GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2019-2020

Thermal Installations (E028700)

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

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

Credits 6.0 **Study time 180 h** **Contact hrs** 75.0 h

Course offerings and teaching methods in academic year 2020-2021

A (semester 1)	English	Gent	self-reliant study activities	30.0 h
			excursion	8.75 h
			lecture	30.0 h
			seminar: coached exercises	32.5 h
			seminar: practical PC room classes	3.75 h
B (semester 1)	Dutch		excursion	8.75 h
			guided self-study	30.0 h
			seminar: practical PC room classes	3.75 h
			seminar: coached exercises	32.5 h
			self-reliant study activities	30.0 h

Lecturers in academic year 2020-2021

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

Offered in the following programmes in 2020-2021	**crdts**	**offering**
Bridging Programme Master of Science in Electromechanical Engineering (main subject Mechanical Energy Engineering)	6	A
Bridging Programme Master of Science in Chemical Engineering	6	A
Bridging Programme Master of Science in Chemical Engineering	6	B
Master of Science in Electromechanical Engineering (main subject Control Engineering and Automation)	6	A
Master of Science in Electromechanical Engineering (main subject Maritime Engineering)	6	A
Master of Science in Electromechanical Engineering (main subject Mechanical Construction)	6	A
Master of Science in Electromechanical Engineering (main subject Mechanical Energy Engineering)	6	A
Master of Science in Electromechanical Engineering (main subject Mechanical Energy Engineering)	6	B
Master of Science in Chemical Engineering	6	A
Master of Science in Chemical Engineering	6	B

Teaching languages

Dutch, English

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

Guided self-study, excursion, lecture, self-reliant study activities, seminar: coached exercises, seminar: practical PC room classes

Extra information on the teaching methods

Lecturing theory, guided exercisies on heat exchangers design
project on two-phase flow, project on design with software

Learning materials and price

Book :
Heat Exchangers: Selection, Rating, and Thermal Design, Third EditionHardcover–March 1, 2012by Sadik Kakaç Hongtan Liu, Anchasa Pramuanjaroenkij, CRC press
Notes on the electronic learning platform

Software : EES

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

Evaluation methods

end-of-term evaluation and continuous assessment

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

Open book examination, oral examination

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

Open book examination

Examination methods in case of permanent evaluation

Assignment, skills test, report

Possibilities of retake in case of permanent evaluation

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, 1 on enegry analysis in plant

Calculation of the examination mark

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