CB208V Genome Medicine 6.0 credits

Genommedicin

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

Establishment

Course syllabus for CB208V valid from Spring 2025

Grading scale

P, F

Education cycle

Second cycle

Main field of study

Biotechnology

Specific prerequisites

Completed degree project 15 credits in technology or natural sciences and 20 credits in biotechnology, cell biology, biochemistry, genetic technology or molecular biology. English B/6.

Language of instruction

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

Intended learning outcomes

Knowledge and understanding to:

- Account for genome variation and related regulatory mechanisms in the context of health and disease
- Describe in detail and summarise single and complex gene disorders as well as explain biological mechanisms associated to cancer

Skills and abilities to:

- Examine current genetic approaches/technologies to detect, treat diseases and the role of genetic variation in drug response, metabolism
- Evaluate and choose appropriate approaches and technologies to diagnose a given disease and assess genetic treatment approaches in a given context

Values and approaches to:

- Assess the functional impact of genetic and epigenetic variants in health and disease

Course contents

The course will be given online and aims to provide students an understanding of the use of genome and epigenome information in medicine. The course will give an advanced introduction to epigenetics and its role in health and disease, cancer, gene therapy and genome editing. The following topics will be included in the course:

- Human Genome Organisation & Principles of Genetic Variation
- Principles of Gene Regulation and Epigenetics
- Single and multifactorial gene disorders
- Genetic Approaches to treating disease, including gene and cell therapy
- Cancer and cancer genomes

We will discuss the organisation and the type of mutations in the human genome. We will then look at its interplay with epigenetic mechanisms as well as the role of 3D structure of the genome in gene regulation. We will then focus on the genetic architecture of monogenic and complex diseases and strategies to find causative or contributing genetic factors involved in disease onset. The impact of genome variation will be exemplified with cancer, rare and complex diseases. Strategies for diagnosis and treatment of the diseases are covered, such as gene and stem cell therapy. Diseases related to polymerization and structural changes of proteins such as Alzheimer's disease and prion conditions will also be addressed.

The student will work in projects to design theoretical experiment setups to find the genetic causes of given diseases.

The course has pre-recorded lectures and there will be online meetings according to the schedule.

Examination

- TEN1 - Home exam, 2.0 credits, grading scale: P, F
- MID1 - Partial exam, 2.0 credits, grading scale: P, F
- PRO1 - Project, 2.0 credits, grading scale: P, 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.

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.