

## Comparative Genomics (C002700)

**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 2)	English	Gent	lecture seminar
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**Lecturers in academic year 2024-2025**

Vandepoele, Klaas	WE09	lecturer-in-charge
Li, Zhen	WE09	co-lecturer

**Offered in the following programmes in 2024-2025**

	<b>crdts</b>	<b>offering</b>
<a href="#">Master of Science in Teaching in Science and Technology(main subject Biochemistry and Biotechnology)</a>	3	A
<a href="#">Master of Science in Biochemistry and Biotechnology</a>	3	A
<a href="#">Exchange programme in Biochemistry and Biotechnology (master's level)</a>	3	A

**Teaching languages**

English

**Keywords**

Genomes, Evolution, Sequence analysis, Homology.

**Position of the course**

This course shows how basic bioinformatics techniques can be applied to solve complex biological questions regarding genome structure, gene regulation and evolution. This course gives an overview of some data resources publicly available for different eukaryotic species and demonstrates the application of different methods (e.g. sequence analysis, phylogenetic tree construction) to analyze the structure and evolution of genomes in more detail. This course also includes an introduction to comparative gene expression analysis.

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**

- (Genome-wide) Sequence retrieval and resources for comparative genomics
- Homology, orthology & paralogy detection (BLAST, Multiple Sequence Alignments, protein clustering, phylogeny)
- Non-coding sequence evolution (local/global pairwise/multiple alignment tools, Conserved Noncoding Sequences, TFBS identification)
- Genome organization, evolution (colinearity, synteny) and phylogenetic dating of duplication events
- Comparative gene expression analysis
- Case studies

**Initial competences**

Basic knowledge genetics & molecular biology (genomes, genes, proteins, DNA, RNA, promoter). You successfully followed a course Introduction to Bioinformatics.

**Final competences**

- 1 Application of basic comparative genomics techniques to retrieve and manipulate genomic sequence data.
- 2 Extracting computational research protocols from scientific publications.
- 3 Developing basic computational pipelines to answer specific biological questions

regarding gene/genome structure and evolution.

**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: Handouts

Name: Handouts

Indicative price: Free or paid by faculty

Optional: no

Language : English

Additional information: All information is available in the online free course material. Additional scientific publications are also shared.

**References****Course content-related study coaching**

In addition to the lectures the student can ask questions or additional information (e-mail or personal appointment).

**Assessment moments**

end-of-term assessment

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

Written assessment with open-ended questions

**Examination methods in case of periodic assessment during the second examination period****Examination methods in case of permanent assessment****Possibilities of retake in case of permanent assessment**

not applicable

**Extra information on the examination methods**

Attendance practical sessions obliged.

**Calculation of the examination mark**

Written exam. Attendance to the practical sessions obliged.