Course syllabus

Hållbar kemi och bioteknik
Sustainable Chemistry and Biotechnology

KBTF06, 7,5 credits, G2 (First 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.
Elective for: B4, MBIO1, MLIV1
Language of instruction: The course will be given in English

Aim

The aim of this course is to answer: What is “Sustainable Chemistry” and how to produce chemicals in an environmental friendly way? How can we connect development of new processes to Agenda 2030 and the principles of "Green Chemistry"?

Can Biotechnology (enzymes and microorganisms) be utilized and developed to create more environmental friendly chemicals and chemical industries ?

This course will provide you with information on production and use of chemicals from a sustainable perspective, by giving knowledge on how to select alternatives and evaluate the sustainability of the different alternatives.

The role of Biotechnology in creating more environmental friendly processing will be discussed.

Learning outcomes

Knowledge and understanding
For a passing grade the student must

- understand principles of importance for sustainable development, and relate to e.g. Agenda 2030 and the concept "Green chemistry"
- have knowledge on the potential of biotechnology in the field
- have insights in possible effects of chemicals/ chemical processes on the environment
- be able to carry out, evaluate and report on the topic at laboratory level

Competences and skills
For a passing grade the student must

- do a written assignment in a selected topic related to sustainable product/process - development, e.g. as a simple life-cycle assessment (LCA).
- present a topic of relevance in an oral seminar and make slides for the presentation

Judgement and approach
For a passing grade the student must

- be able to analyse and present conclusions from written material in the topic
- be able to question and formulate questions on sustainable development by biotechnology

Contents

The course is composed of lectures, a seminar, and laboratory work.

Lecture themes:

- Sustainable chemistry via biotechnological development: concepts and principles
- Biotechnology/chemical processes: sustainable processes, rules and recommendations using chemicals, catalysis and biocatalysis
- Raw materials and biorefinery processes
- Waste and byproducts valorizations
- Choice of solvents
- Industrial "white" biotechnology
- Biobased production of energy carriers
- Process assessment (LCA)/Product evaluation, chemistry and sustainable development. Circular economy.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)
Assessment: Written exam, passed assignment and laboratory work. Final grading is based upon the written exam. Assignment and laboratory work is graded G/U.

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: 0123. **Name:** Written Exam.
Credits: 5. **Grading scale:** TH. **Assessment:** Written exam
Code: 0223. **Name:** Assignment and Oral Presentation.
Credits: 0. **Grading scale:** UG. **Assessment:** Assignment, and oral presentation of literature task

Code: 0323. **Name:** Laboratory Work.
Credits: 2,5. **Grading scale:** UG. **Assessment:** Written report

Admission

The number of participants is limited to: No
The course overlaps following course/s: KBTF05, KBTF01

Reading list

- Compendia/material handed out during the course.

Contact and other information

Course coordinator: Javier Linares-Pastén, javier.linares-pasten@biotek.lu.se
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