

# MASTER OF SCIENCE IN BIOINFORMATICS (ENGINEERING)

120 ECTS CREDITS - LANGUAGE: ENGLISH

## INHOUD

Recent technological advances have dramatically changed our view on life science research and have turned biology in a data-driven science. It is in this context that bioinformatics, a booming interdisciplinary field, has evolved from a new research domain to a basic discipline in only 15 years. Bioinformatics aims at gaining a better and preferentially more quantitative molecular understanding of cellular processes by integrating and modeling large amounts of molecular data.

Therefore, if ...

- you like problem solving through data analysis and data mining,
  - you are intrigued by understanding and modeling complex biological processes,
  - you want to make biological discoveries by decoding big data,
  - you like working in an interdisciplinary environment,
- ... then bioinformatics is something for you.

As a bioinformatician you will become an interdisciplinary scientist or engineer who can develop or use state-of-the-art statistical and computer science techniques to mine molecular data in order to answer fundamental or applied biological and biomedical questions. Ghent University offers an interfaculty Master of Science in Bioinformatics programme, which - depending on the chosen track - can result in an Engineering or Bioscience Engineering degree. The programme

- offers a track tuned toward your specific interests and background that prepares you for different job profiles in the bioinformatics domain (respectively bioinformatics scientist and bioinformatics engineer);
- offers both theoretical deepening and data analytical/problem solving skills;
- is embedded in a strong bioinformatics and biotechnology research environment, located at the Faculty of Sciences, Medicine, Bioscience Engineering and Engineering and Architecture and is affiliated with the VIB and IMEC.

### Master of Science in Bioinformatics: Engineering

With a bachelor degree in Engineering or Computer Science, you have the optimal background to become a bioinformatics engineer.

As bioinformatics engineer, you are skilled in developing new algorithms and complex software implementations, primarily focusing on, but equally applicable outside the bioinformatics domain. You will follow a module of 'biologically oriented' courses (9 credits) that will provide you with the basic domain knowledge to understand a data-driven biological problem. However, the major part of your curriculum (engineering module of 42 credits) will focus on advanced engineering and computer science techniques that elaborate on an already advanced knowledge obtained

during your bachelor. The applied bioinformatics module (33 credits) will make you familiar with the data specificities of the bioinformatics domain (preprocessing techniques, noise and potential biases, assumptions etc.) and allow you to acquire the essential interdisciplinary skill set that is needed to be successful in modern science and engineering. The master thesis corresponds to 30 credits and focuses on a research topic. Within your programme, you have the opportunity to do an internship in order to become familiar with the role and expectations of a bioinformatics engineer in the industry or a governmental institution.

## STRUCTUUR

### ARBEIDSMARKT

Technological advances have turned biology in a data-driven science. The avalanche of molecular data enables key discoveries in biology, ecology and molecular evolution, drives innovation in biotech and pharma industry and supports medical and governmental decision making. However, the power of using these data for innovation depends on interdisciplinary skills to analyse, integrate and interpret the data. There is thus an urgent need for bioinformatics scientists and engineers with an interdisciplinary mind set. Currently a large discrepancy exists between the exponential increase of biological data (28% each year) and the number of newly educated bioinformaticians (increase of only 5,8%) who typically find a job in agro, biotech and pharma industry, in research and governmental institutes, and in genetic centra and hospitals. Because of their interdisciplinary and analytical skill sets bioinformaticians also find their way in consultancy, in spin offs and in data analytics.

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## TOELATINGSVOORWAARDEN VOOR HOUDERS VAN EEN VLAAMS DIPLOMA

### 1 Rechtstreeks:

- Bachelor in de computerwetenschappen
- Bachelor in de informatica
- Bachelor in de ingenieurswetenschappen, afstudeerrichting: computerwetenschappen
- Bachelor in de ingenieurswetenschappen: computerwetenschappen

### 2 Na het met succes voltooien van een voorbereidingsprogramma:

#### 60 SP

- Bachelor in de biochemie en de biotechnologie
- Een diploma van een opleiding 'Bachelor of Science in de bio-ingenieurswetenschappen'

#### aantal studiepunten te bepalen door de faculteit

- Een diploma van een opleiding 'Bachelor of Science in de ingenieurswetenschappen' (met inbegrip van 'architectuur')

### 3 Op voorwaarde van toelating door de inrichtende faculteit: na het met succes voltooien van een voorbereidingsprogramma:

#### 60 SP

- Bachelor in de wiskunde, op voorwaarde dat het curriculum van de student een minor biowetenschappen of een minor informatica omvat.

### 4 Rechtstreekse toelating voor het volgen van een brugprogramma (horizontale instroom):

#### a opleidingen nieuwe structuur:

- Master in de industriële wetenschappen: elektronica en ICT: multimedia en informatietechnologie
- Master in de industriële wetenschappen: elektronica en ICT: ICT
- Master in de industriële wetenschappen: elektronica-ICT, afstudeerrichting: ingebedde systemen
- Master in de industriële wetenschappen: informatica
- Master of Electronics and ICT Engineering Technology

#### b opleidingen oude structuur:

- Industrieel ingenieur in elektronica, optie informatie- en communicatietechnieken
- Industrieel ingenieur in informatica

Information on admission requirements and the administrative procedure for admission on the basis of a diploma obtained abroad, can be found on the following page: [www.ugent.be/admission](http://www.ugent.be/admission)

#### Additional information:

Diploma equivalence of international bachelor's degree students will be checked by the OC on the base of their individual dossier.

## LANGUAGE REQUIREMENTS

Language requirements Dutch: no language requirements  
English: CEFR level B2

The language requirements for this study programme can be found on: [www.ugent.be/languagerequirements](http://www.ugent.be/languagerequirements)

## PRACTICAL INFORMATION

### Study programme

[studiekiezer.ugent.be/master-of-science-in-bioinformatics-engineering-en/programma](http://studiekiezer.ugent.be/master-of-science-in-bioinformatics-engineering-en/programma)

### Information sessions

#### Graduation Fair

[afstudeerbeurs.ugent/en/students/further-studies](http://afstudeerbeurs.ugent/en/students/further-studies)

### Application Deadline (for International degree students)

For students who **need a visa**: 1st of April

For students who **do not need a visa**: 1st of June

Read more

### Tuition fee

More information is to be found on: [www.ugent.be/tuitionfee](http://www.ugent.be/tuitionfee)

### Contact

Prof. dr. Kathleen Marchal  
[kathleen.marchal@intec.ugent.be](mailto:kathleen.marchal@intec.ugent.be)

### Learning path counsellor

Sanne Kiekens  
T 09 264 50 53  
[sanne.kiekens@ugent.be](mailto:sanne.kiekens@ugent.be)

## ADMISSION REQUIREMENTS FOR INTERNATIONAL DEGREE STUDENTS

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## Contact (for international degree students)

Student Administration Office

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[www.masterbioinformatics.ugent.be](http://www.masterbioinformatics.ugent.be)