



P000086, Epigenetics and Sustainable Animal Production (ESAP), 8.0 Hp

Syllabus

Finalized by: FUN, 2024-02-27

Valid from: 2024H

Level within study regulation:

Third cycle

Grading scale:

Pass / Failed

Course language:

Swedish

Entry requirements:

Admitted to a postgraduate program in animal science, biology, veterinary medicine, food science, nutrition, nursing, or related subjects. For application, there is a requirement for knowledge in genetics (at least 2 credits)—proficiency in English equivalent to the Swedish upper secondary course English 6

Objectives:

After completion of the course, the student should be able to:

1. Understand gene and genome organization in eukaryotes.
2. Describe epigenetics principles and mechanisms that are associated with epigenomics, changes in chromatin structure, and transcriptional regulation. This should be in association with the interplay between underlying epigenetic modifications. Describe the methodologies and tools available for measuring epigenetic modifications.

3. Discuss the involvement of epigenetic modifications in embryonic development and cell differentiation and assess the significance of epigenetics in reproductive traits.
4. Highlight the fundamental role of epigenetics in regulating metabolic and immune responses.
5. Obtain a general understanding of methods used to identify DNA methylation and chromatin structure and modifications and to utilize protocols and demonstrations to extract high-quality genomic DNA.
6. Apply the acquired skills to perform or understand the analysis of the genome/methylome, process genomic and methylome data obtained from experiments and conduct downstream bioinformatics and statistical analyses.
7. Utilize the knowledge gained in the course to develop their own ideas in the field of epigenetics

Content:

The course provides a comprehensive exploration of epigenetics and epigenomics, delving into their significance in shaping phenotypes during development. It encompasses a series of lectures that address specific objectives, offering insights into key facets of the field. Following the lectures, there will be practical sessions involving data analysis. Additionally, students will engage in group discussions centred around predetermined topics, fostering a collaborative learning environment. These discussions will be followed by exercises and hands-on experiences, specifically designed to equip students with the necessary skills for analysing DNA methylation—the most extensively studied epigenetic modification.

Hybrid Lectures: The theoretical component will be delivered through hybrid lectures, enabling the participation of students from various locations. This format ensures accessibility and flexibility for all participants.

Practical sessions for genomic DNA Extraction and Quality Control: The theoretical aspects of DNA extraction and quality control will be covered in hybrid lectures. However, active participation in hands-on practical sessions is essential. Students are required to be physically present to gain practical experience in these crucial aspects of the course.

Bioinformatics and Biostatistical Analysis: The bioinformatics and biostatistical analysis section will involve a combination of lectures and an interactive Canvas platform. After every lecture, a set of questions will be provided, guiding students through the necessary steps with clear instructions. Subsequent steps will be unlocked based on the timely submission of results from the preceding stages. This structured approach encourages problem-solving, troubleshooting, and progression from simple to more complex tasks.

Modes of assessment:

1. Written examination
 2. Compilation of the bioinformatics data analysis and final reporting of the results (can be done in groups of two).
 3. Developing your own concept, write a short concept note of about 5000 characters (including space) about it.
 4. Final presentation of the tools used and the conclusions drawn from the analyses in point 2 and a written report for point 3.
- If a student has failed an examination, the examiner has the right to issue supplementary assignments. This applies if it is possible and there are grounds to do so.
 - The examiner can provide an adapted assessment to students entitled to study support for students with disabilities following a decision by the university. Examiners may also issue an adapted examination or provide an alternative way for the students to take the exam.
 - If this syllabus is withdrawn, SLU may introduce transitional provisions for examining students admitted based on this syllabus and who have not yet passed the course.
 - For the assessment of an independent project (degree project), the examiner may also allow a student to add supplemental information after the deadline for submission. Read more in the Education Planning and Administration Handbook.

Organisation:

Department of Applied Animal Science and Welfare

Supplementary information

Other information:

- The right to participate in teaching and/or supervision only applies for the course instance the student was admitted to and registered on.
- If there are special reasons, students are entitled to participate in components with compulsory attendance when the course is given again. Read more in the Education Planning and Administration Handbook.