BB2485 Metabolic Engineering 7.5 credits

Metabolic Engineering

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

Establishment

Course syllabus for BB2485 valid from Spring 2020

Grading scale

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

Education cycle

Second cycle

Main field of study

Biotechnology

Specific prerequisites

At least 150 credits from grades 1, 2 and 3, of which at least 100 credits from years 1 and 2, and bachelor's work must be completed. The 150 credits should include a minimum of 20 credits within the fields of Mathematics, Numerical Analysis and Computer Sciences, 5 of these must be within the fields of Numerical Analysis and Computer Sciences, 30 credits of Chemistry, possibly including courses in Chemical Measuring Techniques and 20 credits of Biotechnology or Molecular Biology.

Language of instruction

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

Intended learning outcomes

On completion of the course, the students should be able to:

- Quantitatively describe metabolic pathways for production of industrially relevant fuels and chemicals discussed in the course
- Characterize the above pathways based on elemental, redox, and energy balances, discuss their engineering requirements, and propose relevant metabolic engineering strategies
- Construct and solve mathematical representations of metabolic networks, based on provided external measurements
- Implement genome-scale metabolic modelling for design and evaluation of metabolic engineering strategies

Course contents

- Metabolic pathways for production of organic acids, amino acids, alcohols, monomers, and polymers.
- The underlying concept behind balancing the above pathways, based on elemental, redox and energy balance.
- Metabolic control analysis.
- Metabolic engineering strategies.
- Metabolic flux analysis (MFA).
- The concepts of genome-scale stoichiometric metabolic models.
- The use of genome-scale models for designing metabolic engineering strategies.
- The inclusion of thermodynamic constraints in genome-scale stoichiometric models.
- State-of-the-art genome-scale modelling, combining stoichiometry, proteomics and metabolomics.

Examination

- PRO1 - Assignment in metabolic modelling, 2.5 credits, grading scale: P, F
- TEN1 - Written exam, 5.0 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.