

QBio204: Algorithmic Bioinformatics

Module Responsible:

Prof. Dr. Gunnar Klau

Version:

02/01/2021

Module Organizer:

Prof. Dr. Gunnar Klau

Type:

Compulsory

Lecturer:

Prof. Dr. Gunnar Klau, Dr. Ruben Garrido-Oter, Dr. Alissandra Denton

Total Working Time

180 h

Credit Points

6 CP

Contact Time

60 h

Self Study

120 h

Duration

1 Semester

Course Components

Lecture: 2 SWS

Exercise: 2 SWS

Group Size

P: 40

P: 20

Frequency

Every Summer Semester

Learning Competencies:

After this course, students will be able to

- apply basic algorithmic design principles, prove correctness and analyze running times
- differentiate between tractable and intractable algorithmic problems and understand the consequences
- distinguish different classes of algorithms
- understand and apply classic bioinformatics algorithms
- implement many of these algorithms in the programming language Python;
- select an appropriate algorithm to solve a given task.

Content:

- Algorithms and Complexity
- Exhaustive Search: DNA Motifs
- Greedy Algorithms: Genome Rearrangements
- Dynamic Programming: Sequence Alignment
- Graph Algorithms: Sequencing
- Combinatorial Pattern Matching: Suffix Trees
- Phylogenetic Trees and Molecular Evolution

Conditions of Participation:

Passed Module QBio104 and QBio103

Examination:

Learning portfolio consisting of

- Written exams based on the content of the lectures (50% of the final grade)
- Exercises (50% of the final grade)

Prerequisites for Awarding Credits for this Module:

- Passing Exercises (50 % of Exercise Sheets)
- Passing Written Exam

Factor for the Overall Grade:

The grade is weighted according to the credit points (CP) in the overall grade.

Language:

English

Literature:

Neil C. Jones, Pavel A. Pevzner: An Introduction to Bioinformatics Algorithms. The MIT Press, 2004.

Further Information: