



**Karolinska
Institutet**

Course syllabus for

Computational proteomics, 4.5 credits

Datoranalys av proteomikdata, 4.5 hp

This course syllabus is valid from autumn 2024.

Course code	4BI131
Course name	Computational proteomics
Credits	4.5 credits
Form of Education	Higher Education, study regulation 2007
Main field of study	Biomedicine
Level	AV - Second cycle
Grading scale	Pass, Fail
Department	Department of Medicine, Huddinge
Decided by	Programme committee for study programmes in biomedicine
Decision date	2024-03-11
Course syllabus valid from	Autumn 2024

Specific entry requirements

A Bachelor's degree or a professional degree worth at least 180 credits in biomedicine, biotechnology, cellular and molecular biology, medicine, or the equivalent. Proficiency in English equivalent to the Swedish upper secondary school course English 6/English B.

Objectives

Proteomics platforms are broadly used in biomedical research to measure entire proteomes and to characterize their post-translational modifications. Similar to data from other omics platforms, the resulting data needs to be correctly processed in order to obtain high-quality results and interpretations. This course provides basic knowledge of the most popular proteomics approach, peptide mass spectrometry, and the different steps in the data analysis. Furthermore, common concepts of quality control and quantitative analysis are introduced.

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

1. explain the basic concepts of peptide mass spectrometry,
2. discuss different experimental approaches to quantify proteins,
3. describe the data analysis steps from raw spectra to interpretation,
4. apply quality control of proteomics data,
5. use tools for quantitative analysis.

Content

This course covers the following topics:

1. Basics of proteomics and mass spectrometry
2. Experimental design and statistics
3. Identification of proteins and post-translational modifications
4. Differential and functional analysis
5. Visualization and quality control
6. Proteomics databases

Teaching methods

The course is at Master's level, where students are assumed to be familiar with the most common study methods in higher education. The fundamental pedagogical view is based on learning as an active research process. Learning activities include:

1. On-line videos
2. Structured learning activities (Open EdX platform)
3. On-line assignments

Examination

On-line assignments and final written report. Graded Fail or Pass.

Compulsory participation

This is an online course run from the University of Southern Denmark. To complete the course the student must participate in and perform all teaching and learning activities.

The course examiner assesses if and, in that case, how absence from compulsory components can be compensated for. A student's study results cannot be finalised/registered until the student has participated in the compulsory components or compensated for their absence in accordance with the examiner's instructions. Absence from a compulsory component may mean that the student cannot compensate for absence until the next time the course is given.

Limitations of the number of examinations or practical training sessions

Students who have not passed the regular examination are entitled to participate in five more examinations. If the student has failed six examinations/tests, no additional examination or new admission is provided.

The number of times that the student has participated in one and the same examination is regarded as an examination session. Submission of a blank examination is regarded as an examination. An examination for which the student registered but not participated in, will not be counted as an examination.

If there are special grounds, or a need for adaptation for a student with a disability, the examiner may decide to deviate from the syllabus's regulations on the examination form, the number of examination opportunities, the possibility of supplementation or exemptions from the compulsory section/s of the course etc. Content and learning outcomes as well as the level of expected skills, knowledge and abilities may not be changed, removed or reduced.

Other directives

This course is run by the Department of Biochemistry and Molecular Biology, University of Southern Denmark, Odense in an online mode.

The course language is English and examination is performed in English.

Course evaluation will be carried out in accordance with the guidelines established by the Committee for Higher Education.

This course replaces the course Computational proteomics, 4.5 credits (4BI111) and cannot be included in a degree together with the latter course.

Literature and other teaching aids

Online material in Open EdX with links to further literature, training material and software.