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# Master's program in bioinformatics at Aarhus University

This document provides an overview of the key classes of the Master's program in bioinformatics at Aarhus University, and how to combine them into recommended study programs.

See http://kandidat.au.dk/en/bioinformatics/ for overall info about the Master's program in bioinformatics at Aarhus University.

See http://kursuskatalog.au.dk/en/for course descriptions of individual classes offered at Aarhus University, including the classes in bioinformatics program.

## Classes and areas of specialization

The main classes of in the bioinformatics program are organized into three areas that each consists of three classes of 10 ECTS. The areas reflect that bioinformatics is about developing and applying statistical models, algorithms, and computer programs for handling and analysis of biological and biomedical data.

| Area | Class | |
|---|---|---|
| **Algorithms and Programming** | Computational Thinking in Bioinformatics | CTiB |
| | Algorithms in Bioinformatics | AiB |
| | Elective | |
| **Machine Learning and Data Science** | Data Science in Bioinformatics | DSiB |
| | Statistical & Machine Learning in Bioinformatics | SMLiB |
| | Elective | |
| **Molecular Evolution and Genomics** | Evolutionary Thinking | ET |
| | Genomic Thinking | GT |
| | Elective | |

Elective class can e.g. be.

| Class | | Comments |
|---|---|---|
| Projects in Bioinformatics | PiB | Individual 5 or 10 ECTS project |
| Analysis of GWAS Data with a Focus on Prediction of Complex Phenotypes | GWAS | 5 ECTS class AU Summer University. |
| Next-Generation Sequencing | NGS | 5 ECTS class AU Summer University. |
| High-Performance Computing for Data Analysis | HPC | 5 ECTS elective class |
| Advanced Topics in Genomics | ATiG | 10 ECTS elective class |
| Topics in Bioinformatics | TiBC | 10 ECTS elective class |
| Machine Learning | ML | 10 ECTS elective class (CS) |
| Data Visualization | DV | 10 ECTS elective class (CS) |
| Deep Learning for Visual Recognition | DLVR | 10 ECTS elective class (CS) |

Students are also allowed to follow relevant classes from other Master's programs at Aarhus University.

## Recommended Study Programs

A student admitted into the bioinformatics program will have basic skills in (1) mathematics and statistics, and basic skills in either (2a) biological sciences, or (2b) computer science, reflecting that the student's Bachelor's degree can be in a biological, or computational/mathematical oriented discipline.

A student in the bioinformatics program must:

- Follow the **at least 20 ECTS of two areas of specialization**. All students admitted into the bioinformatics program can follow the classes in the Data area, and depending on whether the student has a background in a biological or computational/mathematical discipline, the student can follow the classes in either the Bio or Alg area.

- Follow the class **Computational Thinking in Bioinformatics** (CTiB), if the student has a background in a biological discipline, or the class **Evolutionary Thinking** (ET), if the student has a background in a computational/ mathematical discipline.

- Follow **up to 40 ECTS of elective classes**, e.g. the last in their areas of specialization, or the initial class in other areas of specialization.

- Make an individual **Project in Bioinformatics** (PiB), which can be either 5 or 10 ECTS depending on whether the student follows e.g. the class Next-Generation Sequencing.

- Make a **30 ECTS Master's thesis**.

This can e.g. yield the following recommended study programs:

**Study Program:**

| Semester | Area / Alg | Area / Data | Area / Bio |
|---|---|---|---|
| 1 | CTiB | DSiB | ET |
| 2 | AiB | SMLiB | GT |
| 3 | PiB | Elective (TiBC) | Elective (ATiG) |
| 4 | Thesis | | |