

# Genome Analysis

Programme course

6 credits

Genome Analysis

TVCB12

Valid from: 2017 Spring semester

**Determined by**

Board of Studies for Chemistry, Biology  
and Biotechnology

**Date determined**

2017-01-25

## Main field of study

Engineering Biology

## Course level

Second cycle

## Advancement level

A1X

## Course offered for

- Chemical Biology, M Sc in Engineering
- Engineering Biology, M Sc in Engineering

## Entry requirements

Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

## Prerequisites

Gene Technology

## Intended learning outcomes

In this course the student will acquire advanced theoretical and methodological knowledge in genome analysis as well as molecular mechanisms involved in monogenic and polygenic traits and diseases. In a project laboratory work the student study the strategies for disease gene identification with advanced genetic laboratory methods, bioinformatics and interpretation of results. The student will also obtain knowledge in molecular epidemiology and how genetic variation in populations influence genetic predisposition for disease. By the end of the course the student will be able to:

### Knowledge and understanding

- Comprehend and integrate the knowledge on molecular mechanisms involved in monogenic and polygenic traits to understand the genetic basis of diseases
- Describe the interplay between genetic and environmental factors
- Explain how concepts of genetic variation in populations are affecting evolution and population genetics
- Identify strategies and explain the theoretical basis of molecular genetics methodology to be able to identify disease genes

### Competence and skills

- Demonstrate how calculation of genetic association and risk is performed
- Apply computer-based methods to be able to identify disease genes
- Practically perform and explain selected molecular genetics methodology for gene identification

### Judgement and approach

- Interpret experimental results and evaluate genetic association studies and risk calculations
- Present, evaluate and communicate pros and cons of molecular genetics methods
- Summarise and assess scientific literature within medical genetics

## Course content

Molecular mechanisms involved in monogenic and polygenic traits and diseases

Disease gene identification

How environmental factors influence the genome and affects expression

Genetic variation in populations and its influence on genetic predisposition, including molecular/genetic epidemiology

Calculation of allele frequencies, associations and risk

Principles of major molecular genetic laboratory methods and interpretation of results, hands-on knowledge of selected methodology

Seminars on selected scientific papers

## Teaching and working methods

The course applies student-centered learning among which Problem Based Learning (PBL) is one pedagogical philosophy and method. The PBL design of the course emphasises the student's development of free, self-supporting, lifelong learning as an instrument for critical inquiry. The students are also encouraged to take responsibility for her/his own learning, and to seek and evaluate information and knowledge and to train co-operation and a flexible attitude to different views and ideas. The educational methods include lectures, tutorial groups, seminars, demonstrations and laboratory work.

## Examination

UPG2	Completed assignments	1 credits	U, G
UPG1	Active participation in seminars	1 credits	U, G
BAS1	Active participation in tutorial groups	1 credits	U, G
TEN1	Written examination	3 credits	U, 3, 4, 5

Assignments, presentations, written examination in English.

## Grades

Four-grade scale, LiU, U, 3, 4, 5

## Department

Institutionen för klinisk och experimentell medicin

## Director of Studies or equivalent

Kajsa Holmgren Peterson

## Examiner

Peter Söderkvist

## Education components

Preliminary scheduled hours: 51 h

Recommended self-study hours: 109 h

## Course literature

### Additional literature

#### Books

Strachan, Tom & Read, Andrew P, (2010) *Human Molecular Genetics* 4th ed

#### Articles

## Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at [http://stydokument.liu.se/Regelsamling/Innehall/Utbildning\\_pa\\_grund-\\_och\\_avancerad\\_niva](http://stydokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva).