Course syllabus

Enzymteknologi
Enzyme Technology

KBKN01, 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.
Elective Compulsory for: MLIV1
Elective for: B4-mb, B4-pt, MBIO1
Language of instruction: The course will be given in English on demand

Aim

The aim of the course is to give advanced knowledge about the technical use of enzymes and the possibilities to change and improve enzyme performance for adaptation to technical applications

Learning outcomes

Knowledge and understanding
For a passing grade the student must

- be able to describe and evaluate methods for modifying enzymes intended for technical use
- be able to describe and evaluate methods for enzyme immobilization and for characterization of the properties of immobilized enzymes
- describe and evaluate methods for the use of enzymes in non-conventional media
- describe the technical use of enzymes

Competences and skills
For a passing grade the student must

- practically carry out enzyme immobilization, characterization of the properties of immobilized enzymes and using enzymes in organic solvents

- design, carry out and evaluate enzymatic transformations
- make written reports from laboratory practicals in which the experiments and results are described and commented upon and where deviations from expected results are analyzed and discussed

Judgement and approach
For a passing grade the student must

- in a group forum orally discuss scientific reports from the literature
- analyze, interpret and critically evaluate scientific reports related to enzyme technology

Contents

The theoretical part of the course describes how the catalysts of the biological world, the enzymes, can be used in a variety of contexts. Examples are the use in bioanalysis, refining of food, washing powder, textile treatment and transformation of chemicals.

The general properties of enzymes are well known from previous courses. In this course is described how enzyme molecules can be modified in order to get improved properties for technical use. Examples include genetic and chemical modification and immobilization. Immobilization, i.e. the coupling of enzymes to carrier material, is treated thoroughly. Likewise are the kinetic properties of immobilized enzymes and ways to quantify these properties emphasized.

In the cell the enzymes function in an aqueous environment. Under certain circumstances enzymes can also work efficiently in a non-aqueous environment or in an environment with a low water activity. This opens up for unique possibilities for an enzymatic synthesis of a number of substances, including chiral substances. This kind of use of enzymes in non-conventional media is treated in great detail.

The laboratory practical has two parts. One part where basic techniques concerning immobilization of enzymes are investigated and one research related part where untested experiments with enzymes are designed and carried out.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)
Assessment: Written examination and reports from the laboratory practicals and literature discussion.

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:** Enzyme Technology, Theory.
Credits: 4,5. **Grading scale:** TH. **Assessment:** Written examination and passed literature discussion.
Contents: The course descibes how the catalysts of the biological world, the enzymes, can be used in a variety of contexts. Examples are the use in bioanalysis, refining of food, washing powder, textile treatment and transformation of chemicals. The general properties of enzymes are well known from previous courses. In this course is described how enzyme molecules can be modified in order to get improved properties for technical use. Examples include genetic and chemical modification and immobilization. Immobilization, i.e. the coupling of enzymes to carrier material, is treated thoroughly. Likewise are the kinetic properties of immobilized enzymes and ways to quantify these properties emphasized. In the cell the enzymes function in an aqueous environment. Under certain circumstances enzymes can also work efficiently in a non-aqueous environment or in an environment with a low water activity. This opens up for unique possibilities for an enzymatic synthesis of a number of substances, including chiral substances. This kind of use of enzymes in non-converntional media is treated in great detail.
Code: 0217. **Name:** Enzyme Technology, Practicals.

Credits: 3. **Grading scale:** UG. **Assessment:** Written reports. **Contents:** The laboratory practical has two parts. One part where basic techniques concerning immobilization of enzymes are investigated and one reasearch related part where untested experiments with enzymes in organic solvents are designed and carried out.

Admission

Admission requirements:

- KBK011 Biochemistry or KBKA10 Biochemistry or KBKF15 Biochemistry

The number of participants is limited to: 48
Selection: Completed university credits within the programme. Priority is given to students enrolled on programmes that include the course in their curriculum.
The course overlaps following course/s: KBK031

Reading list

- Adlercreutz, P., Danielsson, B., Larsson, P.-O., Månsson, M.-O., Ramanathan, K.: : Kompendium: Enzyme Technology.

Contact and other information

Course coordinator: Dr Cedric Dicko, cedric.dicko@tbiokem.lth.se
Course coordinator: Carl Grey, carl.grey@biotek.lu.se
Course homepage: http://www.tbiokem.lth.se/english/education/enzyme-technology/