GHENT UNIVERSITY

Course Specifications

Valid in the academic year 2024-2025

Proteomics (C003086)

Course size *(nominal values; actual values may depend on programme)*

Credits 3.0 **Study time 80 h**

Course offerings and teaching methods in academic year 2024-2025

A (semester 1)	English	Gent	lecture
			seminar

Lecturers in academic year 2024-2025

Devreese, Bart	WE10	lecturer-in-charge
Van Damme, Petra	WE10	co-lecturer

Offered in the following programmes in 2024-2025	crdts	offering
Master of Science in Teaching in Science and Technology(main subject Biochemistry and Biotechnology)	3	A
Master of Science in Bioinformatics(main subject Systems Biology)	3	A
Master of Science in Biochemistry and Biotechnology	3	A
Exchange programme in Biochemistry and Biotechnology (master's level)	3	A
Exchange Programme in Bioinformatics (master's level)	3	A

Teaching languages

English

Keywords

mass spectrometry, proteomics, protein interactions

Position of the course

In this course, we will discuss the concepts and methods for the study of the protein complement of the cell. Focus will be on a detailed description of recently developed mass spectrometric techniques used for the quantitative analysis of biomolecules. In addition, we will discuss the results and interpretation of Proteomic experiments

Contents

Introduction to proteomic, Mass spectrometric techniques (ionization sources, analyzers), Modern mass spectrometers. Mthods for quantitative proteomics (2DPAGE, isotope labeling, label free methods, design). Study of posttranslational modifications), Study of protein interactions, Use of protein arrays and chip devices, Use of mass spectrometry in structural biology.

Initial competences

Basic knowledge of biochemistry, analytical chemistry and analytical biochemistry (level 3rd Bachelor Biochemistry-biotechnology)

Final competences

1 Advanced knowledge of model systems, methods, processes and applications in the different subdisciplines of Biochemistry and Biotechnology and can apply these to resolve complex scientific problem
2 Specialized and practical knowledge of the structure of biomacromolecules, inclusive their analysis and can creatively apply the mechanisms of molecular 'machines'.
3 Specialized and practical knowledge and can apply these in at least two of the following subdisciplines: biochemistry and structural biology, bioinformatics and systems biology, biomedical biotechnology, microbial biotechnology, plant

biotechnology.
4 Apply advanced techniques for problem solving in at least one of the following subdisciplines : biochemistry and structural biology, bioinformatics and systems biology, biomedical biotechnology, microbial biotechnology, plant biotechnology.
5 Communicate in English about science.
6 Build independently logic and analytic reasoning and argumentations.
7 Design in an innovative scientific research, execute the research and report on it in a scientific manner.
8 Critically assess the model systems, techniques and interpretations in Biochemistry and Biotechnology.
9 Students can explain the diverse techniques for quantiative proteomics, the study of protein interactions and applications of mass spectrometry in protein analysis.
10 Students can indicate the use and applicability of proteomics in systems biology and weigh it against other 'omicd' technologies.
11 Evaluation of biochemical research methods for potential and applicability.
12 Students must be able to design a proteomic experiment.
13 Students must be able to interprete mass spectra of peptides and proteins.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Seminar, Lecture

Extra information on the teaching methods

Workshop : interpretation of mass spectra. Analysis of scientific literature.
Experimental design. Data analysis of an LC-MS based proteomics dataset

Study material

Type: Slides

Name: course notes
Indicative price: Free or paid by faculty
Optional: no
Language : English
Number of Slides : 300
Oldest Usable Edition : 2022
Available on Ufora : Yes
Online Available : Yes
Available in the Library : No
Available through Student Association : No

References

Research papers from current literature
study book: Introducing proteomics (Joseph Lovric, 2011), Wiley ISBN 978-0-470-03524-5 (niet verplicht)

Course content-related study coaching

Interactive support through Ufora. Personal: e-mail confirmed appointment

Assessment moments

end-of-term and continuous assessment

Examination methods in case of periodic assessment during the first examination period

Oral assessment, Written assessment open-book, Written assessment

Examination methods in case of periodic assessment during the second examination period

Oral assessment, Written assessment open-book, Written assessment

Examination methods in case of permanent assessment

Skills test

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible

Extra information on the examination methods

The capacity to interprete a mass spectrum is evlauated during a workshop. The score (2/20 points) obtained for this test are part of the scoring for the non-periodical exam (skills test). Students can refuse their score and perform a new test during the following exam session.
In the exam part "open book", the student will first design a proteomics experiment that would allow to investigate a biological question that is posed. During the oral part of the exam, the student is interrogated about this experiment, e.g. on the experimental design, used methods and the validtion methods that are proposed. The student is confronted with some potential alternative methods that are to be judged on applicability.
The exam is predominantly based on an interrogation about methods and terms used in this course.

Calculation of the examination mark

periodical exam : 18/20
non-periodical exam : 2/20

A student that was absent without valid reason or that did not participate in all evaluation forms of the non-periodic evaluations will receive a final score that can not be deliberated. Students that fail to deliver their independent research project will not be allowed to the oral exam (deadlines are clearly communicated).