



DEPARTMENT OF MEDICINE, SOLNA

K2F5678, Current Clinical Applications of Epigenetics in Cardiometabolic Diseases, 1.5 credits (hec)

Aktuella kliniska tillämpningar av epigenetik i kardiometabola sjukdomar, 1,5 högskolepoäng

Third-cycle level / Forskarnivå

Approval

This syllabus is approved by the The Committee for Doctoral Education on 2023-12-22, and is valid from Spring semester 2024.

Responsible department

Department of Medicine, Solna, Faculty of Medicine

Prerequisite courses, or equivalent

Basic knowledge in molecular biology.

Purpose & Intended learning outcomes

Purpose

The aim of this course is to offer participants interested in cardiometabolic diseases a general view of epigenetics and its clinical implications (i.e., early diagnosis and treatment). Moreover, novel scientific approaches and state-of-the-art techniques in this field will be introduced. This course will provide the participants with the essential knowledge to understand and study epigenetics mechanisms in cardiometabolic diseases.

Intended learning outcomes

Upon completion of the course, the participants should be able to:

- 1) Show an in-depth knowledge of the molecular basis of epigenetics;
- 2) Evaluate epigenetic mechanisms and their relevance to cardiometabolic diseases (e.g. obesity, type 2 diabetes, atherosclerosis, heart failure...) by using different molecular biology techniques;
- 3) Have obtained basic knowledge on how experiments for epigenetic studies can be performed, analyzed, and interpreted; and

4) Show an insight into the application of epigenetics in the clinical context for studying, diagnosis, prognosis, and treatment of cardiometabolic diseases.

Course content

Molecular fundamentals of epigenetic control under physiological and pathological conditions will be discussed. We will also examine the interplay between epigenetics and the environment and its potential inheritance. Topics to be covered include the role of DNA methylation, histone post-translational modification, and non-coding RNAs in atherosclerosis, hypertension, type 2 diabetes, insulin resistance, and other cardiometabolic diseases and mechanisms of current and future treatment. Moreover, the course will include examples of in vitro and animal models for the evaluation of epigenetics as well as examples of clinical studies. Finally, there will be a major practical component where participants will get the opportunity to see lab demonstrations and to perform hands-on bench work in the most common techniques regarding epigenetics.

Forms of teaching and learning

The course activities will integrate daily interactive lectures and seminars given by invited scholars in the respective fields, lab demonstrations, hands-on bench work, group learning (literature review and research planning), and a group project presentation and review at the end of the course.

Language of instruction

The course is given in English

Grading scale

Pass (G) /Fail (U)

Compulsory components & forms of assessment

Compulsory components

Full attendance is required for theoretical and practical lessons to follow the course content and pass the course. Those participants who miss any session would need to perform a review of the missing content. Students need to participate in all learning activities and complete self-learning assignments. The final examination must be passed in order to pass the course.

Forms of assessment

In order to pass the course, each group member needs to prove that s/he has reached the previously indicated learning outcomes of the course, to ensure this each participant has to reach a final grade which will be based on 1) a multiple choice test after each day, and participation during the discussions; and 2) an oral group presentation on the last day of the course of a research project in the field of epigenetics, which should be designed applying the knowledge learnt during the course.

Course literature

A complete list of literature will be provided by the lectures and specified one month before the course starts.