

**SYLLABUS**

# **Mechanical Process Technology 7.5 credits M0001K**

**Fysikaliska separationsmetoder**

**Course syllabus admitted: Spring 2024 Sp 3 - Present**

**DECISION DATE  
2023-06-02**

# Mechanical ProcessTechnology 7.5 credits M0001K

## Fysikaliska separationsmetoder

### First cycle, M0001K

Education level	Grade scale	Subject	Subject group (SCB)
First cycle	G U 3 4 5	Mineralteknik	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 You must have successfully completed upper secondary education and have documented skills in English language. You must also have knowledge of minerals (mineralogy); their occurrence, structure and identification; comparable to what is given in K0023K Chemistry of the solid state and geology. Good knowledge in English, equivalent to English B/6.

## Selection

The selection is based on 1-165 credits.

## Course Aim

The course provides the possibility to acquire the basic knowledge in mechanical process technology, with an emphasis on its experimental methods and unit operations.

After completing the course participants should be able to:

- Explain theoretical concepts within mechanical process technology,
- Describe and explain common apparatus and/or machines used within mechanical process technology,
- Do standard calculations for process analysis and design
- Do common routine investigations for the mineral processing and recycling industries....

## Contents

This course covers:

Introduction to mechanical process technology.

- Review of unit operations and processes.

Characterization of disperse systems.

- Experimental methods for analysis of particle size, particle distributions and specific surface. Mass and element distributions plus fractional analysis. Sampling of particulate materials. Pulp flows: pulp density, dilution ratio, % solids by weight, % solids by volume, solids density and bulk density.
- Assignment: Particle size distributions.

Comminution and fragmentation.

- Theories of comminution: the Kick, Bond and Rittinger laws. Crushing and screening: open and closed circuits.
- Industrial screening: screening efficiency, the partition curve and cut-point.
- Assignment: Crushing and screening.

Grinding and classification.

- Mechanisms of breakage and the motion of the charge. General mill types and their application areas
- Grinding circuits: open or closed circuits.
- Sedimentation theory for classification. Sedimentation according to Newton and Stoke. Theory for free or hindered settling and settling ratios, cyclone efficiency, the partition curve, uncorrected and corrected classification curves. Types of classifiers: hydraulic, mechanical and the hydrocyclone.
- Laboratory classes: Grinding investigation. Hydrocyclone classification.

Wet and dry separation methods.

- Assessment of separation efficiency: product balances, grade-recovery curves, selectivity diagrams.
- Concentration by and equipment for: sorting, gravity, magnetic and high-tension separation, froth flotation.
- Circuit designs, calculation of circuit balances.
- Laboratory classes: Wet gravity separation. Magnetic high-intensity/high-tension separation. Froth flotation.

## 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 teaching and learning activities such as lectures, lessons, laboratory classes and a field trip. The lectures provide the possibility for the students to be able to describe and explain the operating principles of apparatuses and machines and describe theoretical concepts. The lessons are used for training of calculation procedures and diagrammatical presentations and for introduction of assignments. The assignments that are introduced in lessons, but must be finished at home, trains the student to independently do calculations and simple technical reports. The laboratory classes (performing the lab, laboratory lecture about evaluation, report) are done in groups; however, the calculations within the evaluation of laboratory experimental results shall be trained by each student individually. The students are trained to do investigations and work in groups and to evaluate, describe and report investigations. The field trip provides the possibility for the students to learn to describe industrial process technology.

## 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 laboratory classes, assignments, written examination and a field trip. The laboratory classes, assignments and field trip are compulsory and are only graded pass – fail. Approved laboratory exercises, a structured and well-formulated written report and participation in laboratory lessons is required for passing the laboratory classes. The reports might have to be written in English. Assignments and lab reports are due one week after the class. Assignments and reports are corrected until four weeks into the next study period. If they are not approved by then, they have to be carried forward to the next time the course is given. The theoretical understanding of the field of study is checked by a written individual full exam, graded 3 4 5. For grade 3, the student must be able to describe what is included in the field of study and to do routine calculations. For grade 4, the student must be able to explain what is included in the field of study and report investigation results. For grade 5, the student must be able to apply the acquired knowledge to partly new theoretical and practical problems.

## 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 M0001K is equal to KGM002

## Course offered by

Department of Civil, Environmental and Natural Resources Engineering

## Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0001	Written exam	G U 3 4 5	4.3	Mandatory	A07	
0005	Assignment reports	U G#	0.5	Mandatory	S24	
0006	Laboratory work	U G#	2.4	Mandatory	S24	
0007	Study trip	U G#	0.3	Mandatory	S24	

## Last revised

by Assistant Director of Undergraduate Studies Eva Gunneriusson, Department of Civil, Environmental and Natural Resources Engineering 2023-06-02

## Syllabus established

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