



## Bioprocess Design

### Bioprocessdesign

15 credits

15 högskolepoäng

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**Ladok Code:** TK741D

**Version:** 1.0

**Established by:** Board of the department 2007-05-22

**Valid from:** Autumn 2007

**Education Cycle:** Second cycle

**Main Field of Study (Progressive Specialisation):** Biotechnology (A1F)

**Disciplinary Domain:** Technology

**Prerequisites:** These prerequisites do not apply to students within the programme Science without Borders.

Meets requirements for acceptance to a masters programme in the field of chemical engineering.

**Subject Area:** Biotechnology

**Grading Scale:** ECTS-credits

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### Content

The course deals with the following areas:

- Review of various accessible databases in order to find information on bioprocesses
- Concept of bioprocesses
- Enzyme kinetics
- Why and how cells produce metabolites
- Fermentation and design of bioreactors
- A summary of various methods for bioseparation
- Estimation of investment and operating expenses
- Financial assessment of bioprocesses.

### Learning Outcomes

After completing this course, students must be able:

- To search the literature and databases in order to acquire knowledge on specific bioprocesses.
- To apply knowledge on the growth of microorganisms, enzyme kinetics and mass transport in order to create a preliminary design for a bioreactor.
- To determine which unit operations are required before and after a bioreactor.
- To propose an appropriate process path and draw a process diagram, e.g. Block Flow Diagram (BFD) and Process Flow Diagram (PFD) for bioprocesses.
- To use commercial software to design various process units.
- To estimate total investment and operating expenses for a bioprocess and perform a financial assessment of the process.

### Forms of Teaching

The teaching comprises the following elements:

- lectures
- project work

Teaching will take place through the medium of English.

The language of instruction is English.

## **Forms of Examination**

The course will be examined through the following examination elements:

### *Examination*

Learning outcomes:

Credits: 7.5

Grading scale: Seven-degree grading scale (A-F)

### *Project*

Learning outcomes:

Credits: 7.5

Grading scale: Seven-degree grading scale (A-F)

The course will be examined by means of a written examination and implement preliminary technical design and financial estimating for a bioprocess.

Student rights and obligations at examination are in accordance with guidelines and rules for the University of Borås.

## **Literature and Other Teaching Materials**

### **Literature**

1. Michael L. Shuler, Fikret Kargi (2002) Bioprocess Engineering, Prentice Hall, ISBN 0130819085
2. Richard Turton, Joseph A. Shaeiwitz, Wallace B. Whiting (2003) Analysis, Synthesis and Design of Chemical Processes, Prentice Hall, ISBN 0130647926
3. Henry C. Vogel; Celeste L. Todaro (1997): Fermentation and Biochemical engineering Handbook: Principles, process design, and equipment, NOYES PUBLICATIONS, USA
4. Handout

Software: ASPEN Plus or CHEMCAD With reservation for alterations and additions

## **Student Influence and Evaluation**

The head of department and teacher responsible for the course are responsible for ensuring that students are invited systematically and regularly to put forward their views on the course. The results of these assessments, which will take place either verbally or in writing, form the basis for the structure of the course.

## **Miscellaneous**