



CORE FACILITIES

SC00034 Gene expression analysis using R, 2 credits

Genexpressionsanalys i R, 2 högskolepoäng

Third-cycle level / Forskarnivå

Confirmation

This syllabus was confirmed by the Council for PhD Education at Sahlgrenska Academy on 2019-03-22, and was last revised on 2020-03-23. The revised course syllabus is valid from Autumn semester 2020.

Responsible Department

Core Facilities, Sahlgrenska Academy

Entry requirements

The course is open for PhD students accepted by a Swedish or international university, in need to analyze different sets of expression data.

To be able to follow the course you should have:

- a background in genetics, cell biology, biomedicine, biochemistry, bioinformatics or similar,
- a research project where you are currently using gene expression data or are planning to use gene expression data.

You must have experience of programming in R.

Learning outcomes

After completing the course the students is expected to be able to:

Knowledge and understanding

- Identify different technologies for generating gene expression data
- Evaluate the main variables that influence the design of the project
- Describe and summarize basic statistics used for the analysis of gene expression data
- Define applicable workflows for analyzing different types of gene expression data
- Interpret the results from the different technologies

Skills and ability

- Use commands in R for data manipulation, statistical tests, plotting etc.

- Write R code as a script to analyze expression data
- Use help pages and web resources to build customized workflows

Judgement and approach

- Understand the techniques introduced for gene expression data
- Design and establish custom approaches for analyzing, visualizing and interpreting gene expression data
- Translate research questions of interest into appropriate R statements
- Select suitable methods for their own data
- Evaluate and interpret the significance of their own and others' scientific results.

Course content

This is a hands-on course that covers the analyses of different types of gene expression data. You will learn to analyze and visualize the results. The use of the programming language R will be a focus. The course includes a combination of lectures and practical sessions.

The data analysis covers the following technologies:

- qPCR
- Microarray
- Bulk RNAseq
- Single cell RNAseq

Types of instruction

The course / workshop includes a combination of lectures and practical sessions.

Language of instruction

The course is given in English.

Grades

The grade Pass (G) or Fail (U) is given in this course.

To receive a passing grade, the student is required to complete all practical sessions and demonstrate that the learning objectives have been reached.

Types of assessment

Assessment will be done through the practical sessions; these are designed to test the understanding of the different applications, so completion of all of them is mandatory. Active participation during group sessions and attendance for at least 80% is also mandatory.

A doctoral student who has failed a test twice has the right to change examiners, if it is possible. A written application should be sent to the Institute.

Course evaluation

The course evaluation will be done through a written questionnaire, available at the university's learning platform, where students will be asked to describe their opinions on the various stages of the course for future development. This information will be compiled and shared with students who participated in the course. Improvements are shared with students participating in the course next time.

Other information

Requested readings: Handouts will be provided during the course.

Students are expected to read the university's policy for prevention of plagiarism (<http://www.uu.se/skriva/plagiering>). Suspected cases of plagiarism will be reported to the university discipline committee.

Computer access and internet is required since all course communication and relevant documents such as lectures, exercises and literature will be posted at the virtual learning platform.

This syllabus was confirmed by the Sahlgrenska Academy's Council for PhD Education on 26-02-2019, and is valid from the autumn semester 2019 (reg.nr.: GU 2019/697). It was entered into Fubas on 19-03-2019.