

Unit Operations in Chemical Industry (E071200)

Course size (nominal values; actual values may depend on programme)
 Credits 6.0 Study time 180 h Contact hrs 60.0 h

Course offerings and teaching methods in academic year 2018-2019

Offering	Language	Teaching Methods	Hours
A (semester 1)	Dutch	seminar: coached exercises	15.0 h
		guided self-study	30.0 h
		practicum	15.0 h
B (semester 1)	English	lecture	30.0 h
		practicum	15.0 h
		seminar: coached exercises	15.0 h

Lecturers in academic year 2018-2019

Heynderickx, Geraldine TW11 lecturer-in-charge

Offered in the following programmes in 2018-2019

Programme	crdts	offering
Bridging Programme Master of Science in Chemical Engineering	6	B
Bridging Programme Master of Science in Chemical Engineering	6	A
Master of Science in Electromechanical Engineering (main subject Control Engineering and Automation)	6	B
Master of Science in Electromechanical Engineering (main subject Electrical Power Engineering)	6	B
Master of Science in Electromechanical Engineering (main subject Maritime Engineering)	6	B
Master of Science in Electromechanical Engineering (main subject Mechanical Construction)	6	B
Master of Science in Electromechanical Engineering (main subject Mechanical Energy Engineering)	6	B
Master of Science in Chemical Engineering	6	B
Master of Science in Sustainable Materials Engineering	6	B
Master of Science in Chemical Engineering	6	A

Teaching languages

Dutch, English

Keywords

distillation, absorption, liquid-liquid extraction, liquid-solid extraction, evaporation, condensation, boiling, drying, filtration, centrifugation, crystallisation, classification, sedimentation

Position of the course

Calculation and design of apparatus for a number of unit operations in chemical industry.

The goal is to learn the student how to describe, calculate, design and optimize a number of unit operations in chemical industry.

Contents

Study of a number of unit operations

- Introduction
- Phase equilibrium
- Distillation
- Absorption and Desorption

- Liquid-liquid extraction
- Liquid-solid extraction
- Condensation
- Boiling
- Evaporation
- Drying
- Filtration
- Centrifugation

Initial competences

The course 'Unit operations in chemical industry' builds on a number of final competences from the courses 'Momentum transport' (Transportverschijnselen), 'Heat and mass transfer' (Warmteteknik en stoftransport), thermodynamics (Thermodynamica).

Final competences

- 1 To understand and to determine phase equilibria
- 2 To gain insight in physical, thermal and mechanical unit operations in chemical industry
- 3 To gain insight in the distillation process
- 4 To gain insight in the absorption process
- 5 To gain insight in the extraction process
- 6 To gain insight in the evaporation process
- 7 To gain insight in the condensation process
- 8 To gain insight in the boiling process
- 9 To gain insight in the drying process
- 10 To gain insight in the filtration process
- 11 To gain insight in the centrifugation process
- 12 To calculate and design apparatus for the above mentioned processes in chemical industry

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, lecture, practicum, seminar: coached exercises

Extra information on the teaching methods

Theory using projector.
Practical work and exercises in groups of 4 to 5 students. One report per group.

Learning materials and price

Syllabus (English): download on MINERVA for free

References

- Perry Chemical Engineers Handbook
- Chemical Engineering (Coulson and Richardson)
- Distillation : principles and practice (Stichlmair and Fair)
- Separation process technology ; Performance, Selection, Scale-up (Humphrey and Keller)

Course content-related study coaching

Practical work is supported by two assistants.
The project work is supported by the lecturer.
The lecturer can be requested to give additional information during the complete semester.

Evaluation methods

end-of-term evaluation and continuous assessment

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

Oral examination

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

Oral examination

Examination methods in case of permanent evaluation

Skills test, report

Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible

Extra information on the examination methods

During examination period: oral closed-book exam, written preparation. During semester: graded project reports; graded lab sessions.

Frequency: 12 weeks with practical work and project work, one afternoon a week. The students work in groups (4 to 5 students). One report per group for practical work and project work.

Calculation of the examination mark

Special conditions: Final Result = $0.25 \cdot (\text{result for semester work}) + 0.75 \cdot (\text{result semester examination})$.