



LUNDS UNIVERSITET  
Lunds Tekniska Högskola

*Course syllabus*

## Separationsprocesser i bioteknik Downstream Processing in Biotechnology

**KBTN05, 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

**Main field:** Biotechnology.

**Main field:** Food Technology and Nutrition.

**Elective for:** B5-pt, K4-p, MBIO1, MLIV2, W5-p, Mlak1

**Language of instruction:** The course will be given in English

### Aim

Reactions decide whether a process is possible or not, whereas separation processes decide whether a process is profitable or not. Selection and proper design of unit operations also have great impact on yield and product purity. Separation processes are therefore key components in pharmaceutical-, biotechnology-, food- and chemical industries.

The aim of the course is to

- provide knowledge of different unit operations for separation of small and large molecules and particles from biotechnology processes
- provide basic knowledge of the physico-chemical foundations of bioseparation processes
- show how separation processes can be used for concentration and purification in various biotechnology applications

### Learning outcomes

*Knowledge and understanding*

For a passing grade the student must

- be able to describe various unit operations used for separation and purification of products from biotechnology processes
- based on the characteristics of a target product select the appropriate unit operation

- be able to analyse product recovery and purity
- be able to explain how gene technology can be used to aid purification of proteins produced by recombinant DNA technology

#### *Competences and skills*

For a passing grade the student must

- be able to evaluate how different physico-chemical parameters affect the performance of separation processes
- be able to design a downstream processing scheme for a product from a specific bio-based raw material
- be able to design a purification scheme based on the concepts of resource efficiency, energy efficiency and economy
- be able to present a downstream process in a written report and in an oral presentation

#### *Judgement and approach*

For a passing grade the student must

- be able to acquire relevant information from different sources and evaluate this independently
- be able to critically evaluate another assignment
- be able to make a choice of a unit operation based on information provided
- be able to do risk assessments around bioseparation processes

## **Contents**

Bioproducts and raw materials, unit operations used in downstream processing, product and purity analysis, bioprocess design and economy, gene technology to facilitate product purification, integration of product recovery with production process, good manufacturing practice related to downstream processing

## **Examination details**

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

**Assessment:** Written examination, written report and oral presentation of projects, and compulsory participation in laboratory exercises

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:** 0117. **Name:** Written Examination.

**Credits:** 3,5. **Grading scale:** TH. **Assessment:** Written examination

**Code:** 0217. **Name:** Compulsory Assignments.

**Credits:** 2,5. **Grading scale:** UG. **Assessment:** Written and oral examination of Projects.

**Code:** 0317. **Name:** Laboratory Work.

**Credits:** 1,5. **Grading scale:** UG. **Assessment:** Laboratory Work

## **Admission**

**Admission requirements:**

- KBKA05 Technical Biology or KBKA10 Biochemistry or KBKF15 Biochemistry or

KMBF01 Molecular Cell Biology

**Assumed prior knowledge:** KETF10 Separation Processes or KETF40/KTE170 Mass Transfer in Environmental Engineering

**The number of participants is limited to:** No

**The course overlaps following course/s:** KBT060

### **Reading list**

- Roger G. Harrison, Paul W. Todd, Scott R. Rudge and Demetri P. Petrides:  
Bioseparations Science and Engineering Second Edition. Oxford University Press, 2015, ISBN: 978-0-19-539181-7.

### **Contact and other information**

**Course coordinator:** Frank Lipnizki, [frank.lipnizki@chemeng.lth.se](mailto:frank.lipnizki@chemeng.lth.se)

**Course coordinator:** Roya Sardari, [roya.sardari@biotek.lu.se](mailto:roya.sardari@biotek.lu.se)