

Behaviour Genetics, 7.5 credits

Beteendegenetik, 7.5 hp

Third-cycle education course

6FIFM91

Department of Physics, Chemistry and Biology

Valid from: Second half-year 2024

Approved by

Approved

Registration number

Learning outcomes

The student will learn and understand the basis of quantitative genetic techniques, in particular how they pertain to behavioural variation. The student will apply such techniques to actual data, as well as discuss the limitations of such techniques and compare and contrast between them. Students will analyse and contrast the genetic architecture underpinning a variety of different behavioural traits, discussing the ramifications for future studies on behaviour.

After the course the students will be able to:

- Describe and understand statistical quantitative genetic techniques and how they apply to complex traits.
- Analyse the heritability and genetic architecture of different behavioural and disease-related traits, and understand the theory and steps required to perform this .
- Critically assess the types of genomic analyses that are prevalent in current biology and how they are complementary to one another, as well as identify weaknesses within the tools currently available.

Contents

The field of behaviour genetics involves the synthesis of ethology, genetics, neurobiology and evolution amongst others, and impacts on a multitude of different fields in biology. Previous to the field's genesis, behaviour had been thought to be controlled by a 'black box', with scant regard to what genes can affect a trait and how they achieve this. As this field has risen to greater prominence, the genes that underpin both the mechanisms and variation present in behaviour are starting to be understood. This course will teach both a combination of the genetic knowledge required to interpret this field, as well as an understanding of the field itself. The course will in addition focus on practical aspects of behaviour genetics, principally the use of statistics and how they are required in the field, experimental design and the like. Aspects as diverse as heritability, genetic mapping, transcriptomics, mutagenesis and transgenics will be covered, whilst a variety of different behaviours will be looked at and dissected, including anxiety, learning and memory, foraging and sleep.

Students will also have to discuss how these techniques can be applied to their specific PhD topics, and present a paper during a seminar where they discuss the merits of the different techniques they can use and potential problems with their application.

Educational methods

The course will consist of lectures, workshops/ seminars and a combined literature and data analysis project. The students are expected to work independently and manage their time efficiently in order to handle the course assignments. Extra costs due to travelling must be paid by the student.

Examination

HEM1 Home examination 3 credits U, G

UPG2 Project 3.5 credits U, G

UPG1 Attendance and presentation in seminars 1 credits U, G

Project involves analysing a given data set in small groups (each group with a specific dataset). Students will take the analysis from an initial examination of the data through to more advanced analysis for gene/ QTL identification. They will then describe the results, discuss the ramifications and implications, and design further experiments tailored to their specific dataset.

To pass, students need to pass each individual assignment. A re-exam for the home examination is offered at two other times in the year.

Grading

Two-grade scale

Course literature

Anholt, R.R.H., Mackay, T.F.C. Principles of Behavioral Genetics. (Academic Press, 2010).