BB1060 Molecular Biotechnology 7.5 credits

Molekylär bioteknik

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

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

Establishment

Course syllabus for BB1060 valid from Autumn 2007

Grading scale

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

Education cycle

First cycle

Main field of study

Biotechnology,Technology

Specific prerequisites

Language of instruction

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

Intended learning outcomes

Molecular biotechnology is becoming a more important element in today's society. Molecular biotechnology is used for, among other things, medicinal purposes, for example, the diagnosis of different diseases and for the development and production of therapeutics. Other, more technical, applications can be exemplified by the development of biological cleaning filters, the manufacturing of more robust and effective enzymes that are used in different processes, etc.

The courses main goal is to provide a good insight into those principles and methods on which modern biotechnology rests and provide understanding for their inherent possibilities and restrictions to solve the future's problems.

After passing the course, the student should be able to:

- describe, within molecular biotechnology, normally used enzymes' biotechnical function/usage area.
- from a given problem, design a suitable pcr-attempt, for example, the cloning of a certain gene, and explain the component's functions thoroughly.
- explain the principle behind different DNA-sequencing methods and discuss their possible strengths and weaknesses
- give examples of different physical and genetic strategies for modifying/manipulating gene expressions and account for which consequences they produce on a cellular level
- describe different mutagens-, screening, and selection methods which are used within the protein engineering field and work out strategies where these are applied in order to solve a biotechnical problem
- from a given problem, choose appropriate combinations of host-vector systems and account for their advantages and disadvantages in relation to the other conceivable systems and describe/explain the different vector components'/elements' functions.
- account for the principles behind modern gene technology based vaccines and give examples of those advantages and disadvantages and possible restrictions compared with traditional vaccines
- give examples of methods for transcriptome and proteome analysis and explain the underlying principles
- present and evaluate a lab experiment in the form of a written report

Course contents

The basics of molecular biotechnology will be reviewed. The tools that make molecular biotechnology possible are presented: different enzymes, vectors, gene library, synthesis of DNA/RNA, DNA sequencing, amplification of DNA- PCR, host-vector systems, promoters, fusion's proteins, design of recombinant bioprocesses, protein expression in yeast, insect cells and mammal cells, mutagens, protein engineering. Applications of molecular biotechnology will be covered, for example: molecular diagnostics, DNA-diagnostics of genetic diseases and infectious diseases. Modern vaccines, subunit vaccines, protein vaccines, and nucleic acid vaccines will be discussed. Trans-genetic plants and animals. Molecular genetics. Gene therapy. Contemporary examples from the activity area will shed light on functional genomics.

Examination

- LAB1 - Laboratory Work, 1.5 credits, grading scale: P, F
- TEN1 - 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.

Other requirements for final grade

A written exam (TEN1; 6,0 credits, grading scale A-F), labs (LAB1; 1,5 credits, grading scale Pass/Fail).

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.