GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2025-2026

Thermal Installations (E028700)

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

Credits 6.0 **Study time 180 h**

Course offerings in academic year 2027-2028

A (semester 2)	English	Gent
B (semester 2)	Dutch	Gent

Lecturers in academic year 2027-2028

De Paepe, Michel	TW08	lecturer-in-charge
Lecompte, Steven	TW08	co-lecturer

Offered in the following programmes in 2027-2028	**crdts**	**offering**
Bridging Programme Master of Science in Chemical Engineering	6	A
Master of Science in Chemical Engineering	6	B
Master of Science in Chemical Engineering	6	A

Teaching languages

English, Dutch

Keywords

THERMAL INSTALLATIONS
heat exchangers, two phase gas liquid flow, flow regimes, Heat transfer and pressure drop during evaporation and condensation, Steam technology, combined-heat-and-power, cryogenics

Position of the course

Insight in the thermal energy flows in industial installations
Design of heat exchangers (single and two phase flow) and installations and steam boilers
Operational aspects of thermal systems in industry : CHP, steam networks and cryogenics

Contents

- Classification of heat exchangers
- Design of recuperators: Logaritmic temperature difference, NTU method, Non constant heat transfer coefficient
- Tubular heat exchangers: constructive aspects
- Shell and tube heat exchangers: constructive aspects
- Plate heat exchangers: constructive aspects
- Compact heat exchangers
- Fouling: Fouling types, Results oif fouling
- Heat pipes
- Two fase flows: Flow regimes and pressure drop
- Condensation: Condensation modes, Condensors
- Boiling: Critical heat flux,pool boiling, flow boiling
- Steam boilers: Boiler classification, Circulation and constrcution
- Steam distribution: constructive aspects, steam traps
- Cryogenics
- Decentralised energy production: Combined heat and power

Initial competences

Engineering Thermodynamics, Heat en combustion technique, Transportphenomena

Final competences

1 Pointing out heat exchanger types and their properties
2 Designing heat exchangers
3 Using software for energy calculations
4 Understanding the physics of two phase gas liquid flow
5 Analysing complex thermal processes and cycles
6 Approaching energy use in an industrial context in a critical way both in a company and in society

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

Group work, Seminar, Excursion, Lecture

Extra information on the teaching methods

Lecturing theory, guided exercisies on heat exchangers design Excursions to companies
Group work on two-phase flow and on design with software , report to be handed in
2.14.0.0

Study material

Type: Handbook

Name: Heat Exchangers: Selection, Rating, and Thermal Design, Third Edition 2012by S CRC press
Indicative price: € 50
Optional: no
Author : Sadik Kakaç Hongtan Liu, Anchasa Pramuanjaroenkij
Online Available : No
Available in the Library : Yes
Available through Student Association : Yes
Usability and Lifetime within the Course Unit : regularly
Usability and Lifetime within the Study Programme : one-time
Usability and Lifetime after the Study Programme : regularly

Type: Syllabus

Name: Pdfs of chapters of books which are provided on Ufora
Indicative price: Free or paid by faculty
Optional: no
Available on Ufora : Yes
Online Available : No
Available in the Library : No
Available through Student Association : No

References

- Fundamentals of heat exchanger design, Shah, Sekulic, Wiley.
- Heat exchanger design handbook, Kuppan, Marcel Dekker.
- Int Journal of Applied Thermal Engineering
- Heat transfer Engineering
- ASME Heat Transfer
- Int Journal of Heat and Mass Transfer

Course content-related study coaching

Assessment moments

end-of-term and continuous 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

Written assessment

Examination methods in case of permanent assessment

Skills test, Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is not possible

Extra information on the examination methods

During examination period: written theory closed-book exam, ;exercices exam open book
reports on projects: 1 on heat exchanger design, 1 on two phase flow design

Calculation of the examination mark

PE1 reports 4/20 oral theory exam 4/20 exercises exam 12/20
PE2 exercises exam 20/20