BB1120 Cultivation Technology 6.0 credits

Odlingsteknologi

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for BB1120 valid from Spring 2016

Grading scale

A, B, C, D, E, FX, F

Education cycle

First cycle

Main field of study

Technology, Biotechnology

Specific prerequisites

The upper-secondary school from 1 July 2011 and adult education at upper-secondary level from 1 July 2012 (Gy2011)

Specific entry requirements: Physics 2, Chemistry 1 and Mathematics 4. In each of the subjects the minimum grade required is Pass.

The upper-secondary school before 1 July 2011 and adult education at upper-secondary level before 1 July 2012

Specific entry requirements: mathematics E, physics B and chemistry A. In each of the subjects the grade required is Passed or 3.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

Knowledge and understanding

• know and describe the principle historical development of bioproducts and bioprocesses and the characteristics of common production organisms

• describe the content of different types of common media

• be able to describe the flux leading to overflow metabolism in E.coli, S. cerevisiae and animal cells

• understand why and how growth occurs and substrate is consumed in cultivation

• know and describe the common kinetic models for consumption of substrate, maintenance requirements and formation of different products categories

• know and describe common types of bioreactors including the auxiliary equipment. Be able to describe the mixing patterns and the parameters that affects the mixing in those reactors.

• understand how oxygen and carbon dioxide is transported between gas and liquid in bioreactors and the parameters that affect its efficiency

• know, describe and operate the common cultivation techniques used in bioprocessing

Skills and abilities

• be able to calculate the composition of a minimal medium on basis of the components commonly used

• be able to outline and describe simple structured models of the cellular metabolism

• be able to calculate total, volumetric and specific activities and yields in bioprocesses, know the meaning of these concepts and use them to describe the process performance

• be able to derive mass balances for cell, byproduct and product accumulation, substrate and oxygen consumption for different cultivation techniques

• be able to set up Matlab simulations on basis of mass balances and relevant kinetic models

• be able to draw the principal progress of process variables for the cultivation concepts

• be able to plan, operate and evaluate the performance of bioprocesses

• be able to perform oxygen transfer capacity measurements and be able to outline mixing time measurements in bioreactors

Ability to judge and to adopt a standpoint

• be able to speculate on how different cultivation conditions affect growth and byproduct formation

• be able to evaluate the reason to why growth ceases in batch cultivation

• be able to discriminate on the use of a specific cultivation concept depending on its benefits and drawbacks in relation to the product and process requirements

• be able to reflect on the effect on process economy with respect to choice of medium, bioreactor and cultivation technique for a specific process and product

• be able to declare how variations in substrate feed, stirring, airflow and cultivation volume affects the cultivation performance

Course contents

Course literature

Larsson G, Compendium in Cultivation technology.

Examination

• TENA - Examination, 6.0 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.