

## Bioinformatics (I002610)

**Cursusomvang** *(nominale waarden; effectieve waarden kunnen verschillen per opleiding)*

**Studiepunten 5.0** **Studietijd 150 u**

**Aanbodsessies in academiejaar 2023-2024**

A (semester 1) Engels Gent

**Lesgevers in academiejaar 2023-2024**

Van Criekinge, Wim LA26 Verantwoordelijk lesgever

**Aangeboden in onderstaande opleidingen in 2023-2024**

	stptn	aanbodsessie
<a href="#">Master of Science in Bioscience Engineering: Cell and Gene Biotechnology</a>	5	A
<a href="#">Uitwisselingsprogramma bio-ingenieurswetenschappen: cel- en genbiotechnologie (niveau master-na-bachelor)</a>	5	A

### Onderwijstalen

Engels

### Trefwoorden

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

### Situering

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.

### Inhoud

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.

### Begincompetenties

Mathematics and computer science courses on Bachelor level.

### Eindcompetenties

- 1 Clear understanding of what Bioinformatics is
- 2 A working knowledge of biological databases
- 3 Knowledge in algorithms used in sequence manipulations (alignment, 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

#### **Creditcontractvoorwaarde**

Toelating tot dit opleidingsonderdeel via creditcontract is mogelijk mits gunstige beoordeling van de competenties

#### **Examencontractvoorwaarde**

Dit opleidingsonderdeel kan niet via examencontract gevolgd worden

#### **Didactische werkvormen**

Werkcollege, Hoorcollege, Zelfstandig werk

#### **Toelichtingen bij de didactische werkvormen**

Theory: oral lectures

Exercises: computer and paper exercises

#### **Leermateriaal**

A syllabus is available. On-line forum (<http://www.bioinformatics.be>).

#### **Referenties**

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

#### **Vakinhoudelijke studiebegeleiding**

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

#### **Evaluatiemomenten**

periodegebonden evaluatie

#### **Evaluatievormen bij periodegebonden evaluatie in de eerste examenperiode**

Mondelinge evaluatie

#### **Evaluatievormen bij periodegebonden evaluatie in de tweede examenperiode**

Mondelinge evaluatie

#### **Evaluatievormen bij niet-periodegebonden evaluatie**

#### **Tweede examenkans in geval van niet-periodegebonden evaluatie**

Niet van toepassing

#### **Toelichtingen bij de evaluatievormen**

Theory: period aligned evaluation (50%)

Exercises: period aligned evaluation (50%)

Theory: oral (closed book) examination

Exercises: written/computer (open book) examination

#### **Eindscoreberekening**

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.