GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2024-2025

Bioinformatics (I002610)

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

Credits 5.0 **Study time 150 h**

Course offerings in academic year 2025-2026

A (semester 1) English Gent

Lecturers in academic year 2025-2026

Van Criekinge, Wim LA26 lecturer-in-charge

Offered in the following programmes in 2025-2026	crdts	offering
Master of Science in Bioscience Engineering: Cell and Gene Biotechnology	5	A
Exchange Programme in Bioscience Engineering: Cell and Gene Biotechnology (master's level)	5	A

Teaching languages

English

Keywords

Algorithms for sequence analysis, gene structure and function prediction, phylogenetics, hidden Markov models, biological databases

Position of the course

This course on bio-informatics focuses on the algorithmic and computational aspects of biological datamanagement and -exploitation. It complements the students mathematical and computational background and lays the foundation for the bio-informatician.

Contents

The contents of bio-informatics courses at foreign universities is extremely variable. Considering the background of the bio-engineer student, the following elements are essential for this course:

1. Databases: types, querying, design, internet-aspects, existing biological databases
2. Computational molecular biology:
2.1. String and sequence algorithms: similarity of sequences, (multiple) alignments, sequence assembly
2.2. Tree algorithms: phylogenetic trees, parsimony, consensus trees
2.3. Graph algorithms: interval graphs, physical mapping
3. Probability and statistics: hidden Markov models, clustering
4. Biological applications: gene discovery, structure prediction, function prediction

These elements will be combined in a consistent manner, with a balance between the mathematical, computational aspects and their biological relevance.

The exercises will familiarize the student with the algorithms with the help of pen and paper and by own implementation (e.g. in Perl). The exercises will also show how to use and evaluate some of the many available bio-informatics tools on the internet.

Initial competences

Mathematics and computer science courses on Bachelor level.

Final competences

1 Clear understanding of what Bioinformatics is
2 A working knowledge of biological databases
3 Knowledge in algorithms used in sequence manipulations (alignement, assembly and pattern recognition)
4 Understanding of protein modeling and phylogeny
5 Understanding in how bioinformatics can be applied in white, green, blue and red biotechnology

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, Independent work

Extra information on the teaching methods

Theory: oral lectures
Exercises: computer and paper exercises

Study material

None

References

On-line forum (http://www.bioinformatics.be)

Course content-related study coaching

On-line forum (http://www.bioinformatics.be)

Assessment moments

end-of-term assessment

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

Oral assessment

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

Oral assessment

Examination methods in case of permanent assessment

Possibilities of retake in case of permanent assessment

not applicable

Extra information on the examination methods

Theory: period aligned evaluation (50%)
Exercises: period aligned evaluation (50%)
Theory: oral (closed book) examination
Exercises: written/computer (open book) examination

Calculation of the examination mark

Theory: period aligned evaluation (50%)
Exercises: period aligned evaluation (50%)
Students who eschew period aligned and/or non-period aligned evaluations for this course unit may be failed by the examiner.