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INTERNATIONAL PROGRAMMES

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Master's degree

Master of Science in Bioinformatics

Freie Universität Berlin • Berlin

Overview

Degree	Master of Science in Bioinformatics
In cooperation with	Joint programme of the Berlin University Alliance offered by Freie Universität and Charité – Universitätsmedizin. In cooperation with: • Max-Planck-Institut für molekulare Genetik (MPIMG) • Zuse-Institut Berlin (ZIB) • Max-Delbrück-Centrum für molekulare Medizin (MDC) • Robert Koch-Institut (RKI) • Leibniz-Institut für Gewässerökologie und Binnenfischerei (IGB)
Teaching language	• English
Languages	Courses are held in English.
Programme duration	4 semesters
Beginning	Winter semester
Application deadline	Applications for our Master's programme in Bioinformatics (consecutive Master's programme) are usually accepted from **mid of April until end of May** each year. The dates may change. Please find more information here.
Tuition fees per semester in EUR	None
Combined Master's degree / PhD programme	No
Joint degree / double degree programme	No
Description/content	Bioinformatics research in medicine and the life sciences is increasingly based on analysis and interpretation of biological mass data. The use of computers, combined with accurate mathematical models and efficient algorithms, is indispensable in this process. Building on the knowledge gained in a Bachelor's degree programme in bioinformatics, this programme offers advanced education in the corresponding subfields of mathematics, computer science, biology, and translational bioinformatics. The programme is jointly conducted by the Department of Mathematics and Computer Science, the Department of Biology, Chemistry and Pharmacy and the Charité Medical School. It offers both in-depth theoretical courses and applied training in bioinformatics. This gives students the necessary knowledge and skills to identify relevant biological issues, develop appropriate mathematical or computational solutions to

approach them, and interpret the results correctly in a biological or biomedical context.

The following **focus areas** are offered to students:

Complex Systems
Advanced techniques for modelling, simulation, and analysis of complex networks and dynamic processes pave the way for understanding systems ranging from molecular interaction networks to ecosystems.

Data Science
This specialisation puts the data in the centre. State-of-the-art analysis and knowledge extraction techniques from modern statistics and machine learning will be explored and applied to realistic data sets. Consequences of the data generation process and topics pertaining to big data will also be considered.

Advanced Algorithms
The emphasis lies on advanced algorithms for bioinformatics analyses. This includes methods to generate search indices for very large sequencing data, efficient protein and RNA analysis, and the necessary computer science foundations to analyse and develop novel and efficient algorithms.

Course Details

Course organisation	**Basic studies (30 credit points = CP)**

Three basic modules, 6 CP each, must be done within the first semester. All three modules consist of a lecture and an exercise/tutorial. These modules strengthen and deepen the methodological basics and prepare the students for the focus areas and optional courses.

- **Foundations in Computer Science**
- **Foundations in Mathematics and Statistics**
- **Foundations in Bio-Medicine**

In addition, there is an introductory module provided (12 CP). This introductory module consists of a lecture series and a seminar:

- **Introduction to Focus Areas:** This introduces three profile areas (Advanced Algorithms, Complex Systems and Data Science) and should support the basis of decision-making for the student's own profile area.

Profile area (30 CP)

Starting in the second semester, students choose a profile area. Each profile area consists of the following:

- one **Focus Area (15 CP)**
- Module: **Research Internship (10 CP)**
- Module: **Ethics and Policy Questions (5 CP)**

The following modules are compulsory in the respective focus area:

- **Complex Systems:** Module: Complex Systems in Bioinformatics (10 CP); Module: Complex Systems in Biomedical Applications (5 CP)
- **Data Science:** Module: Data Science in the Life Sciences (15 CP)
- **Advanced Algorithms:** Module: Advanced Algorithms for Bioinformatics (10 CP); Module: Methods in Life Sciences (5 CP)

Elective area (30 CP)

In the elective area, profile modules and elective modules are offered. Modules from the **list of optional modules** can be chosen freely with the following restrictions:

- Profile modules of at least 10 LP from the chosen profile area (Focus Area) must be

completed.

- At least one V-module must be chosen and completed.
- At least one practical module must be selected and completed.

Master's thesis with accompanying colloquium (30 CP)

The Master's thesis is usually written in the fourth semester. The processing time is 23 weeks. During this time, the students should give a 30-minute presentation on the progress of their work.

The **Online Studies Selection Guide (OSA) for the Bioinformatics Master's programme** gives a comprehensive insight into the study programme.

Further information can also be found on the **programme website**.

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A Diploma supplement will be issued	Yes
Integrated internships	No additional internship is necessary.
Course-specific, integrated German language courses	No
Course-specific, integrated English language courses	No

Costs / Funding

Tuition fees per semester in EUR	None
Semester contribution	In total, the semester contribution amounts to 312.89 EUR. It includes a fee of 198.80 EUR for the transportation ticket contribution. This allows you to use public transportation in Berlin for free. Other costs covered by the semester contribution include a 50 EUR enrolment fee, a 54.09 EUR semester contribution to the student support service ("studierendenWERK Berlin"), and a 10 EUR contribution to the student union.
Costs of living	Compared to other European countries, the cost of living in Germany is quite reasonable. However, the cost of living has also risen somewhat in Germany in recent years. The prices for food, accommodation, clothing, cultural events, etc. are slightly above the EU average. You will need around 950 to 1,200 EUR each month to cover your living expenses. The biggest expense is monthly rent, which is between 400 and 700 EUR in Berlin.
Funding opportunities within the university	No

Requirements / Registration

Academic admission requirements	**Summary of the Admission Regulations**

Detailed information for prospective students can be found here

First Degree
You need to have a university degree (Bachelor's or equivalent), either from Germany or an equivalent foreign degree, in a higher education programme comprising at least six semesters that qualifies to practice a profession.

Computer Science, Bioinformatics & Programming Skills (25 CP)
You need at least 25 credits in computer science modules. Out of these, at least 10 credits need to be in modules in which you acquired knowledge in an **imperative programming language**, such as C/C++, Java or Python, and at least 10 credits in the area of **algorithms**.

Mathematics/Statistics (25 CP)
You need at least 25 credits in mathematical modules. Out of these, at least 10 credits need to be in the area of **linear algebra or analysis** and at least 10 credits in the area of **statistics**.

Biology/Chemistry/Biochemistry (25 CP)
You need at least 25 credits in this area. Out of these, at least 10 credits need to be in the area of **biochemistry, molecular biology and genetics**

If you are an applicant who has not received the university degree in Germany, you should apply to Freie Universität Berlin via uni-assist. Uni-assist will check your documents and forward them to the respective university. Before you apply, please read our homepage concerning application procedures, admission requirements and fees. http://www.fu-berlin.de/en/studium/bewerbung/master/index.html and http://www.fu-berlin.de/en/studium/international/studium_fu/index.html

For all inquiries about the application process, admission, enrolment, orientation at Freie Universität Berlin, etc., please contact the Student Services Centre: Info-Service@fu-berlin.de

Student Services Center

Language requirements	Proof of English language skills (level B2 CEFR or equivalent) is required.
Application deadline	Applications for our Master's programme in Bioinformatics (consecutive Master's programme) are usually accepted from **mid of April until end of May** each year. The dates may change. Please find more information here.
Submit application to	Freie Universität Berlin c/o uni-assist e.V. 11507 Berlin Germany

Services

Possibility of finding part-time employment	There are many ways of earning money while you study, for example as waiting staff, academic assistants, or private tutors. Knowledge of German will improve your chances of finding a part-time job, but it isn't necessarily required. However, it is important to be aware of the legal regulations. The student support service at the university, called studierendenWERK Berlin, and the local representative of the "Bundesagentur für Arbeit" (Federal Employment Agency) can provide information about jobs for students. When searching for a job, look at online job boards, ads in local newspapers, and notice boards on campus.

Accommodation	You have the option to stay in a public/private student dormitory or in a private (shared) apartment. Student dormitories are not administrated by the university itself, so Freie Universität Berlin does not have any on-campus housing. However, it works together with "studierendenWERK Berlin" regarding student accommodation.
	If you do not wish to stay in a student dormitory, you can try to find a room or an apartment on the private housing market. Many students in Berlin live in shared apartments ("WGs"). You can find these offers online (e.g. WG-gesucht or Craigslist) or on notice boards on campus.
	Available rooms/apartments near the university are rare. Therefore, students mostly commute from other parts of the city. The commute via public transportation usually takes between 30 minutes and an hour, which is considered a normal travel time in Berlin due to the city's size.

Contact

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Fachbereich Mathematik und Informatik

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