gains, psychometrics
HVAC installations : water/air/local systems
Heat production : boilers, heat pumps, CHP
Chillers: compression, absorption, part load behaviour, shut down ,trigeneration
Alternative techniques : free chilling, earth-air heat exchangers, evaporative chilling, dessicant chilling, ...

Initial competences

Competences gained in
Engineering Thermodynamics
Turbomachines and Displacement Pumps, Compressors and IC Engine Fundamentals
Thermal Installations

Final competences

- 1 Understanding and describing components of HVAC&R systems
- 2 Describing part load behaviour of HVAC&R systems
- 3 Design of HVAC&R systems
- 4 Understanding Energy performance of building, building systems and components
- 5 Doing Dynamic simulation and energy performance calculations

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, Excursion, Lecture, Independent work

Extra information on the teaching methods

Lectures
PC training Modelica
Visit to Diakin Europe
Writing report on design and presentation

Study material

None

References

International Journal HVAC&R Ashrae - Taylor & Francis
• Int Journal of Applied Thermal Engineering
• Energy and Buildings
• Building and Environment
Heating, ventilation and air conditioning, McQuiston, Faye, Parker, Jerald,
ASHRAE HANDBOOKS

Course content-related study coaching

Assessment moments

continuous assessment

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

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

Examination methods in case of permanent assessment

Oral assessment, Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible

Extra information on the examination methods

Design of HVAC system and dynamic simulation of building with HVAC system, reporting and oral presentation

Calculation of the examination mark

Work during the semester: 5/20
Report: 10/20
Presentation: 5/20