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Master of Science in Bioinformatics • Freie Universität Berlin • Berlin .............................................................. 2
# Master's degree

## Master of Science in Bioinformatics

**Freie Universität Berlin • Berlin**

## Overview

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<th>Degree</th>
<th>Master of Science in Bioinformatics</th>
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<tbody>
<tr>
<td>In cooperation with</td>
<td>Jointly conducted with Charité – Universitätsmedizin Berlin. In cooperation with:</td>
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<tr>
<td></td>
<td>- Berlin Leibniz-Institut für Gewässerökologie und Binnenfischerei (IGB)</td>
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<tr>
<td></td>
<td>- Max-Planck-Institut für molekulare Genetik (MPIMG)</td>
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<td></td>
<td>- Zuse-Institut Berlin (ZIB)</td>
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<tr>
<td></td>
<td>- Max-Delbrück-Centrum für molekulare Medizin (MDC)</td>
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<tr>
<td></td>
<td>- Robert Koch-Institut (RKI)</td>
</tr>
<tr>
<td>Teaching language</td>
<td>- English</td>
</tr>
<tr>
<td>Languages</td>
<td>Courses are held in English.</td>
</tr>
<tr>
<td>Programme duration</td>
<td>4 semesters</td>
</tr>
<tr>
<td>Beginning</td>
<td>Winter semester</td>
</tr>
<tr>
<td>More information on beginning of studies</td>
<td>October</td>
</tr>
<tr>
<td>Application deadline</td>
<td>31 May for the following winter semester</td>
</tr>
<tr>
<td>Tuition fees per semester in EUR</td>
<td>None</td>
</tr>
<tr>
<td>Combined Master's degree / PhD programme</td>
<td>No</td>
</tr>
<tr>
<td>Joint degree / double degree programme</td>
<td>No</td>
</tr>
<tr>
<td>Description/content</td>
<td>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</td>
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</table>
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.

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### Course Details

#### Course organisation

**Fundamental study portion (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 Biomedicine

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 students own profile area.

**Profile study portion (45 CP)**

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

- one **Focus Area (30 CP)**
- Module: **Research Internship (10 CP)**
- Module: **Ethics and Policy Questions (5 CP)**

The Focus Areas are again divided into a mandatory area (15 CP) and a required elective area (15 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)

In the required elective area (15 CP) modules from the list of optional modules can be completed, provided that they are assigned to the chosen specialisation.

Besides lectures, exercises and seminars, practical courses/lab seminars are also offered. This provides a direct insight into applied research.

Supplementary area (15 CP)

In the supplementary area comprising 15 credits, students can choose from all modules from the mandatory and required elective areas in the other two profile areas that were not chosen.

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.

<table>
<thead>
<tr>
<th>Types of assessment</th>
<th>Module exams are written or oral exams/presentations. Seminar presentation, reports on practical courses as well as writing and presentation of the Master’s thesis are further forms of assessment.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Diploma supplement will be issued</td>
<td>Yes</td>
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<tr>
<td>Integrated internships</td>
<td>No additional internship is necessary.</td>
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<tr>
<td>Course-specific, integrated German language courses</td>
<td>No</td>
</tr>
<tr>
<td>Course-specific, integrated English language courses</td>
<td>No</td>
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</tbody>
</table>

**Costs / Funding**

<table>
<thead>
<tr>
<th>Tuition fees per semester in EUR</th>
<th>None</th>
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<tbody>
<tr>
<td>Semester contribution</td>
<td>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 are a 50 EUR enrolment fee, a 54.09 EUR semester contribution to the student support service (&quot;studierenwerkenwerk Berlin&quot;), a 8.80 EUR contribution to the student union and a 1.20 EUR contribution to the Semester Ticket office.</td>
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<tr>
<td>Costs of living</td>
<td>Compared to other European countries, the cost of living in Germany is quite reasonable. The prices for food, accommodation, clothing, cultural events, etc. are basically in line with the EU average. You will need around 900 EUR each month to cover your living expenses. The largest</td>
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Requirements / Registration

Academic admission requirements

Summary of the Admission Regulations
(All information is subject to confirmation by the Senate Administration of Berlin.)

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


Language requirements

Proof of English language skills (level B2 CEFR or equivalent) is required.

Application deadline

31 May for the following winter semester

Submit application to

Freie Universität Berlin
c/o uni-assist e.V.
11507 Berlin
Germany
Possibility of finding part-time employment

There are many ways to earn money while you study. For example, you can work as a waiter, academic assistant or private tutor. Knowledge of German will improve your chances of finding a part-time job. Please be aware of the legal regulations.

Student services at the universities and the local representative of the "Bundesagentur für Arbeit" (Federal Employment Agency) can provide information about jobs for students. When searching, look at online job boards, adverts 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., studenten-wg.de or wg-gesucht.de), in various Berlin magazines, or on notice boards. Rooms/apartments around the university are rare. Therefore, students mostly commute from other parts of the city. The duration of the commute on public transport typically ranges from 30 minutes to one hour.

Contact

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Fachbereich Mathematik und Informatik

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Ulrike Seyferth

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Email

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www.daad.de  

GATE-Germany  
Consortium for International Higher Education Marketing  
www.gate-germany.de  

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