



INSTITUTE OF NEUROSCIENCE AND PHYSIOLOGY

NG01CF Next Generation Sequencing Analysis with clinical applications, 5 credits

Next Generation Sequencing analys med kliniska tillämpningar, 5 högskolepoäng
Second Cycle

Confirmation

This course syllabus was confirmed by Institute of Neuroscience and Physiology on 2020-02-02 and was last revised on 2020-12-08 to be valid from 2020-12-08, autumn semester of 2020.

Field of education: Medicine 100%

Department: Institute of Neuroscience and Physiology

Position in the educational system

The course is given as a stand-alone course. The course may be part of the master's / master's degree in biomedical laboratory science.

Main field of studies

Biomedical Laboratory Science

Specialization

A1N, Second cycle, has only first-cycle course/s as entry requirements

Entry requirements

For admission to the course, the Bachelor's degree is required 180 credits or equivalent in any of the fields of medicine, nursing or natural sciences and English 6.

Learning outcomes

On successful completion of the course the student will be able to:

Knowledge and understanding

- Identify the different Next Generation Sequencing technologies in the market
- Describe the workflow a sample undergoes from library preparation to raw sequencing data
- Categorize datasets according to standard quality thresholds
- List bioinformatics tools used in the analysis of Next Generation Sequencing data
- Describe the typical workflow in the analysis of targeted resequencing and RNA sequencing data

Competence and skills

- Propose a suitable experiment design in the analysis of Next Generation Sequencing data
- Analyze and interpret targeted resequencing and RNA sequencing data
- Modify the common Next Generation Sequencing workflows to suit different cases
- Use fundamental commands in R for basic data manipulation and plotting
- Use and, when needed, modify existing R scripts

Judgement and approach

- Review the in vivo and in silico techniques that have been introduced in the course
- Assess the quality of a sequencing project
- Select a specific Next Generation Sequencing workflow based on the sequencing project design
- Evaluate the significance of their own and others' scientific results

Course content

The course includes a combination of lectures and practical sessions where participants will focus on the analysis and interpretation of clinical Next Generation Sequencing (NGS) data applying various bioinformatics tools. The statistical tool R will be introduced to perform and visualize the results. The course covers essential concepts in molecular biology and genetics, the principles on Next Generation Sequencing applications, with a focus on targeted resequencing and RNA sequencing. In depth analysis of Next Generation Sequencing quality assessment and interpretation of mutation and gene expression analyses.

Form of teaching

The course includes a combination of lectures, practical sessions and home assignments

Language of instruction: English

Assessment

The examination consists of a project assignment, where the participant will analyze a clinical sample and present their results in writing and as an oral presentation.

Student has the right to change examiner after having failed twice on the same examination, unless special reasons speak against it. (HF 6 Chapter 22 §). Such a request is made to the institution and must be in writing.

In the event that a course has ceased or undergone major changes, the student will normally be guaranteed access to at least three test cases (including the regular test opportunity) for a period of at least one year based on the course's previous presentation. This must not conflict with HF Chapter 6, Section 21.

At least five occasions the students must be offered tests to pass the results of a course or part of a course.

Grades

The grading scale comprises: Pass (G) and Fail (U).

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

Course evaluation

The course evaluation will be done through a written questionnaire, available at the virtual learning environment, where students are asked to describe their opinions on the various stages of the course for future development.

The results of and possible changes to the course will be shared with students who participated in the course and students who are starting the course next term.

Additional information

The course will be given in English.

Computer access with administration rights as well as internet access is required since all communication concerning the course and relevant documents, such as lectures, exercises and literature, will be posted at the virtual learning environment.