



LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Avancerade separationsprocesser Advanced Separation Processes

KETN45, 7,5 credits, A (Second Cycle)

Valid for: 2023/24

Faculty: Faculty of Engineering, LTH

Decided by: PLED B/K

Date of Decision: 2023-04-18

General Information

Compulsory for: K4-p, W4-p

Elective for: B4-pt

Language of instruction: The course will be given in English on demand

Aim

The purpose of the course is to give the student the engineering tools needed to combine several separation processes in an industrial process and to study the dependence between these and how the overall resource utilization is affected when key parameters for the processes are varied. The goal is for the students to have the ability to design industrial separation processes for the production of chemical, biological and technical products with regard to productivity, product quality and energy efficiency after the course.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

- Be able to describe how the design of different process steps depends on physical transport processes and phase equilibria and how this affects optimization when different process steps are to be integrated into an industrial process.
- Be able to use flowsheeting as a tool to describe how separation processes affect the design of different process steps, as well as how integration of these process steps into an optimized industrial process can be carried out.

Competences and skills

For a passing grade the student must

- Independently able to problematize and analyze various separation processes in terms of efficiency and environmental impact for both fossil and renewable energy raw materials.
- In an engineering way, be able to design separation processes for industry and municipalities.
- Be able to utilize flowsheeting tools to analyze and optimize chemical and biotechnological separation processes.
- Show ability to cooperate in groups with different composition.

Judgement and approach

For a passing grade the student must

- Through flowsheeting calculations and written and oral communication, demonstrate familiarity with process industrial separation problems and the ability to design various separation processes in an engineering manner.
- Be able to evaluate how different parameters affect industrial separation process capacity, energy efficiency, product quality and opportunities to integrate with other process steps.

Contents

The course deals with the design of industrial separation processes using flowsheeting programs and contains in-depth sections on phase equilibria, physical transport processes, multicomponent distillation, absorption and evaporation. In addition, optimization of industrial separation processes with regard to energy efficiency and environmental impact is included.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)

Assessment: The examination takes place through a written exam, a number of sub-projects, reported in writing and orally, and participation in mandatory course events. Final grading is based upon the written exam.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Parts

Code: 0123. **Name:** Written Exam.

Credits: 4. **Grading scale:** TH. **Assessment:** Written exam.

Code: 0223. **Name:** Projects and Mandatory Course Parts.

Credits: 3,5. **Grading scale:** UG. **Assessment:** Oral and written presentations of subprojects and active participation in mandatory course parts.

Admission

Admission requirements:

- KFKA05 Molecular Driving Forces 1: Thermodynamics or KFKA10 Thermodynamics and Surface Chemistry
- KETF10 Separation Processes, Basic Course or KETF40 Mass Transfer Processes in Environmental Engineering

The number of participants is limited to: No

The course overlaps following course/s: KETN20

Reading list

- Alveteg: Handbook in Chemical Engineering. 2022.
- Smith: Chemical Process Design and Integration. John Wiley & Sons, 2016, ISBN: 978-1-119-99013-0.
- Kamal and Al-Malah: Aspen Plus: Chemical engineering applications. John Wiley & Sons, 2016, ISBN: 978-1-119-29364-4.

Contact and other information

Course coordinator: Ola Wallberg, ola.wallberg@chemeng.lth.se

Course coordinator: Helena Svensson, helena.svensson@chemeng.lth.se

Course homepage: <https://www.ple.lth.se/en/>