UNIVERSITY OF GOTHENBURG

CORE FACILITIES

SC00003, Proteomics, 3 credits

Proteomik, 3 högskolepoäng

Third-cycle level / Forskarnivå

Confirmation

This syllabus was confirmed by the Council for PhD Education at Sahlgrenska Academy on 2019-01-31, and was last revised on 2024-03-18. The revised course syllabus is valid from Autumn semester 2024.

Responsible Department

Core Facilities, Sahlgrenska Academy

Entry requirements

To qualify for admission to the course, the student must be registered as a PhD student.

To benefit from the course, it is required that one has passed biochemistry or an equivalent course at the undergraduate level.

Learning outcomes

The objective of the course is to present current trends in proteomics and to demonstrate the principles and capabilities of proteomic strategies to answer various research questions. After the course the students will have an overview of proteomic applications and workflows, from study design and planning of the experiments to analysis and evaluation of results.

Knowledge and understanding

- Have an overview of current methodologies and trends in biological mass spectrometry and proteomics
- Understand the principles of MS-based protein identification and quantification
- Understand key elements of proteomic workflows
- Understand requirements for a quantitative proteomics study considering biological and technical variability, number of replicates and power of analysis

Competence and skills

- Evaluate and discuss advantages and pitfalls of proteomic workflows from literature
- Design and plan a proteomic study applied to their own research
- Perform sample preparation for a proteomic analysis
- Perform database matching for protein identification
- Interpret and analyse results from quantitative proteomic studies

Judgement and approach

- Identify and judge advantages and limitations of proteomic startegies
- Argue how a selected proteomic strategy answers a specific aim or question in a proteomic research project

Course content

The course will cover the basics of proteomics, including applications and the methods used in proteomics research. The course will describe and discus study design, sample handling and sample preparation techniques. The course will present strategies for enrichment and separation of proteins and peptides, basic theory of biological mass spectrometry (MS) and liquid-chromatography-MS instruments, data analysis and bioinformatics of MS data. During the course, the students are expected to design and plan a proteomic study applied to their own research. The individual proteomic studies will be presented and discussed with teachers and other students participating in the course.

Types of instruction

The course consists of lectures, instrument demonstrations and practical sessions designed to demonstrate the proteomic data analysis tools. Practical hands-on laboratory experiments can be performed at the Proteomics Core Facility laboratory or in students own laboratory. MS-analysis and evaluation of the results are performed at the Proteomics Core Facility.

Language of instruction

The course is given in English

Grades

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

Types of assessment

The examination is a web-based multiple-choice exam and an oral presentation of the individual proteomic study and literature study applied to their own research. At least 80% correct answers at the web-based exam, attendance at literature seminar and hands-on laboratory experiments and 75% attendance at lectures are required. In case of absence from mandatory elements, completion of the course (if possible) should be done according to instruciton from the course leader.

If a PhD student, who has been failed on the same examining course component twice, requests a change of examiner before the next examination session, a request of this kind should be sent in writing to the department responsible for the course, and granted, unless there are special reasons to the contrary (Chapter 6, Section 22, Higher Education Ordinance).

Course evaluation

The course evaluation will be provided both as a written questionnaire (joint for Sahlgrenska Academy) and orally as a discussion between the students and the course leader(s). The course responsible teacher compiles analysis of the course evaluation and makes suggestions for further development of the course. The result and any changes in the set-up of the course shall be communicated both to the students that carried out the evaluation and to the students who are about to start the course.