# BB2180 Molecular Biotechnology, Theory 6.0 credits

**Molekylär bioteknik, teori**

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

## Establishment

Course syllabus for BB2180 valid from Autumn 2007

## Grading scale

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

## Education cycle

Second cycle

## Main field of study

Biotechnology

## 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, medical 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 purification filters, the manufacturing of more robust and efficient enzymes to be used in different processes etc.

The courses main goal is to provide a good insight into the principles and methods on which modern biotechnology is based and provide understanding for their inherent possibilities and limits to solver the future problems and issues.

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

- describe, within molecular biotechnology, normally used enzymes' biotechnological function and usage area
- from a given problem, design a suitable pcr-research, for example the cloning of a certain gene, and explain the necessary components' functions
- 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 by gene expression and describe which consequences this have 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 biotechnological issues.
- from a given issue or problem, choose an appropriate combination of value-vector systems and describe its advantages and disadvantages in relation to other conceivable combinations and describe/explain the different vector component's/element's functions
- describe the principles behind modern genetics-based vaccines and give proof of their advantages and disadvantages and possible limits compared with traditional vaccines.
- give examples of methods for transcription and proteome analysis and explain the underlying principles.

## Course contents

The basics for molecular biotechnology will be reviewed. The tools which enable molecular biotechnology are presented: different enzymes, vectors, gene libraries, synthesis of DNA/RNA, DNA sequencing, amplification of DNA-PCR, value-vector systems, promoters, fusion 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 sicknesses and infection diseases. Modern vaccines, sub-unit vaccines, protein vaccines, nucleic acid vaccines, will be discussed. Trans-genetic plants and animals. Molecular genetics. Gene therapy. Furthermore, actual examples from the function genomics work area will be clarified

## Course literature

Molecular Biotechnology: Principles and Applications of Recombinant DNA (2003) Glick and Pasternak, 3e ed., ASM, ISBN 1-55581 269-4.

## Examination

- 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.

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

## Other requirements for final grade

Written examination (TEN1; 6,0 credits, grading scale A-F)

## 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.