

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 2026-2027

A (semester 1)

English

Gent

seminar

excursion

lecture

independent work

Lecturers in academic year 2026-2027

Lecompte, Steven

TW08

lecturer-in-charge

Offered in the following programmes in 2026-2027

[Master of Science in Electromechanical Engineering\(main subject Mechanical Energy Engineering\)](#)

crdts

3

offering

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