



DEPARTMENT OF PHYSIOLOGY AND PHARMACOLOGY

C3F3157 Mechanisms of Gene Regulation in Metabolism, 1.5 credits (hec)

Mekanismer för genreglering av metabola processer, 1,5 högskolepoäng

Third-cycle level / Forskarnivå

Approval

This syllabus is approved by the The Committee for Doctoral Education on 2023-11-28, and is valid from Spring semester 2024.

Responsible department

Department of Physiology and Pharmacology, Faculty of Medicine

Prerequisite courses, or equivalent

No prerequisite courses, or equivalent, demanded for this course.

Purpose & Intended learning outcomes

Purpose

The students of this course will get a broad perspective of how the regulation of gene expression is linked to metabolic and endocrine regulation in different tissues. The course will also cover molecular and physiological aspects related to inter-organ communication, and how this is essential to maintain metabolic homeostasis.

Intended learning outcomes

At the end of the course students will understand and be able to discuss the different mechanisms that regulate gene expression. They will be able to describe how these processes can affect metabolic disease and disease progression. The students will be able to choose the most appropriate methodologies to study diverse aspects of gene regulation in metabolism.

Course content

This course aims at giving students an overview of the current understanding of how metabolism

and metabolic dysfunction are controlled at the level of gene regulation. During one week, students will focus on the genetic and epigenetic mechanisms that affect transcriptional output in diverse organs and tissues in health and disease situations. This will include: basic mechanisms of gene transcription, transcription factors and coregulators, mRNA splicing and genetic variability, the chromatin landscape and associated DNA and histone modifications, noncoding RNAs and regulation of gene expression. Attention will be given to single gene analysis as well as global regulation of gene expression. In each module the student will be introduced to the basic concepts in the field and analyze situations in which dysregulation of the processes under examination leads to metabolic disease. Each module will include a chapter dedicated to the presentation and discussion of current experimental approaches relevant to research in that particular field of science.

Forms of teaching and learning

This course will consist mainly of lectures and group discussions covering both theoretical and practical questions related to the different areas of gene regulation and metabolism. Some sessions will be dedicated to problem solving and presentation of state-of-the-art methodologies relevant to research in each field.

Language of instruction

The course is given in English.

Grading scale

Pass (G) /Fail (U)

Compulsory components & forms of assessment

Compulsory components

Presence at lectures, group work, and final presentation and discussion is mandatory. To compensate for absence a written essay on the missed topic must be performed.

Forms of assessment

Examination will consist of an oral presentation in which students discuss an example of metabolic disorder caused by dysregulation of gene expression and propose a research plan to further study that problem. Students will be able to discuss each other's presentations. The research plan should include appropriate methodology learned during the course.

Course literature

Molecular biology of the cell. By Bruce Alberts - Garland Science (2008) - Hardback - 1601 pages - ISBN 0815341113

Guyton and Hall textbook of medical physiology. By John E. Hall, Arthur C. Guyton - Saunders/Elsevier (2010) - Hardback - 1091 pages - ISBN 1416045740