



# Exchange programme Vrije Universiteit Amsterdam

Vrije Universiteit Amsterdam - Exchange programme Vrije Universiteit Amsterdam - 2024-2025

## Exchange

Vrije Universiteit Amsterdam offers many English-taught courses in a variety of subjects, ranging from arts & culture and social sciences, neurosciences and computer science, to economics and business administration.

The International Office is responsible for course approval and course registration for exchange students. For details about course registration, requirements, credits, semesters and so on, please [visit the exchange programmes webpages](#).

# Principles of Bioinformatics

Course Code	X_401094
Credits	6
Period	P3
Course Level	300
Language Of Tuition	English
Faculty	Faculty of Science
Course Coordinator	dr. E. Bosdriesz
Examiner	dr. E. Bosdriesz
Teaching Staff	dr. J.M. Urtasun Elizari, dr. Q. Peng MSc, prof. dr. J. Heringa, dr. Q. Peng MSc, dr. E. Bosdriesz, dr. ir. K.A. Feenstra
Teaching method(s)	Lecture, Computer lab, Practical

## Course Objective

Are you interested in bioinformatics? Would you like to know how huge amounts of data can be analyzed in order to discover new biology? Would you like to solve open questions in scientific research? This course is open for any Bachelor student in a Science Degree (including Biology or Biochemistry).

Principles of Bioinformatics is the concluding course for the minor Bioinformatics and Systems Biology. The lectures provide a comprehensive overview of key topics in the field. In practical sessions, you'll work on a bioinformatics benchmark, gaining hands-on experience with current algorithms and uncovering areas for further advancement in this rapidly evolving research field

## Learning goals

The student:

- is aware of the major issues, methodology, data resources, and available algorithms in bioinformatics. [Knowledge and understanding]
- can collaborate on a project in a group of diverse backgrounds. [Communication]
- gains hands-on experience in scripting and handling basic mathematical equations as a means of solving bioinformatics problems. [Applying and understanding]
- Ask questions about something that is unclear. [Communication]
- Knows what biological databases contain and how to use them. [Applying and understanding]
- Understands and can explain what a bioinformatics methods benchmark is and why it is relevant. [Knowledge and understanding]

## Course Content

The following topics are covered:

- Evolutionary profiles
- Data resources in for the Life Sciences, including the Gene Ontology Database (GO)
- Homology Searching ( BLAST / PSI-BLAST )
- Genomics, Massively Parallel Sequencing (MPS)
- Benchmarking
- Computational Analysis of Genome Sequencing (Genome Assembly)
- Differential gene expression
- Clustering, machine learning and pattern recognition

There are practical sessions that aim to show you existing solutions within the field of Bioinformatics. In the practicals you will use existing databases and (web-server) solutions to solve biological problems. You will also use python scripts to automate queries to databases and web servers to investigate the value of current Bioinformatics Algorithms.

Practical work:

One individual assignment:

- Homology searching

One group assignment in Python including:

- Running (PSI-)BLAST in Python, using the GO database, creating a ROC plot

## Additional Information Teaching Methods

- 6 lectures together with 'Introduction to Bioinformatics' (2 hours per lecture)
- 2 lectures specific to 'Principles of Bioinformatics'
- 6 group practical sessions (two hour sessions), partially supervised.
- 1 small assignment of which one together with 'Introduction to Bioinformatics'.

## Method of Assessment

- [pass/fail] One individual assignment
- [~10%] One individual assignment
- [~40%] Group assignment consisting of three graded parts
- [~50%] Digital exam to assess: lecture topics

You are allowed to resit one part of the course if that makes you able to pass the course. The resit will be either oral or written after the end of the course.

## Literature

- Course material (slides, scientific papers) on canvas

## Additional Information Target Audience

This course is available for students in the minor 'Bioinformatics and Systems Biology' and students from the major Biomedical Mathematics.

## Additional Information

This course is part of the Minor Bioinformatics and Systems Biology. Most of the lectures of this course will be given together with the BSc course "Introduction to Bioinformatics".

## Recommended background knowledge

Programming in Python, Molecular Biology.  
An interest in programming and biological problems.