GHENT
UNIVERSITY

Course Specifications

Valid as from the academic year 2024-2025

Structural Bioinformatics (C003526)

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 2025-2026

A (semester 1)	English	Gent	lecture seminar

Lecturers in academic year 2025-2026

Savvides, Savvas	WE10	lecturer-in-charge
Mehdipour, Ahmadreza	TW17	co-lecturer

Offered in the following programmes in 2025-2026	**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

Teaching languages

English

Keywords

Secondary structure determination, structure prediction, hybrid methods in structural biology, structure quality validation, molecular visualization, structural databases, molecular docking, force fields, molecular dynamics, structural bioinformatics.

Position of the course

This course will give an overview of the field of structural bioinformatics. This field studies the structure and function of proteins.
This course contributes to the following program competences: Ma.WE.BB.1.2, Ma.WE.BB.1.3, Ma.WE.BB.2.5, Ma.WE.BB.2.6

Contents

- Protein sequence alignments, homology, classification, protein families.
- Structure superposition and comprison.
- Prediction of three-dimensional protein structure
  - Homology modeling
  - Fold recognition
  - Ab initio
- Quality of protein structures
  - Quality indicators of experimentally determined macromolecular structures via X-ray crystallography, electron-microscopy, NMR etc.)
  - Quality control of structures and Errors in protein structures
- Secondary structure prediction
  - Secondary structure preferences of amino acids
  - First, second and third generation algorithms
  - Transmembrane helix prediction
- Integrateive methods in structural biology
- Structural databases
- Introduction to molecular docking and dynamics

Initial competences

Basic knowledge of molecular biology
Basic knowledge of bioinformatics
Basic knowledge of structural biology is a plus

Final competences

1. Have a perspective of the largest research domains in structural bioinformatics and the problems that pose themselves.
2. Have insight in the concepts used by the different algorithms in structural bioinformatics.
3. To be able to identify and apply appropriate online tools, software, and approaches to analyze protein structures and sequences towards research in biochemistry, biotechnology, and structural biology.

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

Study material

Type: Slides

Name: Lecture materials'
Indicative price: Free or paid by faculty
Optional: no
Additional information: Lecture materials via UFORA Online resources and software Lecture recordings

References

Course content-related study coaching

Weekly office-hour

Assessment moments

continuous assessment

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

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

Examination methods in case of permanent assessment

Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible

Extra information on the examination methods

The exam will assume a 'take-home' format.
The exam will be completed independently by each student against a specified deadline and will be submitted online according to specified instructions and format.

Calculation of the examination mark

Evaluation methods: Assignment 100%