SYLLABUS

Unit Operations 7.5 credits B0004K

Enhetsoperationer

Course syllabus admitted: Autumn 2023 Sp 1 - Present

DECISION DATE
2023-02-13

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LULEÅ TEKNISKA UNIVERSITET

Unit Operations 7.5 credits B0004K

Enhetsoperationer

First cycle, B0004K

Education level	Grade scale	Subject	Subject group (SCB)
First cycle	G U 3 4 5	Kemisk apparatteknik	Chemical Engineering

Main field of study

Chemical Engineering

Entry requirements

In order to meet the general entry requirements for first cycle studies you must have successfully completed upper secondary education and documented skills in English language and Chemical Principles (K0016K, Physics 1 (F0004T, Physics 3 (F0006T), Linear Algebra and Differential Equations (M0031M), Transport Processes (B0003K) and good knowledge in English, equivalent to English 6

Selection

The selection is based on 1-165 credits.

Course Aim

The course goal is to give students opportunity to acquire knowledge on the principles of operation of different chemical separation processes.

After completing the course, the student should be able to:
1. describe different unit operations in the chemical industry
2. analyse the influence of factors that affect the function of unit operations
3. perform design calculations for unit operations
4. explain the relationship between the construction and operation of chemical process equipment
5. identify relevant unit operations in process flow diagrams
6. apply representative simulation program to model unit operations
7. design, conduct, and analyse experimental laboratory work

Contents

This course is a survey of unit operations and separation technologies and focuses on the basic principles of various fluid flow processes, heat transfer processes and mass transfer processes. The course includes the following topics:

- Thermodynamic background for separation processes
- Single and multistage systems
- Absorption
- Binary and multicomponent distillation
- Humidification
- Drying
- Evaporation and crystallization
- Liquid extraction and leaching
- Adsorption and ion exchange
- Filtration and membrane processes
- Settling, sedimentation and centrifugation
- Mathematical modelling of separation processes with representative software

Realization

Each course occasion´s language and form is stated and appear on the course page on Luleå University of Technology's website.
This course includes the following teaching and learning activities:

- Lectures
- Tutorials
- Home assignments
- Two experimental laboratory exercises (absorption and binary distillation)
- One modelling laboratory exercise (multicomponent distillation)

Lectures cover the theory of fluid mechanics, heat transfer and mass transfer processes. Tutorials will help students get familiar with the methodology of solving design exercises. The home assignments give the opportunity to the student to practice on the methodology of designing equipment for separation processes and apply the theory learned during the lectures.
The laboratories cover key points from the lectures and offer practical experience with the operation of chemical process equipment and mathematical modelling of processes. The laboratories aid in the development of collaboration skills during group work and critical thinking that involves the design, performance and analysis of results.

Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided.
The course is assessed through a written exam (includes a theory and a calculation part), the assessment of home assignments, two laboratory reports (experimental) and one modelling report (simulation).
Intended learning outcomes 1-5 are assessed through the written exam and the home assignments (Grading scale G U 3 4 5).
Intended learning outcomes 6-7 are assessed through the laboratory reports (Grading scale U G).
All exams included in the module need to be completed for a course grade.
Home assignments are compulsory.
Laboratory exercises include compulsory participation.

Unauthorized aids during exams and assessments

If a student, by using unauthorized aids, tries to mislead during an exam or when a study performance is to be assessed, disciplinary measures may be taken. The term “unauthorized aids” refers to aids that the teacher has not previously specified as permissible aids and that may assist in solving the examination task. This means that all aids not specified as permissible are prohibited. The Swedish version has interpretative precedence in the event of a conflict.

Overlap

The course B0004K is equal to KGB007

Course offered by

Department of Civil, Environmental and Natural Resources Engineering

Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0006	Laboratory reports, experimental	U G#	1	Mandatory	A23	
0007	Laboratory report, modelling	U G#	0.5	Mandatory	A23	
0008	Home assignments	G U 3 4 5	3	Mandatory	A23	
0009	Written exam	G U 3 4 5	3	Mandatory	A23	

Study guidance

Study guidance for the course is to be found in our learning platform Canvas before the course starts. Students applying for single subject courses get more information in the Welcome letter. You will find the learning platform via My LTU.

Last revised

by Assistant Director of Undergraduate Studies Eva Gunneriusson, Department of Civil, Environmental and Natural Resources Engineering 2023-02-13

Syllabus established

Course plan approved by the Department of Chemical Engineering and Geosciences 2007-02-28.